

CHAPTER 4: THE DEEPWATER HORIZON OIL SPILL NATURAL RESOURCE INJURY ASSESSMENT 1

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CHAPTER 4: THE DEEPWATER HORIZON OIL SPILL NATURAL RESOURCE INJURY ASSESSMENT

The Trustees are in the process of assessing injuries caused by the Spill to natural resources and the services provided by these resources. This assessment extends from the deep ocean to the highly productive coastal habitats and estuaries along the five Gulf States, and includes a broad array of fish and shellfish species, rare deep sea corals, plankton and invertebrates that serve as prey for larger organisms, coastal vegetation, birds, sea turtles, and marine mammals. Additionally, impacts to recreational use of these resources and habitats, such as recreational fishing, boating, and other shoreline activities are also being assessed.

The Trustees have developed and implemented hundreds of scientific assessment studies focused in areas ranging from deep sea sediments, through the water column, to the nearshore and shoreline. In so doing, the Trustees have worked with technical teams including scientists from state and federal agencies, academic institutions, and BP. This cooperative approach to injury assessment is strongly encouraged by the OPA NRDA regulations, with the goal of creating a common set of data for quantifying injury in the future.

The Trustees have established websites to provide the public with access to work plans and data related to the injury assessment.¹ In addition, in April 2012 the Trustees published an NRDA status update to provide the public with an overview of the potential impacts to resources in the Gulf of Mexico ecosystem caused by the spill; it also outlined the activities undertaken by Trustees to assess the injury.²

While many of the NRDA data collection efforts have been completed, some investigations continue, many aspects of the injury determination phase are ongoing and the full extent and duration of impacts on the Gulf of Mexico resources and habitats are still being evaluated. This chapter provides an update on the injury assessment as context for the Early Restoration plans presented and proposed in later chapters of this document.

4.1 The Injury Assessment Process: Assessing Injuries in a Complex, Interconnected Ecosystem

Oil from the Spill spread over a large area of the Gulf of Mexico environment, through a variety of different pathways. Oil and gas released from the wellhead rose from the wellhead to the surface of the water and was volatilized to the atmosphere, moved with surface waters, or transported at depth (Camilli et al. 2010). Some of the oil and gas dissolved into the water, some oil was dispersed into tiny oil droplets, and some adsorbed onto particles in the water. Surface oil was transported by natural processes such as wind and waves, eventually reaching Gulf shorelines (Benton et al. 2011). An array of

¹ As NRDA work plans and data are made public, they are posted to www.doi.gov/deepwaterhorizon/adminrecord, www.gulfspillrestoration.noaa.gov, www.fws.gov/home/dhoilspill, and <http://losco-dwh.com>. Data that are made public also are available on www.geoplatform.gov/gulfresponse/

² Natural Resource Damage Assessment April 2012 Status Update for the Deepwater Horizon Oil Spill, http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/FINAL_NRDA_StatusUpdate_April2012.pdf

habitats and associated biological communities and organisms were exposed to the oil and/or gas, including, deep sea habitats such as deep water soft bottom sediments, deep water coral reefs, and mesophotic coral reefs; the offshore and nearshore water column, including nearshore habitats such as unvegetated (unconsolidated) nearshore sediment, submerged aquatic vegetation (SAV), oyster reefs, and coastal waters; and shoreline habitats such as marshes, beaches, barrier islands, and mangroves (OSAT 2010 and White et al. 2012). Oil and dispersant vapors also were present in the atmosphere in some areas.

The Gulf of Mexico ecosystem includes a complex and interconnected web of organisms (species, populations, and communities), habitats, and natural processes and functions. Consequently, natural resources may be adversely affected by oil by direct exposure or indirectly – for example, through loss of spawning and nesting habitat or reductions in prey availability caused by lost primary and secondary productivity. When natural resources are injured, cascading indirect ecological effects can also occur, including changes in ecological structure (such as increasing rates of shoreline erosion) and ecological functions (such as habitat suitability for foraging).

In designing the injury assessment, the Trustees have undertaken studies to evaluate potential Spill-related impacts on species and habitats of particular legal, management and/or ecological concern. However, because of the diversity and complexity of the Gulf of Mexico ecosystem, the vast area of the northern Gulf of Mexico that was affected by the Spill, and the practical challenges of performing scientific studies in some habitats such as the deep ocean, it is impossible to study every species, habitat, location, and ecological process that was potentially affected. Therefore, the Trustees have focused the injury assessment on representative species, habitats, and locations. In this way, the Trustees can then use the results of individual studies to make reasonable scientific inferences about natural resources that were not explicitly studied, based on an understanding of ecological relationships and processes.

Oil and/or dispersants can adversely impact natural resources and natural resource services through a variety of pathways and modes of action. Several examples are provided in the following sections of this chapter. In addition, while efforts to protect biota and habitats from oiling and/or to remove oil from the environment are necessary and critical, such cleanup or response actions can themselves cause natural resource injuries. For example, adverse impacts to habitats and/or biota can be caused by:

- Installation, maintenance, and removal of a wide range of types of physical barriers constructed to prevent oil from entering shoreline habitats;
- Manual and mechanical activities required to remove oil from shoreline and nearshore habitats, including staging areas, access areas, vehicular traffic, and other types of disturbances, in addition to cleaning and removal of oiled substrate and debris; and/or
- The release of freshwater from diversion structures to keep oil from moving into nearshore habitats.

In their assessment of natural resource injuries, the Trustees are applying a combination of field, laboratory, and numerical modeling approaches. Field studies have been performed to document environmental conditions, evaluate exposure, and assess the condition of biological resources. In some circumstances, field-based enumeration of affected biota (e.g., oiled birds) can be undertaken and used

to inform estimation of the magnitude and severity of certain types of spill impacts. However, because of the enormous spatial scale affected by the Spill, detecting changes in some natural resources by observing or counting organisms in the field can be difficult and/or impractical. The Trustees are increasing the interpretive power of their assessment by combining field studies with controlled laboratory studies designed to study the effects of oil on Gulf of Mexico biota. As appropriate, field and laboratory data are combined in mathematical computer models to enable interpretation and quantification of injuries at the broad spatial and ecological scale necessary for the NRDA.

4.2 Injuries to Natural Resources

The following subsections of this chapter provide an update for several areas of the Trustees' ongoing natural resource damage assessment, including:

- Laboratory toxicity testing;
- Deep benthic environments;
- Offshore water column fish and invertebrates;
- Sea turtles;
- Marine mammals;
- Marsh and mangrove habitat;
- Beach habitat;
- Unvegetated nearshore sediment;
- Submerged aquatic vegetation;
- Oyster reefs;
- Birds; and
- Recreational use.

The information provided in this chapter is not intended to provide a comprehensive review of the status of all assessment activities. Rather, it provides an appropriate level of background and context for consideration of the proposed Early Restoration programmatic alternatives and proposed Phase III Early Restoration projects that are the subject of the remaining chapters in this document.

4.2.1 Laboratory Toxicity Testing Program

The Trustees are undertaking a comprehensive laboratory toxicity testing program to evaluate the adverse effects of oil and dispersant on marine organisms of the Gulf of Mexico. The testing program is designed to determine the nature of toxic effects that occurred to different organisms in different habitats, the concentrations of oil and dispersant at which such effects occur, and how exposure to oil in a range of weathering states can adversely affect the viability of organisms in various stages of their life histories.

The Trustees' aquatic toxicity tests involve exposing test organisms to samples of the released oil in various states of weathering (fresh to very weathered), with and without the presence of dispersant. This process was applied to samples of contaminated sediment as well. A wide variety of representative marine and estuarine species, including fish, shellfish, and invertebrates, are being tested as part of the program. Scientists typically conduct these laboratory toxicity tests by exposing test organisms to a range of oil concentrations under controlled conditions. By conducting the tests in this way, scientists

are able to calculate the adverse effects that would be expected to occur at various oil concentrations in specific exposure conditions.

The Trustees' aquatic toxicity testing program includes studies both of the lethal effects of oil and dispersant, to determine the concentrations of oil that kill organisms, and the "sub-lethal" impacts of oil, to determine concentrations of oil that can cause significant adverse effects on the health, growth, reproduction, or general viability of organisms. For example, some of the sub-lethal effects of oil that have been documented in the Trustees' aquatic toxicity tests to date include:

- Disruptions in growth, development, and reproduction;
- Tissue damage;
- Altered cardiac development and function;
- Disruptions to the immune system;
- Biochemical and cellular alterations; and
- Changes in swimming ability and other behaviors that can adversely affect an organism's viability in the environment.

Overall, the results of the Trustees' ongoing aquatic toxicity testing program will provide a means for the Trustees to reach conclusions regarding the nature and extent of different types of adverse impacts to aquatic organisms based on observed, measured, and modeled concentrations of oil and dispersant on and in the water column, as well as in bottom sediments.

Similar to the efforts to assess the adverse effects of oil on marine and estuarine organisms, efforts are ongoing to assess the adverse effects of oil on avian species that inhabit the Gulf of Mexico. Millions of birds utilize the northern Gulf including, but not limited to, sea birds, colonial nesting birds, shorebirds, waterfowl and passerines. The Trustees are conducting laboratory toxicity tests to determine the potential adverse effects of oil from the Spill on avian species.

4.2.2 Deep Benthic Environments

Deep sea habitats are important reservoirs of biodiversity and also serve vital roles in the recycling of carbon and other building blocks for life in the sea, enabling productivity from the near bottom to surface waters of the ocean. New species and ecological relationships are regularly discovered with our increased exploration of these remote regions of the sea. This zone is characterized by little or limited light penetration and is populated by organisms adapted to cold, high-pressure, and dark conditions (Fisher et al. 2007, MacDonald and Fisher 1996). Much of the energy reaching the sea floor is provided in the form of "marine snow", which is a mixture of sediment and biological detritus that, in general, falls from the upper photic zone, through the water column, to the bottom (Grassle 1991). The deep environments under investigation pursuant to the NRDA fall into several major habitat types. These include soft bottom sediments, which make up the majority of the ocean floor in the northern Gulf of Mexico; hard bottom rocky patches that can support deep sea coral communities in depths of greater than 650 feet (200 m); and mesophotic coral reefs found at depths of about 160 – 650 feet (50 – 200 m), the deepest zone where light can penetrate.

Studying the deep ocean environment is challenging, and relatively little is known about the ecology of the organisms using these habitats. The Trustees have been working to quantify the nature and

magnitude of injuries to these unique and sensitive deep water habitats using remotely operated vehicles, autonomous underwater vehicles, and complex water and sediment sampling devices. Data and analyses available to date have documented injuries to these habitats attributable to the Spill, including but not limited to: loss and/or degradation of coral colonies in deep sea coral habitats; reduced numbers of planktivorous fish species and increased prevalence of injured corals at mesophotic reefs in the affected area compared to reference reefs that were outside the influence of the Spill; and adverse impacts to sediment-dwelling animals near the wellhead and in the direction of oil flow.

4.2.3 Offshore Water Column Fish and Invertebrates

The offshore water column of the Gulf of Mexico supports a wide variety of organisms, including numerous species of fish at different life stages (from fertilized eggs, to larvae, juveniles, and adults), as well as many species of phytoplankton, zooplankton, and bacteria (Mann and Lazier 2006 and Lyczkowski-Schultz et al. 2004). All of these organisms play an important ecological role, including serving as prey for fish, invertebrates, birds, sea turtles, and marine mammals as well as cycling and transporting nutrients between nearshore and offshore areas and between the surface and the deep sea (Felder and Camp 2009). Many fish and invertebrates support robust commercial and recreational fisheries.

Oil and gas released from the wellhead rose to the atmosphere and the surface of the water, and was transported at depth. Some of the oil volatilized to the atmosphere, dissolved in the water, dispersed into tiny oil droplets, and adsorbed onto particles in the water. Animals exposed in the water column include small and large pelagic fish and mollusks, demersal fish that live on or near the bottom of the ocean, invertebrates, and planktonic organisms.

To help understand the fate, chemical weathering, transport, and toxicity of the oil, the Trustees have collected data to document physical and chemical water conditions in and around the spill area. These data include currents and physical properties of the water column in the vicinity of the wellhead; dissolved oxygen data to help assess the effect of microbial degradation of the oil and to track the fate of the oil; and data on suspended sediments, chlorophyll concentrations, and other physical measurements. To help evaluate impacts to water column organisms, the Trustees have gathered and analyzed information on the density and abundance of organisms that live in the water column, including variations in their distribution over space and time. Preliminary Trustee analysis suggests that tens of thousands of square miles of surface waters were affected by oiling and that hundreds of cubic miles of surface water may have contained petroleum at concentrations associated with mortality to sensitive aquatic organisms. This indicates that injuries to offshore water column organisms were widespread, both spatially and in terms of the diversity of organisms and life stages that were affected.

4.2.4 Sea Turtles

There are five species of sea turtles living in the Gulf of Mexico that are listed as threatened or endangered under the Endangered Species Act: Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*) and hawksbill (*Eretmochelys imbricata*). Sea turtles nest along beaches throughout the Gulf. Sea turtles were exposed to oil in open water, and in *Sargassum*, through consuming oil, by direct contact, and by inhaling volatile oil and dispersant-related compounds. In addition, response activities, such as collecting and burning oil at sea,

skimmer operations, boom deployment, berm construction, increased lighting at night near nesting beaches, beach cleanup operations and boat traffic may have injured sea turtles directly or blocked access to turtle nesting beaches and changed their reproductive behavior.

More than 1,000 sea turtles (of all life stages) were found dead in the northern Gulf of Mexico between April 26, 2010 and December 2011. The Trustees are using a variety of information to evaluate injuries to sea turtles, including information on exposure, the toxicological effects of oil, veterinary examination of oiled turtles, and analysis of hatching success. Preliminary findings include:

- More than 500 live or dead oceanic turtles were recovered or collected during attempts to rescue sea turtles from oiled Sargassum in the summer of 2010. Oil was often found within the mouth, pharynx, and esophagus in oral exams of live turtles and necropsies of dead turtles that were visibly, externally oiled upon recovery;
- Broad-scale aerial surveys conducted in 2010 indicate that there were tens of thousands of neritic turtles (life-stages found in coastal waters) exposed to oil within the footprint of surface oiling; and
- 14,700 hatchling turtles were relocated from the Gulf to the Atlantic coast of Florida to protect them from potential oil exposure. Although sea turtles typically return to their natal beaches to reproduce, uncertainty about the timing and location of the imprinting process makes it difficult to predict whether surviving relocated turtles will return to Atlantic or Gulf beaches to reproduce.

More than a thousand turtles have been found dead or were captured since the Spill and hundreds of those were oiled. Sea turtles live for many years (decades) and the full extent of impacts to the five affected species of sea turtles may not be apparent for many years. The evaluation of impacts to nesting, oceanic, and neritic turtles is ongoing.

4.2.5 Marine Mammals

Marine mammals that reside in the Gulf of Mexico include 21 species of cetacean (whales and dolphins) and one sirenian (manatee) (Waring et al. 2010). All are protected under the Marine Mammal Protection Act, 16 U.S.C. §§ 1361 *et seq* (MMPA). Sperm whales (*Physeter macrocephalus*) and the West Indian manatee (*Trichechus manatus*) are listed as endangered under the Endangered Species Act. In addition, several other species of baleen whales, notably North Atlantic right whales (*Eubalaena glacialis*), fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaeingliae*), and minke whales (*Balaenoptera acutorostrata*) may occur in the Gulf of Mexico. Based on life histories and habitat preferences of these species, and on observations of oil within marine mammal habitats, Trustees divided marine mammals into three functional groups for the purposes of injury assessment: oceanic marine mammals (targeting primarily sperm whale, Bryde's whale, striped dolphin and Risso's dolphin), coastal dolphins, and estuarine bottlenose dolphins.

Currently available information suggests that thousands of marine mammals were exposed to oil from the Spill. Preliminary data also indicate the presence of adverse health outcomes resulting from this exposure. Dolphin health assessments have been conducted over an area from the Mississippi Sound to Barataria Bay. In 2011 data indicated that bottlenose dolphins in Barataria Bay (which suffered heavy and prolonged exposure to oil) demonstrated signs of severe ill health, with many dolphins sampled in

Barataria Bay given a 'guarded', 'poor' or 'grave' prognosis. Symptoms included low body weight, anemia, low blood sugar, and/or symptoms of liver and lung disease. Collection and evaluation of data relevant to the assessment of the type and magnitude of injury to marine mammals attributable to the Spill is continuing.

4.2.6 Marsh and Mangrove Habitat

The high productivity of coastal marsh vegetation provides an ideal nursery ground that supports a wide variety of finfish, shrimp, and shellfish (Mitsch and Gosselink 2007, Daily et al. 1997, Minello and Webb 1997). Many bird species are dependent on marshes for foraging, roosting and nesting, and marshes are also critical to both migratory and wintering waterfowl (Mitsch and Gosselink 2007). The marsh edge also serves as a critical transition between the emergent marsh vegetation and open water. This area serves as the gateway for the movement of organisms and nutrients between intertidal and subtidal estuarine environments. Additionally, marsh edge has been found to be the most productive area of the marsh for many organisms (English et al. 2009).

The highly productive black mangrove (*Avicennia germinans*) occurs in association with smooth cordgrass (*Spartina alterniflora*) in many locations of the northern Gulf of Mexico and is important for maintaining shoreline protection and stabilization (Carlton 1974 and Massel et al. 1999). It is an essential feeding and nursery habitat for juvenile fish such as snapper (Coleman et al. 2000 and Mumby et al. 2004). The roots of mangroves that emerge from the water and soil provide excellent habitat for small organisms. Some species of colonial waterbirds, such as herons, egrets, and pelicans, build nests in mangroves and forage in the mangroves or nearby (Davis et al. 2005).

Declines in marsh vegetative health have been observed in oiled herbaceous mainland marshes relative to reference marshes. Key measurements illustrating adverse effects of oil on marsh vegetation included reductions in live plant cover, total vegetation cover, and vegetative condition. These effects generally are more pronounced along the highly productive marsh edge. Moreover, shorelines with more significant oiling tended to experience greater adverse effects. Similar effects were observed in mangrove habitats.

In addition to vegetation impacts, impacts on animals that live in the marsh have been demonstrated. For example, researchers have documented a lower abundance of *Littorina* snails (a typically abundant marsh organism that is an important source of prey in intertidal habitats) in heavily oiled areas relative to un-oiled areas more than a year after the Spill began.

4.2.7 Beach Habitat

Beaches are vital both ecologically and economically (Schlacher et al. 2008 and United Nations Millennium Assessment 2005). Ecologically, beaches provide food sources for numerous shoreline and migratory birds, invertebrates, and nesting sea turtles and shorebirds. Organic material such as sea grass that is cast up onto the beach by the surf, tides, and wind provides foraging opportunities and shelter for breeding and wintering shorebirds (Dugan et al. 2003). Colonial nesting gulls, terns, and skimmers nest on open beaches. The sand beaches of the northern Gulf Coast, including various state and federal parks, are also important recreational destinations and tourist attractions that support local and regional economies (e.g., Parsons et al. 2009, Mobile Area Chamber of Commerce 2010, Gulf Coast Business Council Research Foundation 2012, Houston 2013).

Preliminary estimates indicate that about 600 linear miles of sand beach habitat were oiled as a result of the Spill. At the peak of the Spill, beaches were oiled from eastern Texas to the Florida Panhandle. Many of these beaches were oiled repeatedly over an extended time period. A significant effort to remove oil from beaches was launched across the northern Gulf of Mexico. Oiling of beaches can have a variety of effects on the physical and biological communities of the beach and near shore habitats. Shoreline protection and clean up related to the Spill clearly affected biological communities as well. At least 400 miles of oiled beaches also experienced some level of impairment due to response activities.

4.2.8 Unvegetated Nearshore Sediment

The unvegetated nearshore benthic sediments and tidal flats of the Gulf of Mexico serve as an important and diverse habitat for many species. Crabs, shrimp, fish, shorebirds, and terrestrial wildlife feed on the rich populations of organisms living on and in the nearshore sediments (e.g., McTigue and Zimmerman 1998, Perry and McIlwain 1986, Fox et al. 2002, Gabbard et al. 2001). This sediment-based system notably includes the major shrimp species in the Gulf of Mexico, including white, pink, and brown shrimp (Muncy 1984, Bielsa et al. 1983, Lassuy 1983, also see www.fishwatch.gov). Three key commercial species of crabs in the Gulf of Mexico region also are supported by sediment-based ecosystems: blue crab, Gulf stone crab, and stone crab (Lindberg and Marshall 1984, Perry and McIlwain 1986, also see www.fishwatch.gov). Gulf sturgeons (classified as threatened under the ESA) also forage on the bottom of the bays and estuaries of Florida, Alabama, Mississippi, and Louisiana, eating invertebrates such as mollusks, worms and crustaceans (Fox et al. 2002, USFWS and NMFS 2009).

As part of the evaluation of the magnitude and extent of oil that stranded and persisted in the shoreline and nearshore environment, nearshore sediment was sampled within one kilometer of the shoreline in 2010 and 2011. These sediment samples have been analyzed for polycyclic aromatic hydrocarbons (PAHs) and other parameters to evaluate the potential for injury to nearshore species. Analysis of over 2500 sediment samples has revealed the presence of PAHs in many nearshore sediments. Field and laboratory toxicity studies are being conducted to evaluate the implications of this contamination for nearshore fish and invertebrates.

Overall, the Trustees' ongoing assessment of injury to nearshore sediment habitat indicates that shallow water sediments were contaminated with oil following the Spill and that the degree of contamination was sufficient to cause a range of adverse effects on survival, reproduction, health of organisms and overall ecosystem productivity within this important habitat.

4.2.9 Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) refers collectively to a group of rooted plants that grows up to the water surface. Various seagrasses grow in marine water, and other species live in fresh and brackish habitats of the Gulf of Mexico. SAV is a highly productive habitat in the northern Gulf of Mexico which provides food and shelter for fish, shellfish, crustaceans, and other invertebrates (Gulf of Mexico Program 2004). It also is an important foraging habitat for sea turtles and resident and migrating birds (USFWS 2012 and Gulf of Mexico Program 2004). It serves as nursery habitat for many species, produces oxygen in the water column as part of the photosynthetic process and enhances water quality by filtering water and removing excess nutrients. SAV also stabilizes sediment and is vital to keeping barrier islands intact (Fonseca et al. 1998, Poirrier 2007).

Sampling was performed to evaluate oil exposure at a number of sites in the northern Gulf of Mexico. Oil was detected in samples at several SAV sites, and preliminary information suggests that at least 10 square miles of SAV beds were oiled and/or adversely affected by a variety of response activities.

4.2.10 Oyster Reefs

The eastern oyster (*Crassostrea virginica*) forms an integral component of nearshore coastal ecosystems and local economies along the Gulf of Mexico (Eastern Oyster Biological Review Team 2007). Oyster reefs provide numerous ecological services to estuarine systems, including production of biomass, filtering water to remove organic and inorganic particles and improving water quality and clarity. Oyster reefs provide habitat for numerous other shellfish, crabs, and finfish. Oysters are also a valuable commercial and recreational fishery resource (Eastern Oyster Biological Review Team 2007). Oysters in the Gulf of Mexico are present in both intertidal and sub-tidal areas (Eastern Oyster Biological Review Team 2007). Commercial oysters are harvested from sub-tidal areas, but intertidal oysters are important as a source of larvae to maintain populations of both intertidal and sub-tidal oysters.

In response to the Spill, large volumes of freshwater from Mississippi River diversion structures were released as part of a set of response actions designed to reduce the movement of oil into sensitive marsh and shoreline areas. The volume and duration of the low salinity water from these response actions adversely affected oysters over a broad area. Preliminary analyses in 2010 suggest oysters in areas affected by lowest salinity water experienced substantial mortality in Louisiana. Oyster abundance and biomass in 2010 was low in many areas, especially in areas exposed to very low salinity for an extended period of time. In 2012, testing of intertidal areas that were affected by the freshwater diversions, showed a lower abundance of live spat, seed, and market size oysters compared to areas not affected by diversions.

Oyster eggs, sperm, and larvae were also exposed to oil and dispersants through direct contact with water. PAHs are toxic to oyster gametes, embryos, larvae, juveniles and adults and result in lethal and sub-lethal effects (e.g., impaired reproductive success). Intertidal adult oysters were also exposed to oil droplets and oil on suspended sediment and detritus.

Fall 2010 sample results suggest oyster larvae were rare or absent in many of the samples collected across the northern Gulf of Mexico. Oyster spat recruitment was also extremely low or zero in 2010 over large areas of subtidal oyster habitat along the northern Gulf coast. There was also low spat recruitment through the spring and fall of 2011 and the fall of 2012. Trustees are continuing to evaluate effects of 2010 oiling and associated response activities on Gulf oyster populations.

4.2.11 Birds

The northern Gulf Coast is important to a variety of birds that nest on beaches, mudflats, dunes, bars, barrier islands, and other nearshore habitats including marshes and mangroves. Breeding species of regional importance include American oystercatcher, snowy plover and Wilson's plover. The Breton National Wildlife Refuge off the Louisiana coast supports one of the world's largest colonies of sandwich terns. The northern Gulf Coast also supports nearly half of the southeastern population of brown pelican. The northern Gulf of Mexico is critically important wintering habitat for a variety of migratory birds. In addition, Gulf Coast marshes are important to many marsh birds, including but not limited to black rail, clapper rail, king rail, Virginia rail, sora, least bittern, and American bittern. The Gulf Coast also

supports protected bird species, such as the piping plover, which is federally listed under the ESA. At least 70 percent of all piping plovers winter on the shores of the Gulf of Mexico.

Oiled birds can lose the ability to fly, dive for food, or float on the water, which can lead to drowning. Oil and dispersants interfere with the water repellency of feathers and can lead to problems of thermoregulation (i.e., hypothermia). In addition, birds may ingest or inhale oil while cleaning (preening) their feathers, by consuming contaminated vegetation or prey, or by incidental ingestion of contaminated sediment. This exposure can kill the bird, leave it susceptible to predation or lead to long-term physiological, metabolic, developmental, and/or behavioral effects, which can in turn lead to reduced survival and/or reproduction. Exposure to oil also can reduce the hatching of eggs and survival of hatchlings. Therefore, avian injury can be identified through acute mortality, productivity loss, decline in reproductive success, sub-lethal effects, and loss of prey resources (including food and habitat for nest building).

The Spill injured avian resources throughout the Gulf through a variety of mechanisms, including but not necessarily limited to exposure to oil and/or dispersants, disturbance from response activities, cleaning in rehabilitation settings, and adverse impacts to bird resources and degradation of habitat. Approximately 8,500 live impaired and dead birds were collected in the northern Gulf of Mexico as part of wildlife rescue and NRDA operations during and following the Spill. These birds represent over 100 species collected in all five Gulf Coast states. Due to the inability to search all areas and recover all affected birds, collected birds represent a fraction of the total number of birds that were killed or impaired as a result of the Spill. Additionally thousands of photographs were taken of birds that showed external exposure of oil on feathers. This exposure could have potential short-term and long-term effects on individual and offspring survivorship.

The Trustees are conducting a broad spectrum of studies to fully evaluate the impact of the spill on avian species, including incident-specific avian toxicity studies and evaluations of potential impacts experienced by oiled birds collected from the Gulf. This approach allows for controlled laboratory testing of the oil to specifically identify adverse effects and for confirmation that these effects are observed in oiled, wild birds.

4.2.12 Recreational Use

The Gulf of Mexico provides a wide range of recreational opportunities to local residents and visitors from across the nation. These include recreational fishing, boating, visiting beaches, and other activities. The Spill resulted in closures of beaches, fishing areas and waterways, preventing access to these areas by both local and more distant recreational users. In addition to these direct closures, the Spill also caused some recreational users to change the type of recreational activities they would otherwise engage in. Other users cancelled their planned recreational visits or traveled to alternate locations because of the threat of oiling (or because of actual oiling that did not result in beach closures), or visited oiled beaches and therefore suffered from degraded, lower quality trips.

The assessment of Spill impacts to recreational use thus far has focused on lost or degraded recreational use across the Gulf Coast.

For each broad type of injury, Trustee experts developed a sampling and analysis plan to estimate the change in recreational use in the assessment area resulting from the Spill. Each of these approaches is described in more detail below. These assessment activities provide estimates of recreation use including counts of recreational users over time and information on the type of activities in which users engaged. By comparing recreation use during the spill period with the counts during a baseline period, and adjusting for other non-spill related differences between the two periods, the Trustees can estimate the number of lost recreation use in the assessment area. In addition, the Trustees are evaluating recreational use data from a variety of sources and surveys for determining potential impacts in other coastal areas where the data described above is unavailable.

One major category of injury is shoreline use, which includes any recreational visitation to beach sites in the assessment area, such as sunbathing, swimming, birding or other wildlife viewing, walking, and running. Aerial over-flights and on-the-ground fieldwork on beaches started in the weeks following the Spill provide a measure of recreational use along the Gulf Coast shoreline.

Another major category of injury is boating and boat-based fishing trips, which includes any recreational users who would have engaged in recreational fishing or pleasure boating in the assessment area during and after the Spill period. This assessment does not include those fishing for commercial purposes since losses to commercial enterprises are not part of an NRDA claim. Assessment teams started counting departures at public boat ramps in the assessment area shortly after the Spill at publically accessible sites. As boating and boat-based fishing also occurs from non-public locations, such as backyards, private marinas, and other sites, Trustees also conducted surveys to assess impacts upon this recreational user group. Together these data collection efforts provide measures of the level and types of boating and boat-based fishing along the coastal waters of the Gulf of Mexico.

Another major category of injury that required a significant assessment effort is shore-based fishing, which includes fishing from beach locations as well as fishing from piers and jetties or other similar structures. Assessment teams conducted field counts of users engaged in this activity type beginning shortly after the Spill.

While analysis of recreational use data is ongoing, preliminary Trustee review indicates that over ten million recreational user days were lost or otherwise adversely affected by the Spill.

4.3 Use of Assessment Data to Inform Early Restoration Project Selection

Throughout the Early Restoration process, the Trustees have used preliminary results from the Assessment to inform and guide the selection of Early Restoration projects. As noted above, the Assessment work to date clearly demonstrates extensive oiling of marsh and beach shorelines from Texas to the Florida Panhandle. Preliminary results also make clear that the oiling has had significant adverse impacts on coastal and nearshore habitats and their biological communities. In addition, initial results from the Trustees' Assessment clearly show that oiling caused very large reductions in coastal recreation from Texas to Florida. Analysis of recreational data assembled by the Trustees indicates that more than 10 million user-days of beach, fishing and boating activity were lost due to the spill.

Proposed Phase III ecological projects include measures to protect shorelines and enhance nearshore productivity in a variety of habitats. These projects include restoration of barrier islands and

construction of living shorelines, as well as measures to restore oysters, SAVs, and dunes. The ecological projects represent approximately 63 percent of the Phase III program spending. The remaining 37 percent of the Phase III budget is devoted to restoration projects aimed at increasing and enhancing recreational activity in all five affected Gulf States.

Early Restoration reflects the Trustees' proposal to focus on those injury categories for which the nature of the adverse impacts are reasonably well understood. Once the Trustees' Assessment is complete, a final damage assessment and restoration plan will be developed to address injuries not fully addressed by the Early Restoration program.

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CHAPTER 5: PROPOSED EARLY RESTORATION PROGRAMMATIC PLAN: DEVELOPMENT AND EVALUATION OF ALTERNATIVES

This chapter provides information relevant to the programmatic alternatives proposed to address Early Restoration; the 44 Early Restoration projects being proposed in Phase III are presented and discussed in chapters 7-12. More specifically, this chapter provides information relevant to development of a reasonable range of programmatic alternatives proposed for continued pursuit of Early Restoration of injured natural resources and their services under the Oil Pollution Act (OPA) and in accordance with the Framework Agreement. Under each alternative, the Trustees identify a suite of appropriate Early Restoration project types. This chapter includes:

1. A discussion of the criteria used by the Trustees to develop and evaluate programmatic alternatives, referred to here as “programmatic criteria”;
2. Descriptions of proposed Early Restoration programmatic alternatives considered by the Trustees, including a “No Action” alternative; and
3. Identification of the Trustees’ preferred alternative for continued Early Restoration.

As per the NRDA regulations (15 C.F.R. § 990.53(a)(2)), the Trustees consider a reasonable range of restoration alternatives before identifying their preferred alternative. Those alternatives must be designed so that, as a package of one or more actions, each restoration alternative would make the environment and the public whole. Early Restoration for the Spill, however, is only the beginning of the process to restore natural resources and their services, and therefore is intended to contribute to, but will not fully meet, the goal of making the public whole.

The Council on Environmental Quality’s (CEQ’s) regulations implementing NEPA also direct agencies to rigorously explore and objectively evaluate all reasonable alternatives (40 C.F.R. § 1502.14(a)). An alternative is reasonable if it will achieve the stated purpose and need, restore or enhance the quality of the human environment, and avoid or minimize any possible adverse effects of the agency’s actions upon the quality of the human environment (40 C.F.R. § 1500.1(e)–(f)). Alternatives are developed consistent with a range of requirements designed to meet the purpose and need of the proposed action.

For Early Restoration, the Trustees considered both the OPA regulations and the Framework Agreement in developing requirements to meet the stated purpose and need for the Early Restoration program. These requirements are referred to in this chapter as “programmatic criteria” which are appropriate for the development and evaluation of programmatic alternatives. Programmatic criteria are used by the Trustees to narrow what could be a boundless list of options into a reasonable range of alternatives.

The remainder of this chapter provides information about the Trustees’ process for identifying programmatic alternatives and their associated project types for continuing Early Restoration, culminating with the identification of four programmatic alternatives considered by the Trustees.

5.1 Criteria for Developing Programmatic Alternatives

This section describes the suite of programmatic criteria used by the Trustees to develop and evaluate Early Restoration programmatic alternatives that meet the purpose and need described in chapter 1. First, in developing programmatic alternatives appropriate for continuing Early Restoration, the Trustees considered the following criteria found in the OPA regulations at 15 C.F.R. § 990.53(a)(2):

- Whether each alternative is comprised of primary and/or compensatory restoration components that address one or more specific injury(ies) associated with the incident;
- Whether each alternative is designed so that, as a package of one or more actions, the alternative would make the environment and public whole;¹
- Whether each alternative is technically feasible; and
- Whether each alternative is in accordance with applicable laws, regulations, or permits.

In addition to the criteria identified above, the Trustees found three of the OPA regulations evaluation standards (15 C.F.R. § 990.54(a) (2)-(4)) particularly suited to serving as programmatic criteria for evaluating Early Restoration programmatic alternatives:

- The extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;
- The likelihood of success of each alternative; and
- The extent to which each alternative will avoid collateral injury as a result of implementing the alternative.²

The Framework Agreement and its criteria are important components of the Trustees' objectives for Early Restoration, and along with the OPA regulations, were considered in developing programmatic criteria. Although the Framework Agreement primarily contemplates project specific evaluation the concepts can be applied to the development of programmatic alternatives. Thus, when evaluating programmatic alternatives for consistency with framework criteria, the Trustees specifically considered whether the alternative:

- Addresses one or more specific injuries to natural resources or services associated with the incident; and
- Contributes to making the environment and the public whole by restoring, rehabilitating, replacing, or acquiring the equivalent of natural resources or services injured as a result of the Spill, or compensating for interim losses resulting from the incident.

¹ Because Early Restoration will not, by itself, make the environment and the public whole, in Early Restoration planning, the Trustees consider whether each alternative will *contribute to* making the environment and public whole.

² This criterion is adapted from the regulatory language, which includes consideration of "the extent to which each alternative will prevent future injury as a result of the incident." This adaptation reflects the fact that Early Restoration takes place concurrently with, rather than after completion of, NRDA activities for this Spill.

The remainder of this chapter focuses on application of the programmatic criteria for development of the proposed programmatic alternatives, which serve as both the OPA and NEPA reasonable range of alternatives.

5.2 Programmatic Alternatives and Project Types Development Process

For each alternative, the Trustees considered potential project types with a clear nexus to the injuries established by injury assessment efforts to date. As noted throughout this document (and in Chapter 4 in particular), the injury assessment process is ongoing. Currently available information indicates the presence of several types of injuries, and in some cases provides a preliminary indication of the potential severity and/or magnitude of impact. The Trustees identified Early Restoration project types suited to address injuries and losses that are currently indicated while the full assessment process continues to move forward.

In this document, the term “project type” refers to a category that includes restoration approaches with a comparable objective, using appropriate, established restoration techniques to meet that objective. As an example, the project type “Create and Improve Wetlands” includes restoration techniques that improve wetlands by establishing or reestablishing conditions conducive to wetland vegetative growth and/or by restoring hydrologic function within wetland habitats. Project types are not associated with a specific geographic location, nor are they limited to projects of a certain size or cost. Each of the project types has a relationship to one or more of the injury categories discussed in Chapter 4. Based on that continuing injury assessment, and in consideration of public scoping input, the Trustees developed the potential restoration project types described in this chapter.

Consistent with the programmatic criteria identified above, for potential project types, the Trustees considered the extent to which there exist restoration techniques that are (i) commonly applied, (ii) are well understood, (iii) have demonstrated benefits, (iv) have a high likelihood of successful implementation, and (v) are otherwise feasible and effective. Under the programmatic criteria, use of established restoration methods likely to meet the goal of accelerating meaningful restoration of injured natural resources and their services resulting from the Spill would be favored. Therefore, while a particular project may have innovative components, the identified programmatic alternatives represent project types with established restoration methods.

Development of proposed project types builds from the Trustees’ restoration experience and from public input. Significant regional planning efforts previously have undertaken for restoration in the Gulf of Mexico, many of which were developed by the Trustee agencies and included extensive public involvement. The Trustee agencies bring decades of experience and knowledge of the Gulf ecosystem to the *Deepwater Horizon* Early Restoration planning effort. Supplementing this internal expertise, the Trustees are familiar with restoration input from the public, academic, non-governmental and private sectors, including restoration plans developed by several non-governmental organizations following the Spill. Development of potential Early Restoration project types identified in the June 4, 2013 Notice of Intent incorporated experience from these prior and ongoing restoration efforts to develop potential project types available for public consideration and input during the scoping period.

Specifically, beginning with the NOI, the Trustees sought input and involvement from the public to help define the issues and alternatives that should be examined in this document. Through the scoping

process, which included both meetings and opportunities for written comment, the public commented on the potential project types and provided general comment on the level of emphasis between ecological projects and recreational use projects. These inputs helped in the further development of the Early Restoration project types proposed here, as well as informing the structure of the programmatic alternatives.

Within the construct identified above, the Trustees developed the set of project types for inclusion in Early Restoration programmatic alternatives, consistent with the desire to seek a diverse set of projects providing benefits to a broad array of potentially injured resources.³ Ultimately, this process resulted in the inclusion of twelve project types in programmatic alternatives evaluated for Early Restoration in this document, including:

1. Create and Improve Wetlands
2. Protect Shorelines and Reduce Erosion
3. Restore Barrier Islands and Beaches
4. Restore and Protect Submerged Aquatic Vegetation
5. Conserve Habitat
6. Restore Oysters
7. Restore and Protect Finfish and Shellfish
8. Restore and Protect Birds
9. Restore and Protect Sea Turtles
10. Enhance Public Access to Natural Resources for Recreational Use
11. Enhance Recreational Experiences
12. Promote Environmental and Cultural Stewardship, Education and Outreach

Additional project types were considered by the Trustees, but not evaluated in detail in this DPEIS because at this time, the Trustees do not consider them appropriate for Early Restoration. For example, while the Trustees are concerned about and continue to evaluate potential Spill-related injuries to marine mammals and to components of the deep benthic environment (e.g., deep sea corals, mesophotic reefs and deep soft bottom sediment habitat), additional time and effort is needed to identify appropriate, reliable restoration methods. More specifically, as raised in the scoping process, there was interest from some of the public to see an increased focus in Early Restoration on marine resources. Project types that address marine resources (e.g., restore and protect finfish and shellfish) are included in the alternatives described below. However, certain other marine resources are not yet a focus for Early Restoration alternatives. This approach is consistent with the Trustees' consideration to focus on types of projects that: (1) address injuries that are reasonably well understood; and (2) with

³ The discussion of project type names, descriptions, and resources benefitted for purposes of developing and evaluating these programmatic alternatives are not necessarily indicative of NRD offsets agreed upon with BP for any particular project pursuant to the Framework Agreement. Offset types and their relationship to the specific projects proposed in this DERP are described in Chapters 7-12 of this document. Future proposed projects, even if similar to those proposed herein or within the same project type, may bear different proposed NRD offsets.

which the Trustees have significant experience, and allows the Trustees to predict costs and likely success with a relatively high degree of confidence.

The Trustees continue to evaluate the appropriateness of other potential project types for Early Restoration using new data and/or analysis, public input, Early Restoration experience, and other relevant information. If any “new” project types are proposed by the Trustees for inclusion in the Early Restoration process in the future, they would be subject to Trustee OPA and NEPA review, public review and comment on related documentation, Trustee consideration of public comments and, if applicable, finalization.

The Trustees are considering and evaluating the following four programmatic alternatives and their associated project types in this document:

1. No Action (i.e., no additional Early Restoration at this time);
2. Contribute to Restoring Habitats and Living Coastal and Marine Resources (project types 1-9 above);
3. Contribute to Providing and Enhancing Recreational Opportunities (project types 10-12 above); and
4. Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Contribute to Providing and Enhancing Recreational Opportunities (project types 1-12 above).

Each programmatic alternative has a different grouping of project types that fit within its description. The Trustees believe that these alternatives are consistent with relevant programmatic criteria and provide a reasonable range for consideration and evaluation that is inclusive of all twelve project types. These alternatives are responsive to a theme that emerged during scoping. Numerous comments requested that Trustees focus on only ecological project types, e.g., habitat and living coastal and marine resources, for the remainder of Early Restoration. Other commenters requested focus only on recreational use project types; other commenters requested that Trustees focus across both areas.

5.2.1 Relationship Between Programmatic Alternatives and Proposed Projects

Of the 4 alternatives, the 3 programmatic action alternatives represent 3 different ranges of project types for continuing Early Restoration, and reflect whether Early Restoration would focus within the available funding on ecological project types (habitats and living and coastal marine resources), recreational use project types, or allow for consideration of both ecological and recreational use project types. The ultimately selected programmatic alternative will guide the types of projects that align with the Early Restoration program and are therefore appropriate to consider for potential implementation.

Specific to Phase III of Early Restoration, the selected programmatic alternative will define which of the 44 projects described in this document would be considered for individual decision. If Alternative 2 or 3 became preferred then 9 or 35 of projects respectively would be appropriate to consider for Phase III. If Alternative 4 remains preferred, each of the 44 individual projects would be considered for

implementation in Phase III. Future phases of Early Restoration would likewise identify and propose projects pursuant to the selected programmatic alternative. Under any programmatic alternative, a given project is individually evaluated under both OPA and NEPA, and the Trustees' decision of whether to proceed (action) or not proceed (no action) for that individual project is independent of the other projects. The number of projects ultimately selected for action in Phase III does not affect the Trustees' construct of a programmatic alternative.

5.3 Proposed Alternatives

5.3.1 Alternative 1: No Action (No Additional Early Restoration)

Both OPA and NEPA require the evaluation of the considered actions against a No Action alternative. For Early Restoration, the No Action alternative means that the Trustees would not pursue any additional Early Restoration actions at this time. Choosing this alternative would not preclude continued development of the Damage Assessment and Restoration Plan (DARP) and supporting PEIS, but no further implementation of Early Restoration would occur. The OPA regulations call for the evaluation of a natural recovery alternative in which no human intervention would be taken to directly restore injured natural resources and services to baseline (15 C.F.R. § 990.53(b)(2)). Early Restoration Offsets will be applied to the final injury claim, and it is not within the scope of this action to evaluate the long-term appropriateness of natural recovery for any particularly injury category. Analysis of each injury category and determination of whether to allow natural recovery or to undertake restoration will be presented in the DARP and supporting PEIS.

5.3.2 Alternative 1: Consistency with Programmatic Evaluation Criteria

The No Action Alternative is the only alternative that must be analyzed in an EIS that does not respond to the purpose and need for the action (National Environmental Policy Act Handbook, Handbook H-1790-1, U.S. Department of Interior, Bureau of Land Management). This alternative is not consistent with the programmatic criteria as no additional Early Restoration would be conducted at this time.

5.3.3 Alternative 2: Contribute to Restoring Habitats and Living Coastal and Marine Resources

Under Alternative 2, the Trustees would focus on pursuing Early Restoration project types and associated specific projects that contribute to initial restoration and protection of certain habitats and living coastal and marine resources. Nine project types are included in this alternative. A short description is provided of each project type, including examples of restoration techniques appropriate for each project type. These examples do not represent the full suite of techniques available to perform a given project, as numerous variables can affect project logistics.

In discussing project types and specific techniques, the Trustees recognize that that appropriate factors should be incorporated into project engineering and design to facilitate the realization of project goals and minimize the possibility of undesired outcomes. As part of project design and implementation, the Trustees will monitor the success of the applied restoration techniques.

5.3.3.1 Create and Improve Wetlands

This project type involves creating or improving wetlands by establishing or reestablishing conditions conducive to wetland vegetative growth and by restoring hydrologic function within wetland habitats. Appropriate restoration techniques for this project type include but are not limited to:

1. Create or enhance wetlands through placement of dredged material in shallow water bodies
2. Replant vegetation via propagation and/or transplanting
3. Restore hydrologic connections to enhance coastal habitats
4. Backfill canals including drainage canals, access canals established for petrochemical development and canals constructed for other purposes (i.e., recreational and residential uses)

Create wetlands through placement of dredged material in shallow water bodies. Wetland enhancement using sediment placement can be accomplished in several ways. For example, sediment can be deposited in thin layers to increase the elevation of degraded wetlands to within the intertidal range, as has been done across the Gulf. Sediment placement can be used to stabilize eroding natural wetland shorelines, including in combination with engineered breakwaters, or to nourish subsiding wetlands. Dewatered sediment can also be used to construct erosion barriers that reduce loss of wetland acreage and aid in restoring a degraded wetland. Appropriate borrow sources would be evaluated on a project specific level.

Marsh creation using sediment would be designed to contribute to a diversity of open water and marsh edge habitat into the marsh complex. Marsh edge is a vital microhabitat that is heavily utilized by shrimp, crabs, and several fish species.

Replant vegetation via propagation and/or transplanting. In addition to placing sediment, restoration can include re-vegetation. Wetland plants can establish naturally or can be planted. Planting vegetation in marsh and mangrove habitat can reestablish the native plant community and stabilize marsh sediments to maintain the integrity of the marsh platform. Vegetation can be planted in areas to help new restoration become functional faster, or help degrading areas recover from disturbances.

Restore hydrologic connections to enhance coastal habitats. Wetland restoration can include restoring or enhancing natural tidal and freshwater flow regimes in estuarine and coastal transitional landscapes and adjacent watersheds (including the restoration or maintenance of salinity gradients across freshwater, intermediate, brackish, marine, and hypersaline systems). Techniques could include the following: filling, reshaping and re-contouring drainageways to restore hydrology, wetland and/or sedimentary functions; removing blockages, breaching dikes, levees, and spoil banks; and constructing, enlarging, or repairing malfunctioning conveyances (e.g., culverts, bridges, etc.). These modifications can support the restoration of native wetland vegetation composition and cover, and improve connectivity between habitats.

Backfill canals including drainage canals, access canals established for petrochemical development and canals constructed for other purposes (i.e. recreational and residential uses). Wetlands can also be created or restored by filling in abandoned canals and other channelized waterways with dredged or spoil sediments and replanting with appropriate material. Access canals from abandoned oil and gas exploration and residential sites as well as other channelized waterways have become conduits for the

introduction of salt water into previously freshwater or brackish-water marshes. Dead-end canals often result in degraded water quality due to a lack of tidal flushing, and the canals expose formerly protected marshes and transitional coastal wetlands to erosive wind, wave and boat wake energy. A potential cost-effective source of material for backfilling access canals would be existing spoil banks adjacent to these canals. Reducing the number and extent of artificial spoil banks may also provide the added benefit of restoring hydrology, for example, in circumstances where spoil banks have altered natural sheet flow.

5.3.3.2 *Protect Shorelines and Reduce Erosion*

This project type involves developing shore protection systems to slow or prevent erosion. Shorelines maintain the integrity of natural coastal systems by providing a break or buffer to wave and current energy and are important transitional habitats. Shore protection systems are designed to protect and retain shorelines and landward areas. Appropriate restoration techniques for this project type include but are not limited to:

1. Construct breakwaters on/or adjacent to shoreline
2. Construct living shorelines

Construct breakwaters on/or adjacent to shoreline. When used for shore protection, breakwaters are usually built either on or adjacent to the shoreline and are typically oriented parallel to the shore. Breakwaters are designed to break waves or reduce wave action landward of the structure. Depending on their design, breakwaters attenuate wave energy by dissipating, reflecting, or changing the refraction and diffraction patterns of incoming waves. The resulting reduction in wave energy arriving at the shoreline tends to decrease the ability of waves to entrain and transport sediment, thereby decreasing erosion at the shoreline. Breakwaters can extend above the water or be submerged, fully or partially, where they function as reefs or sills. Breakwaters can be solid or porous, and have vertical or sloping faces, and can be continuous or segmented.

Construct living shorelines. Constructing breakwaters can induce sediment deposition, and provide shelter for wetland plants and shoreline habitats to counter shoreline erosion and loss. This technique may include living shoreline features such as the incorporation of oyster shell in the construction of breakwaters. As with breakwaters described above, living shorelines are designed to induce sediment deposition, and provide shelter for wetland plants and shoreline habitats to counter shoreline erosion and loss. Living shorelines use a variety of stabilization and habitat restoration techniques that span several habitat zones and utilize a variety of structural and organic materials. As noted above, oyster shell can be used in living shoreline projects as a substitute for or in addition to stone rip-rap to create hybrid structures that increase habitat diversity. In addition, created wetlands can be constructed on the shoreline side of breakwaters. Subtidal reef restoration, intertidal oyster restoration and oyster escarpments may also be appropriate depending on shoreline conditions and depths.

5.3.3.3 *Restore Barrier Islands and Beaches*

This project type involves restoring barrier islands and beaches which provide important coastal habitat. Appropriate restoration techniques for this project type include but are not limited to:

1. Re-nourish beaches through sediment addition

2. Restore dune and beach systems through the use of passive techniques to trap sand
3. Restore barrier islands via placement of dredged sediments
4. Plant vegetation on dunes and back-barrier marsh
5. Construction of groins, breakwaters, or sediment by-pass structures

Re-nourish beaches through sediment addition. Beach re-nourishment or replenishment involves the placement of suitable material from sources outside the natural sources of sediment for the eroding beach. Sediment is typically taken from a borrow site where the physical and chemical sediment characteristics closely match those at the restoration site. Identification of suitable borrow material is crucial, including consideration of sediment color, grain size, and other characteristics. These factors are important because introducing different sediment characteristics could negatively impact aesthetics, erosion potential and general use by shoreline fauna as well as decrease the lifespan of the re-nourished beach.

Restore dune and beach systems through the use of passive techniques to trap sand. Passive techniques can be used to trap sand transported by winds and waves to restore dune and beach systems. Passive restoration techniques could include, but are not limited to, placement of sand fencing, hay bales, and recycled Christmas trees, or planting native dune vegetation to capture sand.

Restore barrier islands via placement of dredged sediments. Restoration involving the placement of dredged sediments can stabilize, maintain, and restore degraded beach, dune, and back-barrier marsh habitats on existing barrier islands. Sediments used for restoration can be obtained by beneficially using dredged material from navigation channels or by accessing material from approved borrow areas. Dredged material should closely match the chemical and physical characteristics of sediment at the restoration site and target borrow areas should be within reasonable proximity to suitable sites for sediment placement. Among other factors, local hydrodynamics and sediment deposition processes should be carefully monitored and modeled prior to implementation of this technique.

Plant vegetation on dunes and back-barrier marsh. Planting vegetation on dunes and in back-barrier marshes can restore the plant community and provide additional habitat and foraging area for shoreline organisms. Vegetative root structure can stabilize marsh and beach sediments, and contribute to the stability of the shoreline by helping to reduce erosion and encouraging sediment deposition. Planting vegetation can also contribute to the ecosystem function of dunes and back-barrier marshes, providing habitat for fish and invertebrates, birds, and other shoreline wildlife.

Construction of groins, breakwaters, or sediment by-pass structures. In addition to beach re-nourishment, construction of engineered structures such as breakwaters, groins and sediment by-pass methods can be used to decrease erosion of engineered beaches. These structures can increase the life span of re-nourished beaches near passes, inlets, or in areas where erosion rates are high and where sediment supply is limited.

5.3.3.4 Restore and Protect Submerged Aquatic Vegetation

This project type involves restoring submerged aquatic vegetation (SAV) beds using one or more techniques including re-vegetation and protection of SAV with buoys, signage, and/or other protective

measures. These techniques are often used in combination. Appropriate restoration techniques for this project type include but are not limited to:

1. Backfill scars with sediment
2. Re-vegetate SAV beds via propagation and/or transplanting
3. Enhance SAV beds through nutrient addition
4. Protect SAV beds with buoys, signage, and/or other protective measures

Backfill scars with sediment. SAV beds are often injured by motorized boat propellers, with the two primary means of damage observed as linear scars and blowholes. Scar injuries are formed by the dredging effect of the turning propeller, or occasionally the vessel's hull, as the boat travels over a shallow bank. Blowholes are depressions formed from the concentrated force of propeller wash as a vessel attempts to power off a shallow SAV bed. Once injury occurs, rising and falling tides, wind, waves, vessel wakes or currents can expand scars and blowholes into adjacent, intact SAV. Backfilling blowholes or propeller scars with native fill (i.e., local sediment) is a rapid way of returning the seafloor to its original elevation and grade. The focus of this restoration action is to stabilize the substrate as soon as possible to prevent further deterioration of the SAV bed as a result of erosion, and prepare the area for re-colonization by neighboring or transplanted SAV.

Re-vegetate SAV beds via propagation and/or transplanting. SAV beds can be re-vegetated through transplanting whole plants or plugs. Transplanting whole plants (either cultivated or taken from donor beds) requires each plant to be planted by hand. Planting with plugs (uses tubes to secure plants with surrounding sediment and rhizomes intact) helps anchor the new transplant to the sediment until the roots take hold.

Enhance SAV beds through nutrient addition. Nutrients can be added to SAV beds via the use of bird stakes or fertilizer spikes to enhance regrowth in SAV bed blowholes or in smaller areas in need of restoration or enhancement. While many coastal areas suffer from high levels of nitrogen loading from nonpoint sources, these diffuse nutrients are not as effective in fostering SAV recovery as nutrient input from "bird stakes". This method of fertilization utilizes the nutrient composition of bird feces deposited from birds resting on stakes and is effective in facilitating the colonization of SAV in some areas and/or promoting faster growth of transplants. This technique has been tested and found to be effective for areas in Florida where nutrient limitation is impairing seagrass growth.

Protect SAV beds with buoys, signage, and/or other protective measures. Using protective measures can help ensure that existing or restored SAV beds are not damaged through boating or other activities that take place around SAV beds. Protective measures could include buoys and signage or other educational campaign efforts.

5.3.3.5 Conserve Habitat

This project type involves identifying, protecting, managing, and restoring habitat areas or land parcels to complement and advance the goals of coastal management, habitat conservation, and ecosystem restoration. Areas could be nominated for conservation based on their potential for loss or degradation, their ability to protect or buffer wetlands, their contributions to restoring ecosystems and other

significant coastal habitats, to creating connections between protected areas, and/or to reducing coastal water pollution. Appropriate restoration techniques for this project type include but are not limited to:

1. Conserve habitat through fee title acquisition
2. Conserve habitat through property use restrictions and/or management
3. Conserve, manage and restore habitat that is being acquired or is currently under protection.

Conserve habitat through fee title acquisition. The Department of the Interior has the authority to use Eminent Domain to acquire lands and interests for the public good. However, the Department will not exercise this authority to implement Early Restoration projects in relation to the Spill. Acquisition of a land parcel would require voluntary participation by landowners who were willing to sell their land. Successful negotiations would result in land acquisition by the appropriate State or Federal land management agency, accredited land trust, land protection organizations or other qualified non-government organizations. Once areas are acquired, management plans are often developed and implemented to enhance their conservation value.

Conserve habitat through property use restrictions and/or management. In addition to acquisition through fee title, habitat can be protected through the acquisition of lesser property interests and the enactment of voluntary use restrictions. For example, a conservation easement is a legally enforceable agreement between a property owner and a land trust (or other land protection organization) or government agency for the purposes of land preservation and conservation. Land subject to a conservation easement may remain in private ownership; however, a conservation easement would restrict development and certain uses on the property. Regardless of the vehicle used to conserve, acquire, restore, or manage land, the benefits and potential impacts are site and project-specific depending on the type of habitat and resources present.

Conserve, manage, and restore habitat that is being acquired or is currently under protection. Management plans are often developed and implemented to enhance the conservation value of acquired parcels or parcels under protection. Management plans could provide for habitat management or restoration activities in conservation areas to maintain or enhance habitat quality or ecosystem condition; they could also include public access or amenities, or controls on public access. Such plans would identify system modifications that could enhance habitat quality or ecosystem condition, and could consider how multiple protected land parcels can be jointly managed to support multiple life stages of a species or improve the overall condition of a receiving water body.

Conservation, restoration and management approaches identified in plans might include altering land cover or land management, such as reforestation, fire management, removing invasive plant species or eliminating artificial water diversions or use of water diversions to establish the restored hydrologic condition.

5.3.3.6 Restore Oysters

This project type involves restoring or creating oyster reefs to enhance or expand available intertidal or subtidal oyster reef habitat. Appropriate restoration techniques for this project type include but are not limited to:

1. Restore or create oyster reefs through placement of natural or other appropriate materials
2. Enhance oyster production through cultch placement, relay, or cultivation

Restore or create oyster reefs through placement of natural or permissible materials. Oyster reef restoration has been demonstrated to be successful; however, careful project siting is crucial. Projects need to consider basic factors such as suitable substrate, remains of previous oyster reefs, adequate spat set, fouling organisms, currents, predation rates, disease prevalence and intensity, salinity ranges, and tidal elevation. In addition, substrate should be at an appropriate depth to allow for optimal oyster growth and development. The reef location should also have sufficient tidal flushing to provide ample food for oysters. Reefs constructed with natural material (e.g., oyster or other bivalve shells) provide the texture and chemical cues that attract oyster larvae and increase recruitment. However, oyster shell is often expensive and is not always available in large quantities at an economically feasible scenario to build reefs. Other material, such as limestone, concrete, and engineered structures can also be used to create or enhance reefs.

Commercial oysters are harvested from sub-tidal areas, but intertidal oysters are believed to be important as a source of larvae to maintain populations of both intertidal and sub-tidal oysters. Not all oyster reef creation projects are for the purpose of harvest. Oyster restoration may include placement of oyster cultch material near on exposed shorelines to establish or reestablish intertidal oyster reef and enhance or increase secondary productivity.

Enhance oyster production through cultch placement, relay, or cultivation. Oyster production can be enhanced through placement of cultch materials, relay/relocation, or cultivation. Cultch material consists of limestone rock, crushed concrete, oyster shell and other similar material that, when placed in oyster spawning areas, provides a substrate on which free floating oyster larvae can attach and grow into oysters. In the case of projects to relocate reefs, cultch material including live oysters would be harvested from areas with unsuitable or poor habitat conditions and placed in other areas with more optimal conditions for growth. Suitable areas generally have strong bottom currents in bay bottoms and intertidal and subtidal areas. In the case of projects intended to expose suitable substrate for oyster recruitment, existing oyster reef substrate would be “turned over” using bagless oyster dredges to expose suitable surfaces and enhance spat set.

5.3.3.7 Restore and Protect Finfish and Shellfish

This project type would restore and protect finfish by encouraging changes in fisheries efforts and gear, and removing fishing-related debris from aquatic environments. For example, gear modifications that reduce direct and bycatch-related fishing mortality can be effective and practical approaches to restoring populations of recreational, commercial and non-target species. Appropriate restoration techniques for this project type include but are not limited to:

1. Provide incentives for a voluntary, temporary reduction in commercial fishing effort
2. Provide incentives for voluntary use of technological innovations
3. Remove debris from freshwater, estuarine, marine, and/or critical habitats

Two of these techniques provide incentives to temporarily reduce fishing effort and modify fishing gear. The approaches to reducing fishing mortality described are similar to those used in fisheries

management. They differ in that they could be implemented by means of (1) remunerative contracts with commercial fishers to voluntarily reduce fishing effort or the catch of specific species, at least temporarily; and (2) incentives and training for commercial fishers to adopt tools and methods to reduce release mortality. There are several different fisheries that would be appropriate for these techniques, such as the pelagic longline fishery.

Provide incentives for voluntary, temporary reduction in commercial fishing effort. One technique involves voluntarily setting aside some fraction of the catch, catch limit, or individual fishing quota for conservation. The reduction in fishing effort would be for a specified period of time and would compensate fishers at fair market value for leaving fish in the water. Compensation details (price, allocation, etc.) and assurance methods would need to be determined, but this type of technique would result in a reduction in fishing mortality, allowing the population that the fishery targets, as well as bycatch species, to be restored more rapidly.

Provide incentives for voluntary use of technological innovations. This restoration approach could involve providing incentives for fishing vessel owners and operators to voluntarily modify fishing gear or practices to reduce fishing and bycatch mortality. Gear modifications can help target specific size classes of fish for harvest in an effort to protect adults or juveniles and increase survival of non-targeted bycatch returned to the water.

Remove debris from freshwater, estuarine, marine, and critical habitats. Finfish and shellfish restoration could also include the removal of debris from marine, estuarine, and freshwater environments that may trap, hook and entangle species. There are multiple sources of marine debris, including fishing gear lost from commercial fishing vessels, recreational boats, and shore-fishing activities. Removal of derelict fishing gear consisting of nets, lines, crab pots, shrimp nets, and other recreational or commercial fishing equipment that has been lost, abandoned, or discarded in the aquatic environment helps prevent unintentional mortalities.

5.3.3.8 Restore and Protect Birds

This project type involves protecting bird populations by reducing mortality and directly restoring habitat. Appropriate restoration techniques for this project type include but are not limited to:

1. Protect bird nests and nesting habitat, and control predators
2. Prevent and control invasive species
3. Create/enhance bird nesting and/or foraging habitat

Protect bird habitats including nests and nesting habitat, and control predators. Protecting bird habitats including nests and nesting habitat can be accomplished through the use of exclusion devices, vegetated buffers, or distance buffers. One of the most common methods for minimizing disturbance to birds is to create buffer zones between human activities and bird areas. Buffer areas minimize visual and auditory impacts associated with human activities near nest sites. Buffer distances would be determined for a particular species or activity relative to the type of activity occurring such as intensity of activity, time of year, and sensitivity of the species. Seasonal restrictions could be implemented to decrease stress on the birds from the courtship period through fledging of young.

Protecting bird habitats including nests and nesting habitat is important for ensuring the viability of bird populations. Loss of a breeding season and the recruitment of young into the population can result in the gradual decline of a population and can contribute to the decline of a species over the long-term, particularly for range or habitat-restricted species or subspecies. Ground-nesting birds, their eggs, and nestlings are especially vulnerable.

Predation can be a substantial factor when nest sites or colonies are located in habitat that does not afford adequate protection. There are several options for removing or excluding predator threats to nesting birds. Predator control by non-lethal (e.g., exclusionary fencing, live-trapping) and lethal methods consistent with current management practices could be implemented at the discretion of the land-managing agencies based on their evaluation of necessity and feasibility. Non-lethal management of predators on ground-nesting or colonial wading bird species could use techniques that exclude predators from a single nest or from the entire area surrounding a colony. Methods also include baiting, trapping, or hunting, and exclusionary fencing to lessen numbers of undesired wildlife species. These methods help to minimize disturbances associated with human activities and predators that can result in reduced mortality. In addition to predator exclusion or removal, there are other options for minimizing disturbances to nesting birds.

Prevent and control invasive species. Restoration can also focus on removing invasive species that negatively impact bird habitat. There are several methods used to manage land-based or terrestrial invasive species. For plants, these methods include cutting, application of pesticides or herbicides, and biological control to manage plant species.

Create/enhance bird nesting, foraging, and/or other important habitat. Restoration can also focus on creating or enhancing habitat. Creation of habitat can include physical construction of new nesting and/or foraging habitat such as barrier islands and beaches or herbaceous wetlands. Enhancement of habitat can include physical changes to improve nesting and/or foraging habitat such as replanting shoreline vegetation or rotovating (plowing) to remove vegetation for a limited time for certain species.

5.3.3.9 Restore and Protect Sea Turtles

This project type involves restoring and protecting sea turtles through activities that enhance sea turtle habitat, increase the survival of sea turtles at various life stages, or both. Appropriate restoration techniques for this project type include those restoration actions outlined in the Recovery Plans⁴ for each of the impacted Gulf sea turtle species and may include but are not limited to the following restoration examples:

1. Improve nesting beaches
2. Protect and conserve nesting beaches
3. Expand existing stranding networks and rehabilitation capabilities
4. Enhance compliance monitoring through gear monitoring team coordination and enhanced observer monitoring

⁴ <http://www.nmfs.noaa.gov/pr/recovery/plans.htm#turtles>

5. Enhance training and outreach for enforcement personnel to improve expertise in compliance requirements and increased enforcement activities

Improve nesting beaches. The nesting success of sea turtles can be improved by identifying and reducing ongoing threats at nesting sites and protecting and enhancing those nesting sites through threat reduction. Restoration actions that may reduce threats from anthropogenic or natural causes may include ecologically-based predator control or nest relocation where threats cannot be mitigated by other measures. Potential enhancements of nesting sites include, use of turtle-friendly lighting, monitoring, outreach, and education. Education and outreach along with turtle-friendly lighting projects would reduce human light sources, minimizing the potential for hatchlings to become disoriented and increasing the number of hatchlings reaching the water. Nest protection measures that enhance nesting beaches, include identifying, marking and monitoring nesting. Nest detection and enhancement would reduce the potential for predation of eggs, and protect nest sites from human use that could cause harm or destruction of nests. Greater monitoring of nests could improve hatchling survival and result in a higher number of sea turtles surviving to adulthood and reproductive life stages.

Protect and conserve nesting beaches. Many nesting beaches are under threat of development. The protection and conservation of nesting beaches could include purchasing beach-front properties. As sea-levels rise, nesting habitats will become pinched between upland development and the sea. Land purchases could extend the life of nesting beaches by giving the beach/dune system room to migrate landward in response to erosion and sea-level rise.

Expand existing stranding networks and rehabilitation capabilities. Sea turtle restoration could also focus on improving the ability of experts and trained personnel to respond to strandings of sea turtles by expanding stranding networks and rehabilitation capabilities.

Reducing response times to live and dead stranded turtles, increasing assessment efforts to determine mortality sources, and expanding capacity to respond to unusual stranding events would all potentially help turtles. Funding of additional training and responders, as well as for supplies, equipment, data management needs, necropsies, and facilities would increase programmatic capabilities and ultimately increase the number of successfully rehabilitated turtles returned to the Gulf. Achieving this goal could also require additional facilities for stranding and rehabilitation operations and equipment storage as well as providing support for mobile response units to triage and stabilize turtles. Mobile units increase the chances of survivorship and are one of the most often called for resources in cold-stunning events.

Enhance compliance monitoring through gear monitoring team coordination and enhanced observer monitoring. Increases in coordination of gear monitoring teams with other State and Federal agencies in order to avoid duplication of effort, and to allow teams to identify and target areas that are not presently receiving adequate monitoring, could also be part of sea turtle restoration. Courtesy dockside and at-sea inspections by gear specialists would be implemented to provide information on gear requirements and best-use methods. This technique would also provide the training for and increase the number of observers and observer coverage dedicated to specifically designed sea turtle bycatch monitoring. At-sea and dockside inspections by NOAA Fisheries Service gear specialists and marine law enforcement personnel continue to be the most effective means of sustaining compliance with turtle excluder device regulations. Observers and gear monitoring teams provide important information on

protected species interactions with fishing activities, which helps to improve management decisions for protecting and recovering populations. This effort has been shown to be the most effective method of reaching the fishing industry with information on regulated gear requirements and best-use methods (DOC et al. 2011)⁵.

Enhance training and outreach for enforcement personnel to improve expertise in compliance requirements and increased enforcement activities. Training and education could include developing and implementing a State-led Gulf-wide program for enforcement officers to enhance their knowledge and compliance with existing requirements. This technique could include additional money for gas and maintenance of boats to support appropriate increased enforcement activities as well as hiring additional State enforcement personnel. This would support efforts to reduce the sea turtle bycatch mortality in the shrimp trawl or other fisheries across the Gulf. In addition, this could support efforts by local governments to enforce lighting ordinances in beachfront areas.

5.3.4 Alternative 2: Consistency with Programmatic Evaluation Criteria

Alternative 2 is consistent with the programmatic criteria identified in this chapter (Section 5.2), for reasons summarized below:

- The alternative addresses several injuries associated with the incident, by incorporating nine restoration project types that contribute to restoration and/or protection of certain habitats and living coastal and marine resources injured due to the Spill;
- Although natural resource damage assessment activities are ongoing, information available to date indicates that projects within identified categories would help offset injuries to habitats and living coastal and marine resources injured due to the Spill, thereby contributing to the Trustee goal of making the environment and the public whole;
- As described throughout the preceding section of this document, there are multiple, well-established, commonly utilized techniques available for undertaking projects within Alternative 2. Project types that are technically feasible, have a high likelihood of success and can be implemented in conformance with applicable laws, regulations and permits are available; and

⁵ United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2011. Annual Report to Congress on the Bycatch Reduction Engineering Program. Website accessed on January 3, 2012: http://www.nmfs.noaa.gov/by_catch/docs/brep_final_2011.pdf.

- As described in Chapter 6 of this document, the Trustees have carefully considered the potential beneficial and adverse impacts of Alternative 2 project types, and based on that evaluation find that implementation of this Alternative would reasonably limit the potential for collateral injury(ies).

This alternative meets the purpose and need for Early Restoration described in Chapter 1. This programmatic alternative allows the Trustees to consider 9 of the 44 projects described in Chapters 7-12 as the projects proposed for implementation in Phase III. All projects are subject to individual review under OPA, NEPA and other statutes and ultimately to individual decision by the Trustees whether to proceed or not proceed with selection of a given project. If this alternative were selected, projects identified to propose in any specific restoration planning phases (inclusive of Phase III) would focus on, and be limited to, projects restoring for habitats and living and coastal marine resources. Correspondingly, if all of the available Early Restoration funding is expended, relatively more Offsets for habitat and living and coastal marine resources would be established by Early Restoration when compared to alternatives 3 and 4. All accounting for Early Restoration Offsets as credits for injury would be conducted in the final natural resources damage claim.

5.3.5 Alternative 3: Contribute to Providing and Enhancing Recreational Opportunities

Under Alternative 3, the Trustees would focus on pursuing Early Restoration project types and associated specific projects that contribute to providing and enhancing recreational uses lost as a result of the *Deepwater Horizon* oil spill. Three project types are included in this alternative. A short description is provided of each project type, including examples of restoration techniques appropriate for each project type.

5.3.5.1 Enhance Public Access to Natural Resources for Recreational Use

This project type involves creating new or improved access to natural resources for recreational purposes. Despite the popularity of coastal recreation, the public's ability to take advantage of such opportunities can be limited by a lack of access points and/or access infrastructure. Moreover, well-planned public access may help protect natural areas that would otherwise be used as informal access points. Enhanced public access will provide more opportunities for the public to engage in coastal recreational activities such as swimming, boating, fishing, bird watching, beach walking, and photography. Appropriate restoration techniques for this project type include but are not limited to:

1. Improving access to natural resources for recreational use through the construction or enhancement of infrastructure; and
2. Purchase of access rights, easements, and/or property to increase access to resources for recreational purposes.

Improving access to natural resources for recreational use through the construction or enhancement of infrastructure. Access to recreational areas can be improved by enhancing or constructing infrastructure (e.g., boat ramps, piers, boardwalks, dune crossovers, camp sites, or other lodging, educational/interpretive spaces, navigational channel improvements/dredging, safe harbors, navigational aids, ferry service, rebuilding of previously lost facilities, promenades, trails, roads and bridges to access natural resources, and marina pump out stations). Improved public access could also be accomplished by providing or improving water access in publicly owned areas (parks, marinas). This

might also increase boating safety. The construction and operation of boat ramps, piers, or other infrastructure could occur on publicly-owned lands. Larger-scale infrastructure improvements like a ferry service or the construction or improvement of roads and bridges could also serve to improve access to natural resources.

Purchase of access rights, easements, and/or property in areas to increase access to resources for recreational purposes. In some parts of the Gulf, access to shoreline and/or water-based recreational opportunities is limited by the availability of public access points. The targeted purchase of easements, access rights and/or fee simple ownership of property from willing sellers, can provide new access points for public recreational use.

The Department of the Interior has the authority to use Eminent Domain to acquire lands and interests for the public good. However, the Department will not exercise this authority to implement Early Restoration projects in relation to the Spill. Preservation of habitats through acquisition of land or easements will only be from willing sellers or participants. Landowners will be under no obligation to sell to any of the governments associated with the Trustees. Neighbors adjacent to land purchased to gain access to resources under this restoration plan will retain all of their current rights to their land. The government agencies are required to pay fair market value for land purchased. Fair market value will be determined through established appraisal procedures. Where land is occupied, relocation assistance may be available.

5.3.5.2 Enhance Recreational Experiences

This project type involves enhancing the public's recreational experiences. The experience of recreational activities like swimming, boating, diving, bird watching, beach going and fishing can vary depending on the appearance and functional condition of the surrounding environment in which they occur. Appropriate restoration techniques approaches for this project type include but are not limited to:

1. Re-nourish beaches through sediment addition
2. Place stone, concrete, or permissible materials to create artificial reef structures
3. Construction to enhance recreational experiences.
4. Enhance recreational fishing opportunities through aquaculture
5. Reduce and remove land-based debris

Re-nourish beaches through sediment addition. Recreational activities on beaches can be enhanced when beach conditions are improved through the addition of appropriate sediment. Beach re-nourishment or replenishment involves the placement of suitable material from sources outside the natural sources of sediment for the eroding beach. The increased sediment allows for more available area for recreational use which can improve the experience. Identification of suitable borrow material is crucial, including consideration of sediment color, grain size, and other characteristics. These factors are important because introducing different sediment characteristics could negatively impact aesthetics, erosion potential and general use by shoreline fauna as well as decrease the lifespan of the re-nourished beach.

Place stone, concrete, or permissible materials to create artificial reef structures. An artificial reef is defined as a submerged structure that is constructed or placed on the existing substrate in coastal or marine waters. Properly sited, constructed and managed reef sites can be attractive locations for recreation, including fishing, snorkeling, and scuba diving. An artificial reef can be constructed from a variety of different materials including, but not limited to, stone, concrete blocks, decontaminated vessels, or engineered reef unit structures. The site considerations could include locations that enhance or create habitat, support a diversity of fishery resources, and do not impede or interfere with navigation. Artificial reefs enhance recreational opportunities for users such as anglers, snorkelers, and divers.

Construction to enhance recreational experiences. Besides providing access, new construction can benefit the recreational experience by providing for wildlife viewing platforms and fish cleaning shelters for example. New construction could provide meeting spaces for resource-based education and other programs.

Enhance recreational fishing opportunities through aquaculture. This technique can include the breeding, rearing, and release of finfish and shellfish species into the Gulf of Mexico and adjacent coastal bays to increase densities of target species so that recreational fishing opportunities are enhanced.

In the context of Early Restoration, stock enhancement programs could have one or more goals that include providing additional catch for recreational anglers (and potentially commercial anglers), providing information to fishery managers, and/or helping to mitigate losses suffered from anthropogenic effects. This could include the expansion of existing hatchery operations, the construction of new facilities, and the release and monitoring of finfish and shellfish species reared in those facilities. Fishery managers may also use this learning to inform management decision-making, with the potential to enhance recreational experiences. For example, techniques for bait and sport fish hatchery production and holding systems can be developed and refined. Fish produced in hatcheries can be marked, released, and monitored for the purpose of informing fishery managers about the recruitment, survival, and population health of recreationally significant marine fish species.

Each stock enhancement project will be evaluated on a project-specific basis that identifies its goals and objectives and ensures quantification of those parameters that enable measurement of project success. Any stock enhancement project must utilize the 'Responsible Approach' techniques that have been outlined by Blankenship and Leber (1995) and Lorenzen et al., 2010)⁶.

Reduce and Remove Land-Based Debris. Storm-induced debris, in addition to intentional or unintentional disposal of domestic or industrial wastes, can be sources for land-based debris entering the ocean. Land-based debris can be disturbing and disruptive to recreational activities like hiking, beach going, and boating. Removal of marine debris not only restores beauty of coastal environment but removes potentially harmful debris for humans and wildlife.

Efforts to reduce land-based debris could incorporate public education and awareness, as well as physical removal of debris. Specific techniques for removing land-based debris are varied and will depend in large part on the characteristics of the relevant habitat and debris. In general, techniques can be categorized into two types: 1) manual methods (e.g., workers using hand tools); and 2) mechanized methods (e.g., utilizing ATV or tractors with sifters, backhoes, roll-off dumpsters and/or similar machinery).

5.3.5.3 Promote Environmental and Cultural Stewardship, Education, and Outreach

This project type involves providing and enhancing recreational opportunities through environmental and cultural stewardship, education, and outreach activities. Educational activities would provide additional recreational opportunities that improve the connectedness of the public to the environment and develop an awareness and appreciation for natural and cultural resources of the Gulf of Mexico. Appropriate restoration techniques for this project type include but are not limited to:

1. Create or enhance natural resource related education facilities
2. Create or enhance natural resource related education programs

⁶ Such 'Responsible Approach' techniques include, but are not limited to: structuring the project around the specific restoration goal(s); evaluating habitat needs and conditions (abundance of prey and predators) to ensure adequate habitat availability and suitability for stocked individuals; managing and assessing ecological impacts through a well-designed hatchery/broodstock and release program (e.g., ecosystem, genetic, and disease management); assessing the economic and social benefit and costs; incorporating post-release monitoring protocols (i.e., identification of stocked individuals, contribution and potential substitution rates); and, utilizing adaptive management (e.g., modify or cease stocking program depending on monitoring and evaluation results).

Lorenzen, K., K. M. Leber, H. L. Blankenship, 2010. Responsible approach to marine stock enhancement: An update. *Reviews in Fisheries Science*, 18:189-210.

Blankenship, H.L. and Leber, K.M. 1995. A responsible approach to marine stock enhancement. *American Fisheries Society Symposium*, 15:167-175.

Create or enhance natural resource related education facilities. Education facilities could include, but are not limited to, museums, aquariums, cultural centers, interpretive centers, natural laboratories for researchers and students, research and teaching laboratories, and classrooms and offices for technical and support personnel, in order to educate visitors about injured resources resulting from the Spill and/or the recovery of those resources. The aim of these facilities is to provide a location in which environmental and cultural education and outreach can occur through a variety of different mediums. These facilities could vary in form, content, and even function but would concentrate on the coastal resources of the Gulf of Mexico.

Create or enhance natural resource related education programs. The focus on coastal resources could stimulate the general public's interest and understanding of the natural science, environment, and cultural history of the Gulf coastal region. This interest would be enhanced by providing educational features for both the public and students through coastal exhibits and collections, hands-on activities, educational outreach programs related to coastal resources, and other interactive activities. The public would learn about the complexity and importance of coastal ecosystems and come away with a better understanding of the surrounding marine ecosystems of the Gulf and the impact humans are having on these environments. These programs could link recreational activities such as bird watching, hiking, and fishing with educational components, such as including a bird specialist with a bird watching group, including an interpretive trail on hikes near educational facilities, or combining a youth fishing pond with educational information on the management of recreational fishing in the Gulf of Mexico.

5.3.6 Alternative 3: Consistency with Programmatic Evaluation Criteria

Alternative 3 is consistent with the programmatic criteria identified in this chapter (Section 5.2), for reasons summarized below:

- The alternative incorporates multiple project types to address a different and important type of injury caused by the Spill and not captured in Alternative 2: lost and degraded recreational use of Gulf resources;
- Although natural resource damage assessment activities are ongoing, information available to date indicates that recreational use impacts caused by the Spill are substantial, and this alternative contributes to the Trustee goal of making the environment and the public whole in a complementary, albeit different manner than Alternative 2;
- As described throughout the preceding section of this document, there are multiple, well-established, commonly utilized techniques available for undertaking projects within Alternative 3. Project types that are technically feasible, have a high likelihood of success and can be implemented in conformance with applicable laws, regulations and permits are available; and
- As described in Chapter 6 of this document, the Trustees have carefully considered the potential beneficial and adverse impacts of Alternative 3 project types, and based on that evaluation find that implementation of this Alternative would reasonably limit the potential for collateral injury(ies).

This alternative meets the purpose and need for Early Restoration described in Chapter 1. This programmatic alternative allows the Trustees to consider 35 of the 44 projects described in Chapters 8-12 as the projects proposed for implementation in Phase III. All projects are subject to individual review

under OPA, NEPA and other statutes and ultimately to individual decision by the Trustees whether to proceed or not proceed with selection of a given project. If this alternative were selected, projects identified to propose in any specific restoration planning phases (inclusive of Phase III) would focus on, and be limited to, projects addressing lost recreational use. Correspondingly, if all of the available Early Restoration funding is expended, relatively more Offsets for recreational use loss would be established by Early Restoration when compared to alternatives 2 and 4. All accounting for Early Restoration Offsets as credits for injury would be conducted in the final natural resources damage claim.

5.3.7 Alternative 4: (Preferred Alternative) Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities

Alternative 4 is the Trustees' preferred alternative. Under Alternative 4, the Trustees would focus on pursuing Early Restoration project types and associated specific projects that contribute to the initial restoration and protection of certain habitats and living coastal and marine resources, and to restoring for lost recreational uses. This alternative combines project types allows for proposal and consideration of all specific projects described in Chapters 8-12 appropriate for Early Restoration described in both Alternatives 2 and 3.

5.3.8 Alternative 4: (Preferred Alternative) Consistency with Programmatic Evaluation Criteria

Alternative 4 is consistent with the programmatic criteria identified in this chapter (Section 5.2). As described above, Alternative 4 is a combination of Alternatives 2 and 3, each of which are consistent with programmatic evaluation criteria individually. Combining the two alternatives would allow the Trustees to address a larger number of injuries caused by the Spill than addressed by Alternatives 2 or 3 individually and contribute more broadly to the Trustee goal of making the environment and the public whole, using techniques that are commonly utilized, feasible, highly likely to succeed, and reasonably limited in their potential to cause collateral injury.

This alternative meets the purpose and need for Early Restoration described in Chapter 1. This programmatic alternative allows the Trustees to consider all of the 44 projects described in Chapters 8-12 as the projects proposed for implementation in Phase III. All projects are subject to individual review under OPA, NEPA and other statutes and ultimately subject to individual decision by the Trustees whether to proceed or not proceed with selection of a given project. If the Trustees select the preferred alternative, projects proposed in any specific restoration planning phases (inclusive of Phase III) would focus on projects that restore habitats and living and coastal marine resources as well as projects that address lost recreational use. Correspondingly, if all of the available Early Restoration funding is expended, a more diverse set of projects might be expected under Early Restoration when compared to alternatives 2 and 3. The Trustees currently prefer this alternative since it allows a wider range of restoration project types to be considered to address injured resources. All accounting for Early Restoration Offsets as credits for injury would be conducted in the final natural resources damage claim.

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CHAPTER 6: ENVIRONMENTAL CONSEQUENCES

This Chapter describes the predicted consequences, or effects, of implementing Phase III Early Restoration alternatives proposed in Chapter 5 on the physical, biological, and human environment described in Chapter 3. This Chapter is organized as follows:

- Section 6.1 provides a brief description of the Early Restoration project area and description of the scope of the analysis for which environmental consequences have been determined.
- Section 6.2 provides definitions of impact determinations and their significance, using resource-specific criteria for the determinations.
- Sections 6.3 through 6.7 present the analysis of the environmental consequences of alternatives by resource. Impacts on the physical and biological environments are further disaggregated by each of the 12 project types (organized by alternative) identified in Chapter 5. For each project type, potential restoration techniques are noted. Impacts on the human use¹ and socioeconomic environment are presented in consideration of project types in their aggregate for each alternative.
- Section 6.8 summarizes the range of impact findings for each alternative.
- Section 6.9 provides an analysis of cumulative impacts of proposed alternatives by resource.
- Section 6.10 provides a discussion of other required findings under NEPA, including unavoidable adverse impacts, the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity, irreversible and irretrievable commitment of resources. The section also includes a discussion of climate change.
- Appendix 6-A provides examples of potential mitigation measures and Best Management Practices (BMPs) that could be implemented to further reduce potential effects to various resources on a project-specific basis.
- Appendix 6-B presents examples of cumulative actions that are ongoing in the Gulf of Mexico.

6.1 Project Area and Scope of Analysis

Although the NRDA regulations do not constrain the geographic location of restoration projects, an area must be defined as the affected environment in order to complete a PEIS which is part of the NEPA process. The area considered as the affected environment for purposes of this PEIS includes the northern Gulf of Mexico and its coastal environment. The ecosystem is comprised of a complex biological community of interacting organisms, including humans, and their physical environment(s). The scope of the analysis is limited to those activities and potential effects from those activities that are reasonably foreseeable from the Early Restoration alternatives (as described in Chapter 5) proposed herein. As discussed above, the analysis is organized by programmatic alternative and project types within the alternatives, as summarized in Table 6-1.

¹ The term “human use” in this chapter, and in Chapters 8 through 12, is specific to the evaluation under NEPA of the potential impacts on those aspects of the human environment not addressed in the assessment of the physical and biological environments. The term ‘human use’ here is not intended to address or substitute for an evaluation of human use in the context of OPA or the OPA implementing regulations.

Table 6-1. Summary of Phase III Early Restoration Project Types by Action Alternatives 2, 3 and 4.

ALTERNATIVE 4	
ALTERNATIVE 2	ALTERNATIVE 3
<ul style="list-style-type: none"> • Create and improve wetlands • Protect shorelines and reduce erosion • Restore barrier islands and beaches • Restore and protect submerged aquatic vegetation • Conserve habitat • Restore oysters • Restore and protect finfish and shellfish • Restore and protect birds • Restore and protect sea turtles 	<ul style="list-style-type: none"> • Enhance public access to natural resources for recreational use • Enhance recreational experiences • Promote environmental and cultural stewardship, education, and outreach

It should be noted that the beneficial environmental effects described in this Chapter’s NEPA analyses, as well as in the environmental impacts portions of Chapters 8 through 12, consider potential direct, indirect, and cumulative impacts that are reasonably foreseeable, as required under NEPA. The NEPA concept of “reasonably foreseeable” differs from the NRDA evaluation of actions to benefit specific injured resources. Chapter 7 provides information on the NRDA component of the project-specific analysis for Phase III and the development of Offsets.

6.2 Determining the Level of Impact

Under NEPA, federal agencies must consider the environmental effects of their actions. These effects may include, among others, impacts to social, cultural, and economic resources, as well as natural resources. To identify those resources that could be significantly impacted by the proposed alternatives and actions, appropriate definitions of *impacts* must first be identified. Table 6-2 provides guidelines for resource-specific definitions for determining effects of programmatic alternatives as well as for individual planned actions.

As defined in NEPA, evaluations should include direct and indirect effects. Effects are defined in the Council for Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [C.F.R.] § 1508.8 and 1508.7) as follows:

- Direct effects, which are caused by the action and occur simultaneous to the activity and at the same place.
- Indirect effects, which are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.
- Cumulative effects are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other

actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In this analysis, effects are described by both the expected duration (short-term, long-term) and the expected intensity (in this analysis, impacts are defined as minor, moderate, or major). The intensity definitions used here are described in terms of adverse impacts (other than for cultural resources, which also include a definition of beneficial impacts). For resource areas where there is no expected effect from project activities, a “no impact” conclusion is made. The analysis of beneficial impacts focuses on the duration (short- or long-term), without attempting to specify the intensity of the benefit. As described further in Section 6.3, a “no impact” conclusion is made for the No Action alternative because the No Action alternative would largely result in a continuation of the conditions as described in Chapter 3, without the benefits to resources intended as a result of Early Restoration.

All projects conducted as part of Early Restoration would secure all necessary state and federal permits, authorizations, consultations or other regulatory processes related to sensitive habitats (e.g. wetlands or Essential Fish Habitat)) and protected species (e.g. marine mammals such as manatee, federal or listed species such as sea turtles, etc.), and other applicable requirements. Chapter 7 provides an overview of other key applicable laws and regulations, and more specific information is provided in the project-specific analyses in Chapters 8 through 12. For example, if individual Phase III Early Restoration actions, or projects conducted under future phases of Early Restoration, have the potential to affect an ESA-listed species or designated critical habitat, consultation with NMFS or USFWS would occur and, if necessary, a biological opinion would be prepared. Avoidance of identified locations for threatened and endangered species would be implemented on a site-specific basis. It is important to note that some restoration techniques are intended to benefit listed species and their habitats and would intentionally be targeted to occur in locations where species are or may be present. The analysis also assumes that restoration projects would be implemented in appropriate locations and with proper design criteria.

Appendix 6-A provides a listing of example BMPs and mitigation measures that could be included as appropriate on a project-specific basis to avoid, minimize, or reduce potential adverse effects to the resources. Additional BMPs and mitigation measures are discussed in Chapters 8 through 12. The potential programmatic environmental consequences described in this Chapter are presented largely without factoring in the types of specific project actions and requirements that could avoid or minimize the potential adverse effects at a project-specific level in planning and implementation. These include but are not limited to steps taken through site selection, engineering and design, use of proven restoration techniques and best management practices, and other conditions or activities required for project-specific regulatory compliance. As part of the project specific environmental review, appropriate BMPs and mitigation measures would be selected prior to project implementation. For example, projects that require use of a borrow source for material to use in upland or submerged habitats (i.e. beach re-nourishment, wetland or marsh creation, etc.) would use appropriate sources that were chemically and physically suitable to the placement site. Another example would be avoiding sensitive habitats during critical periods, such as sea turtle nesting beaches during the nesting season.

In this Chapter, the Trustees choose to indicate the types of impacts that could occur recognizing that they could be mitigated as noted above. This approach assists the Trustees in identifying specific

projects that effectively avoid or minimize collateral harms. For the proposed Phase III Early Restoration projects, project-level actions and requirements anticipated to avoid or minimize adverse effects are considered in the proposed project evaluations in Chapters 8 through 12. Appendix 6-A identifies examples of BMPs and mitigation measures that could be employed, depending on site-specific considerations, for each resource.

Table 6-2. Guidelines for NEPA Impact Determinations in the Draft Phase III ERP/PEIS.

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
Geology and Substrates	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	Disturbance to geologic features or soils could be detectable, but could be small and localized. There could be no changes to local geologic features or soil characteristics. Erosion and/or compaction could occur in localized areas.	Disturbance could occur over local and immediately adjacent areas. Impacts to geology or soils could be readily apparent and result in changes to the soil character or local geologic characteristics. Erosion and compaction impacts could occur over local and immediately adjacent areas.	Disturbance could occur over a wide-spread area. Impacts to geology or soils could be readily apparent and could result in changes to the character of the geology or soils over a wide-spread area. Erosion and compaction could occur over a wide-spread area. Disruptions to substrates or soils may be permanent.
Hydrology and Water Quality	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable, but it could be small and localized. The effect could only temporarily alter the area's hydrology, including surface and groundwater flows.</p> <p><u>Water Quality:</u> Impacts could result in a detectable change to water quality, but the change could be expected to be small and localized. Impacts could quickly become undetectable. State water quality standards as required by the Clean Water Act could not be exceeded.</p> <p><u>Floodplains:</u> Impacts may result in a detectable change to natural and beneficial floodplain values, but the change could be expected to be small, and localized. There could be no appreciable increased risk of flood loss including impacts on human safety, health, and welfare.</p> <p><u>Wetlands:</u> The effect on wetlands could be measurable, but small in terms of</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable, but small and limited to local and adjacent areas. The effect could permanently alter the areas hydrology including surface and groundwater flows.</p> <p><u>Water Quality:</u> Effects to water quality could be observable over a relatively large area. Impacts could result in a change to water quality that could be readily detectable and limited to local and adjacent areas. Change in water quality could persist; however, could likely not exceed state water quality standards as required by the Clean Water Act.</p> <p><u>Floodplains:</u> Impacts could result in a change to natural and beneficial floodplain values and could be readily detectable, but limited to local and adjacent areas. Location of operations in floodplains could increase risk of flood loss including impacts on human safety, health, and welfare.</p> <p><u>Wetlands:</u> The action could cause a measurable effect on wetlands indicators</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable and wide-spread. The effect could permanently alter hydrologic patterns including surface and groundwater flows.</p> <p><u>Water Quality:</u> Impacts could likely result in a change to water quality that could be readily detectable and wide-spread. Impacts could likely result in exceedance of state water quality standards and/or could impair designated uses of a water body.</p> <p><u>Floodplains:</u> Impacts could result in a change to natural and beneficial floodplain values that could have substantial consequences over a wide-spread area. Location of operations could increase risk of flood loss including impacts on human safety, health, and welfare.</p> <p><u>Wetlands:</u> The action could cause a permanent loss of wetlands across a wide-spread area. The character of the wetlands could be changed so that the functions typically provided by the wetland could be permanently lost.</p>

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
		area and the nature of the impact. A small impact on the size, integrity, or connectivity could occur; however, wetland function could not be affected and natural restoration could occur if left alone.	(size, integrity, connectivity) or could result in a permanent loss of wetland acreage across local and adjacent areas. However, wetland functions could only be permanently altered in limited areas.	
Air Quality and Greenhouse Gas Emissions	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The impact on air quality may be measurable, but could be localized and temporary, such that the emissions do not exceed the Environmental Protection Agency's (EPA's) de minimis criteria for a general conformity determination under the Clean Air Act (40 C.F.R. 93 § 153).</p> <p>The contributions to GHGs may be measurable, but below 25,000 metric ton/year of carbon dioxide (CO₂) or its equivalent.²</p>	<p>The impact on air quality could be measurable and limited to local and adjacent areas. Emissions of criteria pollutants could be at the EPA's de minimis criteria levels for general conformity determination. The contribution to GHG emissions could exceed 25,000 metric tons of CO₂ or its equivalent annually.³ Although the level of emissions could be similar to a large source (i.e. natural gas and petroleum users, landfills, agriculture, etc.), the levels could not be a dominant contributor to GHGs in the area.</p>	<p>The impact on air quality could be measurable over a wide-spread area. Emissions are high, such that they could exceed the EPA's de minimis criteria for a general conformity determination.</p> <p>The contribution to GHGs could exceed 25,000 metric tons of CO₂ or its equivalent annually. The source could be a dominant contributor in terms of GHG in the area.</p>
Noise	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project.</p>	<p>Increased noise could attract attention, but its contribution to the soundscape could be localized nor could it affect current user activities.</p>	<p>Increased noise could attract attention, and contribute to the soundscape including in local areas and those adjacent to the action, but could not dominate. User activities could be affected.</p>	<p>Increased noise could attract attention, and dominate the soundscape over wide-spread areas. Noise levels could eliminate or discourage user activities.</p>
Habitats	<p><u>Short-term:</u> Lasting less than two growing seasons.</p> <p><u>Long-term:</u> Lasting longer than two growing seasons.</p>	<p>Impacts on native vegetation may be detectable, but could not alter natural conditions and be limited to localized areas. Infrequent disturbance to individual plants could be expected, but</p>	<p>Impacts on native vegetation could be measurable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations</p>	<p>Impacts on native vegetation could be measurable and wide-spread. Frequent disturbances of individual plants could be expected, with negative impacts to both local and regional population levels. These</p>

² "The reference point of 25,000 metric tons of direct CO₂-equivalent GHG emissions may provide agencies with a useful indicator – rather than an absolute standard of insignificant effects -- for agencies' action-specific evaluation of GHG emissions and disclosure of that analysis in their NEPA documents. CEQ does not propose this reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, as that term is used by NEPA, but notes that it serves as a minimum standard for reporting emissions under the Clean Air Act." CEQ, "Draft NEPA guidance on consideration of the effects of climate change and GHG emissions." 2010.

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
		<p>without affecting local or range-wide population stability. Infrequent or insignificant one-time disturbance to locally suitable habitat could occur, but sufficient habitat could remain functional at both the local and regional scales to maintain the viability of the species.</p> <p>Opportunity for increased spread of non-native species could be detectable but temporary and localized and could not displace native species populations and distributions.</p>	<p>negatively, but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain functional to maintain the viability of the species both locally and throughout its range.</p> <p>Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.</p>	<p>disturbances could negatively affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range.</p> <p>Actions could result in the wide-spread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.</p>
<p>Living Coastal and Marine Resources: Wildlife Species (including birds)</p>	<p><u>Short-term:</u> Lasting up to two breeding seasons, depending on length of breeding season.</p> <p><u>Long-term:</u> Lasting more than two breeding seasons.</p>	<p>Impacts to native species, their habitats, or the natural processes sustaining them could be detectable, but localized and could not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, migrating, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat could remain functional at both the local and range-wide scales to maintain the viability of the species.</p> <p>Opportunity for increased spread of non-native species could be detectable but temporary and localized and could not displace native species populations and distributions.</p>	<p>Impacts on native species, their habitats, or the natural processes sustaining them could be measureable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat could retain function to maintain the viability of the species both locally and throughout its range.</p> <p>Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.</p>	<p>Impacts on native species, their habitats, or the natural processes sustaining them could be detectable, and wide-spread. Frequent responses to disturbance by some individuals could be expected, with negative impacts to feeding, reproduction, migrating, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts could occur during critical periods of reproduction or in key habitats and could result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines.</p> <p>Actions could result in the wide-spread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.</p>

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
<p>Living Coastal and Marine Resources: Marine and Estuarine Fauna, (fish, shellfish benthic organisms)</p>	<p><u>Short-term:</u> Lasting up to two spawning seasons, depending on length of season.</p> <p><u>Long-term:</u> Lasting more than two spawning seasons.</p>	<p>Impacts could be detectable and localized but small. Disturbance of individual species could occur; however, there could be no change in the diversity or local populations of marine and estuarine species. Any disturbance could not interfere with key behaviors such feeding and spawning. There could be no restriction of movements daily or seasonally.</p> <p>Opportunity for increased spread of non-native species could be detectable but temporary and localized and could not displace native species populations and distributions.</p>	<p>Impacts could be readily apparent and result in a change in marine and estuarine species populations in local and adjacent areas. Areas being disturbed may display a change in species diversity; however, overall populations could not be altered. Some key behaviors could be affected but not to the extent that species viability is affected. Some movements could be restricted seasonally.</p> <p>Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.</p>	<p>Impacts could be readily apparent and could substantially change marine and estuarine species populations over a wide-scale area, possibly river-basin wide. Disturbances could result in a decrease in fish species diversity and populations. The viability of some species could be affected. Species movements could be seasonally constrained or eliminated.</p> <p>Actions could result in the wide-spread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.</p>
<p>Living Coastal and Marine Resources: Protected Species</p>	<p><u>Short-term:</u> Lasting up to one breeding/growing season.</p> <p><u>Long-term:</u> Lasting more than one breeding/growing season.</p>	<p>Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, but small, localized, and could not measurably alter natural conditions. Impacts could likely result in a “may affect, not likely to adversely affect” determination for at least one listed species.</p>	<p>Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable and some alteration in the numbers of protected species, or occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local and adjacent population levels. Impacts could occur in key habitats, but sufficient population numbers or habitat could remain functional to maintain the viability of the species both locally and throughout its range. Some disturbance to individuals or impacts to potential or designated critical habitat could occur. Impacts could likely result in a “may affect, likely to adversely affect” determination for at least one listed species. No adverse modification of critical habitat could be expected.</p>	<p>Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, wide-spread, and permanent. Substantial impacts to the population numbers of protected species, or interference with their survival, growth, or reproduction could be expected. There could be impacts to key habitat, resulting in substantial reductions in species numbers. Results in an “Is likely to jeopardize proposed or listed species / adversely modify proposed or designated critical habitat (impairment)” determination for at least one listed species.</p>

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
Socioeconomics and Environmental Justice	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>A few individuals, groups, businesses, properties or institutions could be impacted. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions.</p> <p>Actions could not disproportionately affect minority populations and low-income populations.</p>	<p>Many individuals, groups, businesses, properties or institutions could be impacted. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.</p> <p>Actions could disproportionately affect minority populations and low-income populations. However, the impact could be temporary and localized.</p>	<p>A large number of individuals, groups, businesses, properties or institutions could be impacted. Impacts could be readily detectable and observed, extend over a wide-spread area, and could have a substantial influence on social and/or economic conditions.</p> <p>Actions could disproportionately affect minority populations and low-income populations. However, the impact could be permanent and widespread.</p>
Cultural Resources	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p><u>Adverse impact:</u> The disturbance of a site(s), building, structure or object could be confined to a small area with little, if any, loss of important cultural information potential.</p>	<p><u>Adverse impact:</u> Disturbance of a site(s), building, structure or object not expected to result in a substantial loss of important cultural information.</p>	<p><u>Adverse impact:</u> Disturbance of a site(s), building, structure or object could be substantial and may result in the loss of most or all its potential to yield important cultural information.</p>
Infrastructure	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The action could affect public services or utilities but the impact could be localized and within operational capacities.</p> <p>There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.</p>	<p>The action could affect public services or utilities in local and adjacent areas and the impact could require the acquisition of additional service providers or capacity.</p> <p>Detectable increase in daily traffic volumes (with slightly reduced speed of travel) resulting in slowing down traffic and delays, but no change in level of service (LOS). Short service interruptions (temporary closure for a few hours) to roadway and railroad traffic.</p>	<p>The action could affect public services utilities over a wide-spread area resulting in the loss of certain services or necessary utilities.</p> <p>Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in LOS to worsened conditions. Extensive service disruptions (temporary closure of one day or more) to roadways or railroad traffic.</p>
Land and Marine Management	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The action could require a variance, zoning change or amendment to a land use or area comprehensive or management plan, but could not affect overall use and management beyond the local area.</p>	<p>The action could require a variance, zoning change or amendment to a land use or area comprehensive or management plan, and could affect overall land use and management in local and adjacent areas.</p>	<p>The action could cause permanent changes to and conflict with land uses or management plans over a wide-spread area.</p>

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
Tourism and Recreational Use	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>There could be partial developed recreational site closures to protect public safety. The same site capacity and visitor experience could remain unchanged after construction.</p> <p>The impact could be detectable and/or could only affect some recreationalists. Users could likely be aware of the action but changes in use could be slight. There could be partial closures to protect public safety. Impacts could be local.</p> <p>There could be a change in local recreational opportunities; however it could affect relatively few visitors, or could not affect any related recreational activities.</p>	<p>There could be complete site closures to protect public safety. However, the sites could be reopened after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but could still be available.</p> <p>The impact could be readily apparent and/or could affect many recreationalists locally and in adjacent areas. Users could be aware of the action. There could be complete closures to protect public safety. However, the areas could be reopened after activities occur. Some users could choose to pursue activities in other available local or regional areas.</p>	<p>All developed site capacity could be eliminated because developed facilities could be closed and removed. Visitors could be displaced to facilities over a wide-spread area and visitor experiences could no longer be available in many locations.</p> <p>The impact could affect the most recreationalists over a wide-spread area. Users could be highly aware of the action. Users could choose to pursue activities in other available regional areas.</p>
Fisheries and Aquaculture	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>A few individuals, groups, businesses, properties or institutions could be impacted. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions.</p>	<p>Many individuals, groups, businesses, properties or institutions could be impacted. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.</p>	<p>A large number of individuals, groups, businesses, properties or institutions could be impacted. Impacts could be readily detectable and observed, extend over a wide-spread area, and could have a substantial influence on social and/or economic conditions.</p>
Marine Transportation	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The action could affect public services or utilities but the impact could be localized and within operational capacities.</p> <p>There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.</p>	<p>The action could affect public services or utilities in local and adjacent areas and the impact could require the acquisition of additional service providers or capacity.</p> <p>Detectable increase in daily traffic volumes (with slightly reduced speed of travel) resulting in slowing down traffic and delays, but no change in level of service (LOS). Short service interruptions (temporary closure for a few hours) to roadway and</p>	<p>The action could affect public services utilities over a wide-spread area resulting in the loss of certain services or necessary utilities.</p> <p>Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in LOS to worsened conditions. Extensive service disruptions (temporary closure of one day or more) to roadways or railroad traffic.</p>

		IMPACT INTENSITY DEFINITIONS		
RESOURCE AREA	IMPACT DURATION	MINOR	MODERATE	MAJOR
			railroad traffic.	
Aesthetics and Visual Resources	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	There could be a change in the view shed that was readily apparent but could not attract attention, dominate the view, or detract from current user activities or experiences.	There could be a change in the view shed that was readily apparent and attract attention. Changes could not dominate the viewscape, though they could detract from the current user activities or experiences.	Changes to the characteristic views could dominate and detract from current user activities or experiences.
Public Health and Safety , Including Flood and Shoreline Protection	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>Actions could not result in 1) soil, groundwater, and/or surface water contamination, 2) exposure of contaminated media to construction workers or transmission line operations personnel, and/or 3) mobilization and migration of contaminants currently in the soil, groundwater, or surface water at levels that could harm the workers or general public.</p> <p>Increased risk of potential hazards (e.g., increase likelihood of storm surge) to visitors, residents, and workers from decreased shoreline integrity could be temporary and localized.</p>	<p>Project construction and operation could result in 1) exposure, mobilization and/or migration of existing contaminated soil, groundwater or surface water to an extent that requires mitigation and/or 2) could introduce detectable levels of contaminants to soil, groundwater and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the preconstruction conditions.</p> <p>Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be sufficient to cause a permanent change in use patterns and area avoidance in local and adjacent areas.</p>	<p>Actions could result in soil, groundwater and/or surface water contamination, at levels exceeding federal, state, or local hazardous waste criteria including those established by 40 C.F.R. Part 261; 2) mobilization of contaminants currently in the soil, groundwater or surface water resulting in exposure of humans or other sensitive receptors such as plants and wildlife to contaminant levels that could result in health effects; and 3) result in the presence of contaminated soil, groundwater or surface water within the project area exposing workers and/or the public to contaminated or hazardous materials at levels exceeding those permitted by Federal Occupational Safety and Health Administration (OSHA) in 29 C.F.R. Part 1910.</p> <p>Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be substantial and could cause permanent changes in use patterns and area avoidance over a wide-spread area.</p>

6.3 Programmatic Alternative 1: No Action

Both OPA and NEPA require the evaluation of the considered actions against a No Action alternative. For Early Restoration, the No Action alternative means that the Trustees would not pursue any additional Early Restoration actions at this time. The No Action alternative does not preclude continued development of the Damage Assessment and Restoration Plan (DARP) and supporting PEIS, but no new Early Restoration would be undertaken at this time.

Current management, restoration and stewardship programs and activities are described in Appendix 6-B. There would be no change in these programs and activities anticipated under the No Action alternative, and therefore no change anticipated in the effects of these activities on resources. Similarly, other stressors affecting Gulf resources (described in Chapter 3) would also be expected to continue. This section does not re-analyze the existing conditions described in Chapter 3. The No Action alternative would largely result in a continuation of the conditions as described in Chapter 3, without the benefits to resources intended as a result of Early Restoration.

Descriptions of effects to specific resources under the No Action Alternative are described below.

6.3.1 Geology and Substrates

Under the No Action alternative, Phase III Early Restoration actions that would increase stability and function of upland and near-shore coastal substrates would not be initiated at this time. The types of projects that would utilize sediment borrow resources for restoration would not be pursued at this time and those borrow resources could potentially be available for use by others. Correspondingly, potential adverse effects, ranging from minor to moderate and including both short-term (e.g., turbidity) and long-term (use of the materials) impacts would not occur, and benefits to substrates achieved through the use of these materials for restoration would not be realized at this time.

Geomorphic processes are dynamic. Under the No Action alternative, some coastal areas may stabilize over time, while erosion may increase in other areas. As stated in Chapter 3, sediment resources in the Gulf of Mexico are used for many man-made construction and restoration projects. The Gulf of Mexico Alliance (GOMA) has developed a Gulf Regional Sediment Management Master Plan aimed at improving sediment management practices (GOMA 2009). In addition, State master plans for beneficial use of dredged materials have been developed. These plans would be unaffected by the No Action Alternative.

6.3.2 Water Quality and Hydrology

Adverse localized effects to hydrology and water quality may occur associated with the action alternatives; these are expected to be minor and may include both short and long-term effects related to new facility development and operation. These impacts would not occur under the No Action alternative. Similarly, benefits of the action alternatives, particularly Alternatives 2 and 4, to localized water quality and hydrology, range from short to long-term, and these benefits would not be realized under the No Action alternative. Existing hydrologic and water quality conditions and contributing stressors, as described in Chapter 3, would in large part persist under the No Action and action alternatives.

6.3.3 Air Quality and Greenhouse Gases

Adverse effects to air quality and changes in the emission of greenhouse gases associated with the action alternatives, which range from minor to moderate and include primarily short-term effects associated with construction-related activities, as well as long-term effects related to operation of new facilities such as boat ramps, would not occur under the No Action alternative. Similarly, the short to long-term benefits of the action alternatives, particularly Alternatives 2 and 4, to air quality and greenhouse gas emissions, also would not be realized under the No Action alternative.

6.3.4 Noise

As stated in Chapter 3, there are natural and anthropogenic sources of noise in the coastal environment. Primary sources of terrestrial noise in the coastal environment are transportation and construction-related activities. Adverse noise effects associated with the action alternatives, which range from minor to major and which are primarily short-term in nature, would not occur under the No Action alternative.

6.3.5 Habitats

Adverse effects to habitats associated with the action alternatives would not occur under the No Action alternative. These include minor to major short-term effects and minor and moderate long-term effects. In addition, short to long-term benefits of the action alternatives, particularly Alternatives 2 and 4, to habitats would not be realized under the No Action alternative.

Under the No Action alternative, habitats including wetlands, barrier islands and beaches that are subject to ongoing degradation would continue to be subject to existing stressors. The Trustees are implementing Phase I and Phase II Early Restoration projects that benefit wetlands, sea turtle habitat, dune habitat, and bird habitat. As stated above, these efforts would not be affected by the No Action alternative.

6.3.6 Living Coastal and Marine Resources

Living coastal and marine resources encompass a broad range of species that utilize the Gulf Coast and Gulf waters for some or all life stages (e.g., larval, juvenile, adult) or activities (e.g., breeding, foraging, or migration). While some species utilize this area for only one life stage or activity, such as certain migratory birds that use the area as a stopover, others spend their entire life cycle in the Gulf Coast, such as Gulf sturgeon. Adverse effects to living coastal and marine resources associated with the action alternatives, which could include minor to moderate short-term effects and minor to moderate adverse long-term impacts, would not occur under the No Action alternative. In addition, short to long-term benefits of the action alternatives, particularly Alternatives 2 and 4, to living coastal and marine resources would not be realized under the No Action alternative. The Trustees are implementing Early Restoration projects, identified earlier, that benefit oysters and benthic organisms, and these efforts would not be affected by the No Action alternative.

6.3.7 Socioeconomics and Environmental Justice

Adverse effects to socioeconomics associated with the action alternatives, which could include minor to moderate short-term effects and minor adverse long-term impacts, would not occur under the No Action alternative. Similarly, benefits of the action alternatives, to human use and socioeconomics, including the creation of both temporary and permanent jobs, would not be realized under the No Action alternative. Since no actions would be pursued, there is no potential for disproportionately high

and adverse impacts to minority and low income populations, therefore no environmental justice concerns are raised by pursuit of the No Action alternative.

6.3.8 Cultural Resources

Under the No Action alternative, some cultural resources that may be affected by the Action Alternatives would be preserved in their natural condition. Adverse effects to cultural resources associated with the action alternatives, which could include minor to moderate short-term and long-term adverse effects, would not occur under the No Action alternative.

6.3.9 Infrastructure

Adverse effects to infrastructure associated with the action alternatives, which could include minor to major short-term effects and long-term adverse impacts, would not occur under the No Action alternative. Similarly, benefits of the action alternatives, to infrastructure, such as the creation and improvement of boat ramps and potential benefits associated with shoreline stabilization, would not be realized under the No Action alternative.

6.3.10 Land and Marine Management

Potential effects to land and marine management associated with the action alternatives, including minor to moderate short-term adverse impacts, primarily associated with temporary closures related to construction activities would not be realized under the No Action alternative. Long-term benefits associated with improvements to land and marine areas managed as well as benefits through enhanced environmental education, would not be realized under the No Action Alternative.

6.3.11 Tourism and Recreational Use

Tourism and recreational use in the Gulf Coast region includes a broad range of activities, ranging from beach visitation and boating to hunting and fishing. Effects to tourism associated with the action alternatives, including minor to moderate short-term adverse impacts as well as long-term benefits, would not be realized under the No Action alternative.

6.3.12 Fisheries and Aquaculture

Effects to commercial fisheries and aquaculture associated with the action alternatives, including moderate short-term adverse impacts as well as long-term benefits (e.g., from protection of shorelines and SAV protection and restoration), would not be realized under the No Action alternative.

6.3.13 Marine Transportation

Under the No Action alternative, marine infrastructure would continue to provide important transportation, services, and other important functions. Effects to marine transportation associated with the action alternatives, including short-term and long-term minor adverse impacts and long-term benefits, would not be realized.

6.3.14 Aesthetics and Visual Resources

Aesthetic and visual resource elements include natural features, vistas, or views including shorelines, natural and maintained beaches, mangroves and other wetlands. These can also include urban or community visual elements such as architecture, skylines, or other man made characteristics (see Chapter 3). Effects to aesthetics and visual resources associated with the action alternatives, including

short-term moderate and long-term minor adverse effects and long-term benefits, would not be realized under the No Action alternative.

6.3.15 Public Health and Safety, including Flood and Shoreline Protection

As stated in Chapter 3, delivery of public health and safety to Gulf Coast communities has been complicated by large storm events that have historically caused extensive damage to shorelines as well as infrastructure such as roadways, bridges and buildings. Under the No Action alternative, existing programs that provide public health and safety would continue. Effects to public health and safety associated with the action alternatives, including short-term and long-term minor adverse effects and long-term benefits, would not be realized under the No Action alternative.

Flood risk management refers to methods used to reduce or prevent the detrimental effects of flood waters, including the construction of floodways (man-made channels to divert floodwater), levees, lakes, dams, reservoirs, or gates to hold extra water during times of flooding. Shoreline protection consists of engineered structures or other solutions meant to slow erosion due to rising sea levels and storm wave action. Effects to flood risk management and shoreline protection associated with the action alternatives, including short-term and long-term minor adverse effects and long-term benefits, would not be realized under the No Action alternative.

6.4 Alternatives 2 (and 4): Physical and Biological Environments

This section describes the environmental consequences of Alternative 2 for physical and biological environments. Impacts for physical and biological resources are disaggregated by each of the nine project types identified in Chapter 5 under this Alternative. For each project type, potential restoration techniques are noted. Because Alternative 4 is inclusive of Alternative 2, the analysis of environmental consequences for these project types is the same for Alternative 4 as Alternative 2.

6.4.1 Project Type 1: Create and Improve Wetlands

This project type involves creating or improving wetlands to establish or reestablish conditions conducive to wetland vegetative growth and to restore hydrologic function within wetland habitats. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

1. Create or enhance wetlands through placement of dredged material in shallow water bodies
2. Replant vegetation via propagation and/or transplanting
3. Restore hydrologic connections to enhance coastal habitats
4. Backfill canals including drainage canals, access canals established for petrochemical development and canals constructed for other purposes (i.e., recreational and residential uses)

6.4.1.1 Geology and Substrates

Restoration activities undertaken to create and improve wetlands could benefit nearshore geology and substrates by allowing normal geomorphic processes to resume. This, as well as the planting of vegetation and restoring hydrologic connections, would help prevent further erosional loss of natural geological substrates. This would be a long-term beneficial effect to geology and substrates because effects would extend beyond the construction period. Short-term adverse effects to nearshore geology

and substrates are expected to be minor to moderate and associated with disturbance during the construction phase.

Use of equipment in submerged substrates to excavate material for wetland creation can disturb sediments. This adverse effect would be minor and short-term because actions would be localized and generally would not extend beyond the construction period. Substrates at borrow areas could be disturbed or altered during excavation and construction. These adverse effects would be minor to moderate and long-term because they could affect a localized area, or larger area, and extend beyond the construction period.

Staging and equipment used for re-vegetation, canal backfilling, or restoration of hydrologic connections could also result in impacts to geology and substrates, such as rutting or a temporary increase in local erosion. These adverse effects would be minor and short-term because they would be localized and generally would not extend beyond the construction period. However, compaction of soils by these construction activities would be a long-term, minor adverse effect that would extend beyond the construction period, if staging does not occur on an already paved or otherwise disturbed area.

6.4.1.2 Hydrology and Water Quality

Restoration activities could improve the filtering capacity of wetland recharge zones, improving long-term water quality and hydrologic function. Vegetation replanting could also help, through organic production, accumulation of sediment, reduction of storm surges and limitation of the shoreward extent of saltwater flow, thereby reducing the pace and extent of future surface derived saltwater intrusion and assisting in the maintenance of salinity regimes in brackish and freshwater systems. Removing blockages and improving conveyances would distribute flood water both temporally (to have a lower and longer peak) and spatially (over a larger floodplain area). These would be long-term beneficial effects because they would extend beyond the construction period.

Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion.

6.4.1.3 Air Quality and Greenhouse Gases

During restoration activities there could be short-term minor to moderate adverse impacts to air quality from emissions generated by construction equipment and vehicles. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions.

6.4.1.4 Noise

During the construction period, minor to moderate short-term adverse impacts of noise could occur from dredging, backfilling canals, and other noise-generating restoration activities, depending on the location and the equipment being used and the distance to sensitive receptors such as recreational users or wildlife. Over the short-term, these actions could result in a change in the soundscape which would attract attention. Although such changes would not dominate the soundscape, they could detract

from the current user activities or experiences. However, upon completion of wetland restoration activities, no long-term noise-related impacts would be anticipated.

6.4.1.5 Habitats

The creation and restoration of wetlands (including the expansion of shoreline and marsh edge along barrier islands) would result in a long-term benefit to the health and stability of many important habitats including wetlands, barrier islands, beaches and dunes, areas of SAV and coastal transition zones. These activities could help reestablish native plant communities, stabilize substrates and support sediment deposition, strengthen shorelines, and reduce erosion.

Adverse effects could occur to these habitats from different restoration activities such as dredging, placement of sediment transport pipeline, placement of sediment, filling of canals, or in-water construction work. Adverse impacts could include:

- increased soil erosion, vegetation trampling, vegetation removal, or other disturbance from human activity from project staging or construction, or;
- changes in water quality from turbidity and substrate disturbance from in-water work with heavy equipment, re-vegetation activities.

These impacts would be, for the most part, minor to moderate and would take place over the short-term, during the construction activity. Depletion of sand or sediment at a borrow site could also result in a localized long-term moderate adverse effect to the borrow site habitat due to the disruption of existing conditions and exploitation of sand and sediments. BMPs and other mitigation measures that may be employed to further minimize or contain adverse impacts are detailed in Appendix 6-A.

Adverse impacts from wetland restoration actions would not be expected on regional habitat function and viability because these impacts would be short-term, limited to the restoration site, and would only occur during construction. Ultimately, this restoration technique would be a long-term benefit to wetlands.

6.4.1.6 Living Coastal and Marine Resources

Creating and improving wetlands and shallow water habitats could provide a long-term benefit to coastal and marine resources by reducing or preventing erosion and establishing more stable habitats. Restoring hydrologic connections could support salinity regimes that are conducive to oyster growth. In addition, the creation and restoration of wetlands could provide a long-term benefit by enhancing nesting and/or foraging habitat for birds as well as increasing habitat for terrestrial wildlife. Finfish could also benefit from wetlands restoration, which could provide habitat for foraging, spawning, and shelter. Stabilizing sediment from re-vegetation would indirectly result in a long-term benefit to pelagic microfaunal communities through improved water clarity and enhanced photosynthesis.

Some short-term minor adverse effects could occur if resources, including oysters, fish, sea turtles, marine mammals, benthic communities, and pelagic microfaunal communities are present in the construction area. Possible impacts could include increased turbidity, reduction of water quality, noise pollution, and disruption to the water column and habitat. In particular, dredging, replanting, or other construction activities could result in the following adverse impacts:

- Dredging sediment from borrow areas could have a short-term, minor effect to oyster populations near the borrow site from increased turbidity and siltation, which may increase mortality and inhibit spawning activities.
- Direct mortality of benthic organisms would likely occur in work areas. Other adverse effects to benthic organisms would include covering and destroying suitable habitat, increasing turbidity during construction, and changing soil and water chemistry (e.g., salinity). These effects would be long-term and minor because affected benthic organisms would be limited to the localized area where wetland restoration work occurred.
- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb or kill some pelagic microfaunal organisms. These impacts would be short-term and minor because, at the community level, pelagic microfaunal communities could move away to other readily available habitat areas;
- Fish present in the work area could be temporarily displaced, or eggs and larvae could be killed due to smothering or crushing by equipment, construction activity, or sediment placement. Fish could also be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could also result in mortality of individual finfish. At the community and population level, these would be minor short-term adverse effects that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Sea turtle and marine mammal individuals present in project areas where dredging or underwater use of equipment is occurring could be subject to temporary increased noise, turbidity, and water quality changes as well as alteration or loss of forage or nesting habitat, all of which could temporarily displace individuals or prey during construction and could result in short-term, minor impacts. If projects may incidentally harass marine mammals or adversely affect ESA-listed marine mammals or sea turtles, consultation or authorizations with appropriate agencies would be required prior to project implementation.
- Construction in upland habitats could result in short-term impacts due to operation and staging of heavy equipment which can create noise, reduce or remove available habitat or disrupt normal movement of wildlife. As such, bird and terrestrial wildlife individuals that forage or nest in or near the work area could be temporarily disturbed or displaced. Changes in depths at marsh habitat could also displace some invertebrate species that are attracted to the former habitat. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

Some minor long-term impacts could occur if restoration activities fill in existing wetlands and provide access for native and non-native terrestrial animals that could increase predation of local nesting birds.

6.4.2 Project Type 2: Protect Shorelines and Reduce Erosion

This project type involves developing shore protection systems to slow or prevent erosion by stabilizing the shoreline through the use of engineered structures which can serve as breakwaters, reefs and

platforms for vegetation. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

- Construct breakwaters on/or adjacent to shoreline; and
- Construct living shorelines.

6.4.2.1 Geology and Substrates

Placement of breakwaters and living shorelines could benefit geology and substrates by reducing erosion and increasing the lifespan of shorelines near passes, inlets, or in areas where erosion rates are high and sediment supply is limited. These effects would be long-term because they would last beyond the construction period.

Adverse effects could occur to geology and substrates from installation of shore protection systems. Use of equipment in submerged substrates would disturb sediments; these actions would result in short-term minor adverse effects limited to the area where construction activity occurred. Placement of structures such as living shorelines would permanently cover existing geology and substrates. Adverse effects from soil compaction and rutting of adjacent shoreline substrates during construction may also occur. These adverse effects would be minor to moderate and long-term, because they would affect substrate/geologic characteristics of the adjacent shoreline, and could extend beyond the construction period.

6.4.2.2 Hydrology and Water Quality

Shoreline protection and erosion reduction could generally help reduce storm surges on coastal wetlands, and limit the shoreward extent of saltwater flow. These actions could reduce the pace and extent of future saltwater intrusion to freshwater and brackish systems and reduce erosion and loss of the wetlands and channel networks. This could be a long-term beneficial effect because it would extend beyond the construction period.

Equipment usage and boating traffic in construction areas could pose a minor short-term adverse effect by increasing the risk of water quality contamination during the construction period. In addition, the installation of shore protection systems could increase turbidity. This would be a minor short-term adverse effect because it would be localized and would only occur during the construction period.

6.4.2.3 Air Quality and Greenhouse Gases

Project construction would require the use of equipment and vehicles, emissions from which could result in minor to moderate adverse impacts to air quality in the project vicinity. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. Examples of estimated project-specific emissions are described in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project.

6.4.2.4 Noise

During the construction period, adverse impacts to the environment due to an increase in the ambient noise level could occur, particularly along shorelines where construction activities would take place. The severity of impacts would depend to a large degree on the location of the project, the amount of noise

that these activities would generate, and the distance to sensitive receptors such as recreational users or wildlife. Installation activities, equipment operation, and vehicle or boat traffic associated with the construction of breakwaters and living shorelines could result in short-term minor to moderate adverse impacts from noise. For example, during the use of motorized heavy equipment such as cranes and barges, noise would be created which could be readily apparent and attract attention. Although such changes would not dominate the soundscape and some sounds could be dampened or masked by ambient wave or ship noise, these actions could detract from the current user activities or experiences and create audible contrast for visitors in the project area.

Over the long-term these features placed along shorelines as a result of restoration activities would become part of the background noise and would not attract attention, dominate the soundscape, or detract from current user activities or experiences.

6.4.2.5 Habitats

Placement of breakwaters and other shore protection systems could protect wetlands, barrier islands, beaches, coastal transition zones, SAV and shallow water habitats by reducing erosion rates, increasing wetland sediment deposition, and prolonging habitat lifespans, which would provide a long-term benefit.

Adverse effects to wetlands could occur if existing wetlands or wetland vegetation were present in the project area where restoration-related construction activities would occur. Construction effects could include filling, disruption, or alteration of wetlands. These effects would be minor because they would be limited to the local area, and may range from short-term to long-term.

Adverse effects to SAV and shallow water habitats could occur where in-water work with heavy equipment is used to place engineered structures. These effects would include covering existing SAV meadows or increasing turbidity during construction. Turbidity would dissipate quickly and effects from this water quality change would be minor and short-term. However, adverse effects from covering SAV would be minimized due to pre-construction surveys in specific project locations; impacts to SAV could be minor and would be avoided and minimized to the maximum extent practicable.

Short-term minor to moderate adverse effects to coastal transition zones could occur during construction from the use of heavy equipment. In addition, the introduction of breakwaters could have short-term to long-term and minor to moderate adverse effects on coastal transition zones from altered flood control or hydrology.

6.4.2.6 Living Coastal and Marine Resources

Placement of breakwaters and living shorelines could protect eroding wetlands and shallow water habitats and, in some cases, would allow for additional wetlands and shallow water habitat creation on the shore side of the constructed breakwaters. These actions would provide long-term benefits to benthic populations, pelagic microfaunal communities, and finfish, by increasing habitat and foraging areas. In addition, the actions could protect foraging habitat and roosting locations for birds, which would be a long-term benefit. Construction of breakwaters could also result in a long-term benefit to terrestrial and marine mammals, sea turtles and birds by providing expanded stabilized beach areas that are suitable foraging and nesting habitat along the Gulf Coast.

Placement of breakwaters and living shorelines would require use of in-water heavy equipment and sediment placement, which would increase human activity, noise, vibration, and turbidity in the short-term. These activities could result in the following adverse impacts:

- Short-term minor impacts to local oyster populations or other benthic organisms may occur from increased turbidity, substrate disturbance, or siltation during construction.
- Short-term, minor disturbance or loss of pelagic microfaunal communities from increased turbidity, which decreases available light necessary for photosynthesis, and from disruption in the water column and surface water. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once turbidity dissipates; ;
- Short-term, minor displacement of finfish individuals or mortality of individual finfish, including adults, eggs, or larvae, could occur during construction, depending on timing and location of construction and affected species. However, it is anticipated that finfish would move away to other readily available aquatic habitats during the construction period. Fish present in the dredging or fill-placement area could be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could result in mortality of individual finfish. Overall, this would be a minor short-term adverse effect that would not be expected to reduce local fish populations or designated EFH. If projects have a potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Short-term, minor to moderate displacement of sea turtle and marine mammal individuals from the work area due to increase in activity, noise, vibration, and turbidity during construction. These impacts would be short-term and minor and would affect localized areas only. If projects have potential for incidental harassment of marine mammals or adverse effects to ESA-listed marine mammals or sea turtles, authorizations and consultations with appropriate agencies would be required prior to project implementation.
- Short-term minor displacement of local birds and terrestrial species or mortality of intertidal invertebrates could occur during construction, although most wildlife would be expected to move away to forage in other readily available foraging habitat during this activity. Structures that extend above the water surface could also potentially improve predator access to nesting birds, resulting in a minor long-term adverse impact limited to the localized area of breakwater placement. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

6.4.3 Project Type 3: Restore Barrier Islands and Beaches

This project type involves restoring barrier islands and beaches which provide important coastal habitat. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

- Re-nourish beaches through sediment addition
- Restore dune and beach systems through the use of passive techniques to trap sand
- Restore barrier islands via placement of dredged sediments
- Plant vegetation on dunes and back-barrier marsh

- Construction of groins, breakwaters, or sediment by-pass structures

6.4.3.1 Geology and Substrates

Placement of appropriate soils on eroding beaches and/or dune systems could benefit geology and substrates by helping stabilize eroding areas. In addition, passive or active efforts to capture sediments and reintroduce them to the system would also help to stabilize these areas. These effects would be long-term because they would last beyond the construction period.

Adverse effects from beach re-nourishment and barrier island restoration may occur to geology and substrates from construction activities. Use of equipment in submerged substrates to excavate material for beach re-nourishment can disturb sediments, which would be a short-term minor effect limited to the area where excavation occurred. Staging and heavy equipment use for beach re-nourishment could result in minor short-term impacts to upland geology and substrates. Borrow sources for beach re-nourishment may occur in upland or submerged areas, which would be disturbed during excavation and removal and the structure of existing soils and geology could be altered. These adverse effects would be minor and long-term because disturbance would be limited to the local area. Placement of structures such as groins or footings may permanently cover existing geology or substrates, effects of which would be minor and long-term because they are limited to the local area. In some areas, hard shoreline protection near beaches may lead to accretion near the structure and accelerated erosion around the ends of the structure. Because hard structures may cause net beach erosion, construction of groins and breakwaters may cause long-term minor to moderate long-term adverse impacts in some areas.

6.4.3.2 Hydrology and Water Quality

Beach re-nourishment and, particularly, barrier island restoration have the potential to reduce the effects of future storm surges on nearshore wetlands and associated brackish-water resources. These effects could include reduced erosion/loss of these wetlands and channel networks as well as reduced inland extent of saltwater encroachment during storms. These would be long-term beneficial effects because they would extend beyond the construction period.

The dredging of borrow sources could locally degrade water quality at the borrow site through the disturbance of sediment and increased turbidity. This would be a minor short-term adverse effect because it would be localized and would only occur during the construction period. Placement of sediment in the nearshore environment to re-nourish beaches could cause sedimentation and turbidity in the immediate vicinity of the work area. These effects would be minor and short-term as turbidity would dissipate shortly after placement activities are completed.

6.4.3.3 Air Quality and Greenhouse Gases

During dredging, excavation or placement of materials on barrier islands and beaches, there could be minor to moderate adverse impacts to air quality associated with the use of heavy equipment and vehicles. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the duration and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to an increase in GHG emissions.

6.4.3.4 Noise

During the construction period, local noise levels would increase and minor to major short-term adverse impacts from noise may occur, particularly at barrier islands and beaches where beach re-nourishment activities would take place. The severity of impacts would depend to a large degree on the location of the project, the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. Typically, impacts are expected to range from minor to moderate. The construction or placement of passive techniques to trap sand could result in temporary changes to the soundscape, which would be only slightly apparent to visitors while this technique is being constructed, and would not attract attention, dominate the soundscape, or detract from current user activities or experiences. In these instances, impacts to ambient noise levels would be minor. Dredging activities associated with barrier island restoration and beach re-nourishment, by contrast, could result in short-term minor to moderate impacts due to noise. These activities could adversely impact the soundscape by introducing mechanical dredging, a readily observable audible contrast if occurring in areas where noise would detract from current user activities or experiences. In these instances, short-term impacts of noise would be minor to moderate.

Over the long-term, the restoration activities would not have a noticeable impact on noise levels. The placement of structures such as groins, breakwaters and sediment by-pass structures in natural areas where these elements did not previously occur would not present an audible contrast to natural surroundings. Any added noise from these elements would not be readily apparent and would not attract attention, dominate the soundscape, or detract from current user activities or experiences.

6.4.3.5 Habitats

The purpose of re-nourishing beaches or restoring barrier islands through sediment addition is to re-build and stabilize the area by providing clean sediment or replenishment of suitable materials from borrow sources compatible with the restoration site. The construction of engineered structures such as breakwaters and groins and sediment by-pass methods could decrease erosion of beaches and may increase the lifespan of beaches near passes, inlets, or in areas where erosion rates are high and sediment supply is limited. Benefits would be anticipated from increasing stability and resilience of barrier islands and beaches in the long-term. Re-nourishment of beaches and barrier islands can enhance beach habitat and provide benefits to other habitats, such as wetlands through storm surge protection. These actions could also provide protection for back-bay SAV habitats and coastal and riparian areas by reducing erosion and scouring.

Back barrier marsh and beach stability could be achieved by planting vegetation to reduce erosion and encourage sediment deposition. Restoration of dune and beach systems by passive techniques to trap sand (i.e. placement of sand fencing, hay bales, and recycled Christmas trees and by replanting and re-vegetating) could also stabilize marsh and beach sediments. These actions could contribute to the stability of the shoreline of the barrier island or beach, resulting in a long-term benefit. Planting vegetation on dunes and in back-barrier marshes could also restore the plant community within wetlands, resulting in long-term beneficial effects. Vegetation planting and dune beach restoration could stabilize marsh and beach sediments contributing to the stability and protection of habitats that are critical to the coastal and riparian ecosystem and yield a long-term benefit to coastal transition zones.

Adverse effects to wetlands from beach re-nourishment through sediment addition would occur if existing wetlands or wetland vegetation were present where restoration associated activities such as dredging, placement of a sediment transport pipeline or in-water construction work take place. The effects could include filling, disruption, or alteration of wetlands. If they occur, these effects would be minor and short-term because they would be limited and localized.

Adverse effects to SAV and shallow water habitats from beach re-nourishment and barrier island restoration may result if sediment deposition occurs in shallow water habitats where SAV is present. Potential adverse impacts on SAV could include covering existing SAV or increasing turbidity during construction. These adverse impacts would be expected to be short-term and minor.

Short-term minor adverse effects to barrier islands or beaches could occur during construction from human activity and/or the use of equipment to place sand traps or plant vegetation on affected dunes, beaches, and marshes. However, hand placement is typically employed for this technique which is a minimally-invasive method. Turbidity effects would be minimized, short-term and minor. SAV population changes would not occur.

In some areas, hard shoreline protection near beaches may lead to accretion near the structure and accelerated erosion around the ends of the structure. Because hard structures may cause net beach erosion, construction of groins and breakwaters may cause long-term minor to moderate long-term adverse impacts in some areas.

Adverse effects to wetlands could occur if existing wetlands or wetland vegetation were present in the project area and would be affected by filling, disruption, or alteration of wetlands during construction. These effects could be short or long-term, but would be limited to the local area and therefore considered minor.

Short-term minor to moderate adverse effects to beaches, dunes and barrier islands could occur during construction from the use of heavy equipment and from construction activities on the beach area, dunes, barrier islands, and to coastal transition zones.

Adverse effects to SAV could occur in areas where in-water work with heavy equipment is used to place engineered structures. These effects would include covering existing SAV populations or increasing turbidity during construction. However, turbidity would dissipate quickly and be minor and short-term. However, adverse effects from covering SAV would be minimized due to pre-construction surveys in specific project locations; impacts to SAV could be minor and would be avoided and minimized to the maximum extent practicable.

6.4.3.6 Living Coastal and Marine Resources

There are several long-term beneficial effects to finfish expected from enhancing barrier island systems. Beaches contribute to the quantity and quality of adjacent shallow water soft-bottom habitats that serve as nurseries and foraging areas for some finfish. A larger beach area also enables improved food and nutrient exchange to aquatic habitats. Re-nourishment of beaches could provide a long-term benefit to terrestrial wildlife by protecting valuable beach and dune habitat. Such benefits include:

- These beaches are essential for a number of endangered beach mice, protected sea turtles, and other protected species.
- Overall, this project type could provide a long-term benefit to birds by providing crucial habitat for shorebirds. Some species that nest or winter on barrier islands or sandy beaches could benefit long-term due to the restoration of habitat that has been disappearing from development along the coasts. These beaches are essential stopover areas for migratory birds to rest and feed during migration.
- Re-nourishment of beaches through sediment addition and restoration of barrier islands could be a long-term benefit to wildlife populations, and could be a long-term benefit by creating new habitat suitable for beach mice and other terrestrial species that utilize beach habitats.
- Sediment deposition on beaches could reduce erosion rates and thereby provide protection for back-bay habitats where pelagic microfaunal communities may be present. Overall, this could result in a long-term benefit to pelagic microfaunal communities and an indirect, long-term benefit to the food chain to which pelagic microfaunal communities are a fundamental part.
- Nourishment of beaches through sediment addition and restoration of barrier islands would likely be a long-term benefit to bird, sea turtle and beach mice populations by providing expanded stabilized areas of suitable island and beach habitat along the Gulf Coast.
- Placement of sand fencing, hay bales, and recycled Christmas trees, or planting native dune vegetation can restore the plant community and provide additional habitat and foraging area for shoreline organisms, and stabilize and restore existing dune systems.
- Planting vegetation on dunes and in back barrier marshes would restore plant communities and could provide additional habitat and foraging area for other shoreline organisms. Shoreline grasses and other plants tolerant of a dune environment could be used to stabilize dunes. Replanting dune and back-barrier marsh areas could create suitable habitat for birds, benthic communities, finfish, pelagic microfaunal communities, manatees and sea turtles and also stabilize the dune or marsh area. Shoreline habitats landward of the beach could benefit from beach, dune, and back-barrier marsh restoration because restoring these areas could provide protection from storm surge and erosion. This technique could provide long-term indirect benefits to migratory and resident birds as well as nesting sea turtles and beach mice or other terrestrial wildlife by expanding or stabilizing habitat. Additionally, reducing erosion could benefit oyster populations that can be adversely affected by excessive sediment in nearshore waters.
- Upland species may benefit from construction of engineered structures such as breakwaters, groins and sediment by-pass methods which could decrease erosion of beaches and may increase the lifespan of beaches near passes, inlets, or in areas where erosion rates are high and sediment supply is limited. Shoreline habitats landward of the beach could benefit from beach, dune, and back-barrier marsh restoration because restoring these areas could provide protection from storm surge and erosion. This technique could provide long-term benefits to terrestrial wildlife, including protected species such as beach mice and diamondback terrapin.

To facilitate creation and/or restoration of beaches and barrier islands, sediments would be dredged from borrow sources which could result in the following adverse impacts:

- Sediment removed from nearshore waters could impact local oyster populations or other benthic communities near the borrow site from increased turbidity, substrate disturbances or siltation, which could locally increase mortality and inhibit spawning activities in the short-term until silt dissipated.
- Increased turbidity might limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb or kill some pelagic microfaunal communities in the immediate vicinity. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once turbidity dissipates
- Fish present in the dredging or fill-placement area could be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could result in mortality of individual finfish. This would be a minor adverse effect that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Sea turtle and marine mammal individuals present in project areas where dredging or underwater use of equipment is occurring could be subject to temporary increased noise, turbidity, and water quality changes as well as alteration or loss of habitats. If projects have potential to incidentally harass marine mammals or may adversely affect sea turtles, consultations with appropriate agencies would be conducted prior to project implementation.
- Birds that forage in or near the dredge site could be temporarily affected. However, these effects would be short-term and minor as birds would be expected to move away to forage in other readily available foraging habitat during the dredging. If projects may adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

Short-term minor adverse effects to sea turtle nesting habitat could occur from human activity or equipment operation used during installation of passive means to trap sand such as sand fencing, hay bales, and recycled Christmas trees. These materials can become lodged in shallow water habitats near beach placement sites. However, these materials would degrade or wash out with tidal fluctuations and would not be expected to result in adverse effects to terrestrial or marine species that may be in the area.

Some minor short-term displacement of local birds or wildlife could occur during vegetation planting operations. However, increased vegetation in dune and marsh areas could improve habitats that are essential for migratory birds and terrestrial species. Additionally, planting marsh habitats could result in short-term adverse effects to pelagic microfaunal communities due to turbidity and temporary reduction of light availability. Any finfish or other animal species present in the marsh planting areas may also be temporarily disturbed from turbidity or other in-water activities that would cause species to disperse to other areas. These effects would be minor short-term during planting activities only.

Construction in upland habitats could result in short-term impacts due to operation and staging of heavy equipment which can create noise, reduce or remove available habitat or disrupt normal movement of wildlife. These effects would be minor and short-term. If engineered structures were constructed in

areas where protected species may be present, consultations with appropriate agencies would occur prior to project implementation.

If heavy equipment is used to place, modify or replace engineered structures in the aquatic environment minor short-term impacts could include increased sedimentation, increased turbidity, and potential leaking of construction fluids which could affect finfish, marine mammals, benthic organisms or sea turtles that may be present. However, these would be short-term minor effects because species would be expected to move away to other readily available aquatic areas. Long-term impacts to local oyster populations may occur from sediments or other materials placed directly on top of an existing oyster reef/substrate or from removal of existing hard substrate habitats (such as groins or reefs).

6.4.4 Project Type 4: Restore and Protect Submerged Aquatic Vegetation

This project type involves restoring submerged aquatic vegetation (SAV) beds using one or more techniques including re-vegetation and protection of SAV with buoys, signage, and/or other protective measures. These techniques are often used in combination. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

1. Backfill scars with sediment
2. Re-vegetate SAV beds via propagation and/or transplanting
3. Enhance SAV beds through nutrient addition
4. Protect SAV beds with buoys, signage, and/or other protective measures

6.4.4.1 Geology and Substrates

Implementation of restoration activities would provide a long-term benefit to geology and substrates by backfilling blowholes or propeller scars (which result from boat traffic in shallow water areas) with native fill (i.e., local sediment), which could return the seafloor to its original elevation and grade. Stabilizing the substrate with vegetation could also prevent further disturbance of the substrate from tides, wind, waves, vessel wakes, or currents, which can expand scars and blowholes into adjacent areas.

For all implemented techniques, affected areas would be localized and typically small. Backfilling, re-vegetation, bird stakes or fertilizer spikes, and buoys or signage would have only minor, short or long-term local adverse effects on nearshore sediments due to temporary increase in turbidity during construction or installation.

6.4.4.2 Hydrology and Water Quality

SAV helps stabilize shorelines, diffuse the energy of storms, and trap sediment. As such, restoring SAV could help protect shorelines. SAV restoration activities could also improve wetland filter function, slow water velocities and reduce turbidity, and prevent erosion and sedimentation. These would be long-term beneficial effects because they would extend beyond the construction period.

Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion. There would be negligible local disturbance from placement of signs or buoys. Fertilization and bird stakes would increase the long-term risk of adding more nutrients than could be used by plants on-site, resulting in increased nutrient concentration in adjacent or downstream areas. However, given the small scale of fertilizer use, this effect would be minor.

6.4.4.3 Air Quality and Greenhouse Gases

During restoration activities, there could be short-term minor to moderate adverse impacts to air quality from emissions generated by construction equipment and vehicles. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions.

6.4.4.4 Noise

During the construction period, temporary impacts to ambient noise levels would result from SAV restoration activities. The severity of impacts would depend to a large degree on the location of the project and the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. For example, the placement and use of barges and associated equipment for backfilling scars with sediment would temporarily emit noise, which may detract from current user activities or experiences. These short-term construction-related adverse impacts to ambient noise levels would be minor to moderate in nature.

Over the long-term, the SAV restoration activities would not have a noticeable impact on noise. For example, the placement of signage posted to warn boat traffic of the submerged vegetation would not present an audible contrast to natural surroundings. As a result, noise from these elements would not be apparent and would not attract attention, dominate the soundscape, or detract from current user activities or experiences.

6.4.4.5 Habitats

Backfilling scars and re-vegetating the areas as part of restoration activities would be expected to enhance adjacent wetland, barrier island, beach, or other coastal habitats. Restoring SAV resources could, over the long-term, also improve water quality by providing areas of slower moving water that can reduce shoreline erosion rates. These would be long-term benefits to local habitats, because effects would persist beyond the construction period.

Temporary adverse effects could occur to local habitats affected by SAV restoration activities. There could be minor short-term increases in sediment disturbance and turbidity associated with in-water activities such as SAV planting and fertilization, but this would be expected to settle quickly and be limited to the localized area where restoration activities occurred. Short-term minor to moderate adverse effects to barrier islands, beaches, coastal transition zones, or other habitats could also occur from the temporary introduction or staging of construction equipment to remediate, replant, and backfill scars to prepare for re-colonization and transplantation of SAV.

6.4.4.6 Living Coastal and Marine Resources

Increasing SAV ecosystem function and area would expand the amount of available habitat creating a long-term beneficial effect to coastal and marine resources that use those areas.

Adverse effects could occur if resources, including oysters, fish, sea turtles, marine mammals, benthic communities, and pelagic microfaunal communities, are present where restoration activities occur. Mortality of benthic organisms could occur in areas identified for borrow source material dredging and

in-water construction work, where planting of SAV is taking place, or where staking or placement of signs occurs. These effects would be short-term and minor because they would occur only during in-water activities would be limited to small areas.

SAV restoration actions would result in short-term minor impacts to pelagic microfaunal communities due to substrate disturbance and increased turbidity which, when suspended in the water column, could reduce the ability for some pelagic microfaunal species to photosynthesize. Turbidity from replanting efforts would be temporary and would dissipate quickly, and pelagic microfaunal should be able to re-establish readily available habitats.

Restoration activities that involved the use of in-water equipment and sediment disturbance could affect sea turtles, manatees, and other marine mammals through a temporary increase in activity, noise, vibration, turbidity, and alteration or loss of foraging habitat. This could result in temporary displacement of individuals from the work area. Construction activities will vary depending on the type and size of the project but are generally anticipated to be short-term. If projects may incidentally harass marine mammals or may adversely affect ESA-listed marine mammals or sea turtles, authorizations or consultations with appropriate agencies would be required prior to project implementation.

Fish present in the work area could also be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could result in mortality of individual finfish. This would be a minor short-term adverse effect that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.

Birds that forage in or near the restoration site could be temporarily disturbed or displaced. However, these effects would be short-term and minor as birds would be expected to move away to forage in other readily available habitat. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

6.4.5 Project Type 5: Conserve Habitat

This project type involves land acquisition and management actions to conserve Gulf Coast habitats. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include, but are not limited to:

1. Conserve habitat through fee title acquisition
2. Conserve Habitat Through Use Restrictions and/or Management
3. Conserve, manage, and restore habitat that is being acquired or is currently under protection

6.4.5.1 Geology and Substrates

Fee title land acquisition or use of a conservation easement could reduce disturbance of geology and substrates by protecting lands from development pressure. This would be a long-term beneficial effect that will extend the life of the project.

Specific restoration activities identified as part of land management plans could result in short-term minor to moderate adverse effects to affected substrates and/or geology. The intensity of impacts

would be highly dependent on the management goals for the acquired land and the location of the project. For example, land acquisition could permit public access for recreational use. This public use, which would depend on management stipulations developed as part of the land acquisition, could result in short-term minor to moderate adverse effects through increased soil compaction, rutting, or erosion from human presence and activity within island marshes, flats, dunes, and beaches. For example, invasive plant species are initially removed from a property, short-term disturbance to geological resources would occur, but the replanting or recolonizing of native vegetation would enhance the acquired land over the long-term.

6.4.5.2 Hydrology and Water Quality

Where easements and protected lands overlap groundwater recharge zones, surface water, or brackish-water resources, water sources and quality could be further protected from future degradation by helping to reduce runoff. Similarly, where protected land overlaps wetlands or shorelines, the protection of natural hydrologic processes could indirectly help limit development and associated effects on water quality, including via saltwater intrusion. These would be long-term beneficial effects that would occur over the life of the project.

Specific restoration activities identified as part of land management plans could result in short-term minor to moderate adverse effects to affected water resources. The severity of impacts would be highly dependent on the management goals for the acquired land and the location of the project. For example, land acquisition could permit public access for recreational use. This public use, depending on management stipulations, could result in short-term minor to moderate adverse effects through increased sedimentation and turbidity from human presence and activity within wetland/shallow water habitat.

6.4.5.3 Air Quality and Greenhouse Gases

No change from status quo to air quality or GHG impacts would be anticipated over the short or long-term from the identification, nomination and fee title acquisition of specific habitat areas or the addition of conservation easements to such lands.

During implementation of land management plans, there could be short-term minor to moderate adverse impacts to air quality from emissions generated by construction equipment and vehicles. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions.

6.4.5.4 Noise

No change in status quo to noise would be anticipated over the short-term from the identification, nomination and fee title acquisition of specific habitat areas or the addition of conservation easements to such lands. Depending on the land use, some changes in noise levels could occur, however, these would need to be evaluated on a project specific basis (e.g., public access might result in minor increases to noise levels from recreational users, or preservation of lands may assist in maintaining natural quiet over a longer-term).

During implementation of the land management plan, minor to moderate short- and long-term adverse impacts to ambient noise levels could occur. The severity of impacts would depend to a large degree on the location of the project and the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. Noise impacts associated with specific land management and restoration techniques, such as beach re-nourishment, are discussed under the Project Types associated with those techniques

6.4.5.5 Habitats

Conservation of habitat through fee title acquisition or use restrictions could have a long-term moderate benefit to any habitat on the property acquired or protected. Depending on the restoration site and project goals, barrier islands, beaches, coastal transition zones, or other habitats could experience a long-term benefit from being protected and conserved through acquisition and proper management. Conservation would also allow for upland migration of beach, wetland, or other habitats as the sea levels rises and could limit development encroachment.

Specific restoration activities identified as part of land management plans could result in short-term minor to moderate adverse effects to barrier island, coastal transition zone, beach and dune, or other habitats. The severity of impacts would be highly dependent on the management goals for the acquired land and the location of the project.

6.4.5.6 Living Coastal and Marine Resources

Conservation of habitat through fee title acquisition or conservation easements could have a long-term moderate benefit to pelagic microfaunal communities, finfish, sea turtles, marine mammals, birds, and terrestrial wildlife through the protection of barrier island, beach, wetland/shallow water habitat (marshes, estuaries, mangrove swamps, etc.), or other habitat, depending on project specific goals and the location of acquired land. These habitats can be important for food supply and various life stages of some species. Land acquisitions with stipulations that limit human activities that could adversely affect coastal and marine resources would result in long-term benefits to species that utilize the acquired habitats.

Implementation of land management plans, located within or near restoration activities could result in disturbed, removed, or altered habitats, which could cause minor to moderate, short- and long-term adverse effects to species that use those habitats for forage or nesting purposes. The severity of impacts would be highly dependent on the management goals for the acquired land and the location of the project. For example, land acquisition could permit public access for recreational use. This public use, depending on management stipulations, could result in long-term minor to moderate adverse effects to area species through increased human presence and activity on acquired habitats.

6.4.6 Project Type 6: Restore Oysters

This project type involves the use of cultch or other suitable material for creating reef structures and enhancing oyster populations. Appropriate restoration/protection techniques (described in more detail in Chapter 5) for this project type include, but are not limited to:

- Enhance oyster production through cultch placement, relay, or cultivation
- Use of natural or permissible materials to create oyster reef structure

6.4.6.1 Geology and Substrates

Creating or enhancing nearshore oyster reefs can help protect eroding shorelines on the landward side of the reef structure. In addition, the placement of cultch to establish oyster reefs could reduce wave energy reaching shorelines. This would provide a long-term beneficial effect by reducing shoreline erosion because it would extend beyond the construction period. Depending on where the material was placed, the creation of oyster reefs would reduce the amount of soft bottom habitat resulting in a long-term minor adverse impact to existing soft bottom habitat. If cultch relay or a similar technique is used, there could be a long-term, minor adverse impact on geology and substrate from the removal of oysters from the original site. However, there would be a long-term moderate beneficial impact on substrate in the project area through the increase in hard bottom and elevation as a result of the placement of oyster shell or other suitable substrate for oyster to establish a reef.

6.4.6.2 Hydrology and Water Quality

Creating and enhancing nearshore oyster reefs could help protect eroding wetlands and shallow water areas. Placement of cultch and other materials to establish oyster reefs can reduce wave energy reaching shorelines. This could provide beneficial effects by reducing wave energy of storm surges and thus indirectly reducing saltwater incursion inland. Once established, oyster beds could benefit local water clarity because oysters feed by filtering the water column. The reef could also reduce wave energy reaching the shoreline, minimizing erosion, and decreasing sediment suspended in the water column from erosion. Long-term this method could result in minor improvements to water quality. The benefits would be long-term because they would extend beyond the construction period.

Creation of oyster beds involves the placement of materials using offshore equipment and boats. Oyster reef creation can result in a short-term minor adverse impact to water quality due to the disturbance associated with the placement of materials.

6.4.6.3 Air Quality and Greenhouse Gases

During construction of reefs and placement of materials, short-term impacts to air quality and GHGs would occur from the use of gasoline and diesel powered construction vehicles and equipment, including barges, and exhaust produced by the use of this equipment. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. No long-term impacts to air quality are anticipated and no long-term emissions of GHG would occur.

6.4.6.4 Noise

During construction or restoration of oyster reefs, the use of heavy motorized equipment would result in short-term minor adverse effects to ambient noise levels. The noise generated from the operation of large barges and other equipment would attract attention and contribute to the soundscape in local areas, resulting in short-term minor impacts. However, the severity of impacts would depend to a large degree on the actual project site, distance to sensitive receptors such as recreational users or wildlife and the level of ambient noise. In areas with low ambient noise, adverse impacts would be greater because the contrast created by barges and other construction equipment. Conversely, in areas where commercial and recreational water vessel traffic is commonplace there are higher ambient noise levels

and impacts to ambient noise levels would be less. No adverse impacts to ambient noise levels are expected over the long-term.

6.4.6.5 Habitats

Depending on design and location, creating and enhancing oyster habitat could reduce the intensity of wave action and protect eroding shorelines, which would provide long-term benefits to these habitats. Similarly, restoration or creation of nearshore oyster reefs can help protect shallow water areas that could provide habitat for SAV. Enhancing existing reefs near SAV areas can also encourage more bird activity, which could fertilize SAV beds.

Placement of reefs near shallow water areas would require the use of in-water heavy equipment, which could produce turbidity and adversely affect the immediate area; therefore, these impacts would be short-term and minor.

6.4.6.6 Living Coastal and Marine Resources

Restoration and creation of nearshore oyster reefs can help protect eroding wetlands and shallow water areas that provide habitat for coastal and marine resources. In addition, the reef structure can also provide foraging and shelter areas for these resources such as fish and invertebrates. Creating nearshore oyster reef habitat would result in a long-term beneficial impact on birds because these structures can provide foraging and roosting areas for birds depending on the project design.

Restoration and creation of oyster reefs using natural and permissible materials may cause the short-term and minor loss or displacement of benthic organisms. Placement of these materials on soft bottom habitat will have an adverse impact to benthic organisms. Placement of breakwaters or living shorelines on hard substrate could impact existing oyster populations, resulting in short-term minor effects. Transport of oyster shell may result in the transport of invasive organisms that can have a minor short-term effect on oysters and other reef organisms.

Reef placement and relocation of cultch enhancement activities could require use of in-water heavy equipment that would adversely impact any pelagic microfaunal communities present in the proposed work area. Some smaller projects may not use in-water heavy equipment, but would shoot cultch from cannons off of a boat to the desired location. Adverse impacts would occur from increased turbidity, which decreases available light necessary for photosynthesis, and the degree of impacts would depend on the method used to place the cultch. Disruption in the water column and surface water would disturb or kill some pelagic microfaunal communities. Adverse impacts from in-water work would be short-term and minor because pelagic microfaunal communities would re-establish once turbidity dissipates. Placement of reefs near shallow water areas would involve use of in-water heavy equipment and create turbidity and habitat disturbance, which could have a short-term minor impact on finfish. The noise and disturbance could also have a short-term impact on birds, sea turtles, terrestrial wildlife, and marine mammals that would avoid the area during construction. Minor long-term impacts to birds and terrestrial wildlife could occur from disturbance associated with the potential for increased human activity around the oyster reef. If projects may incidentally harass marine mammals or may adversely affect ESA-listed marine mammals, sea turtles or fish species, authorizations or consultations with appropriate agencies would be required prior to project implementation. Creation of breakwaters, reefs, and living shorelines provides oyster habitat that would have a long-term benefit for oysters.

Oyster cultch placement (including limestone rock, crushed concrete, oyster shell, and other similar material) placed in oyster spawning areas would provide a substrate for oyster larvae to attach and grow, providing a long-term benefit to oysters. Relocating reefs and cultch material from unsuitable or poor habitat conditions to more suitable areas (with strong bottom currents in bay bottoms and intertidal and subtidal areas) could result in a long-term increase in oyster populations. Exposing suitable substrate would also encourage oyster recruitment in those areas. Oyster cultch material placed over existing hard substrate currently occupied by oysters could have a minor short-term impact on local populations as would bagless dredging to “turn over” existing oyster reefs. Long-term beneficial effects to oyster populations would result from cultch placement.

6.4.7 Project Type 7: Restore and Protect Finfish and Shellfish

The purpose of this project type is to reduce direct and bycatch-related mortality of fish and other non-target species. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

- Voluntary, temporary reduction in fishing effort
- Remove debris from freshwater, estuarine, marine, and/or critical habitats
- Provide incentives for voluntary use of technological innovations

6.4.7.1 Geology and Substrates

Equipment that may be employed for the removal of debris from marine environments could include motorized vehicles such as boats to deploy equipment or divers engaged in collection activities. Removal of this debris could temporarily displace substrates within the immediate vicinity as debris is removed and boats/equipment are used. Displaced sediment would be expected to naturally refill in a short-period as a result of the relatively small size of debris. These effects would be short-term because they would likely be small and localized.

6.4.7.2 Hydrology and Water Quality

Temporary reductions in fishing effort and implementation of methods to reduce bycatch mortality could have minor short-term beneficial effects on water quality by temporarily reducing the number of boats on the water. This reduction could reduce the contaminant loadings to surface waters typical of those vessels, assuming that a temporary repose would not lead to an increase in fishing effort in fisheries that were not part of the repose. This is also assuming that vessels were not being used for purposes other than fishing. These effects would be minor and short-term because they would be small, localized, and only occur when boats are not being used for fishing.

The use of equipment to remove debris could pose a minor short-term adverse effect to water quality by increasing the risk of water quality contamination from equipment and vessels used during the removal period. During removal sediment disturbance would increase turbidity within the immediate vicinity of the removal site. This would be a minor short-term adverse effect because it would be localized and would only occur during the debris removal period. Removal of any debris that may leach or otherwise adversely affect water quality would have a long-term beneficial effect because it would remove a potential source of contamination.

6.4.7.3 Air Quality and Greenhouse Gases

Temporary reductions in fishing effort and implementation of methods to reduce bycatch mortality could have minor short-term beneficial effects on air quality by temporarily reducing the number of boats on the water. This reduction could reduce the GHG emission in the local area produced by those vessels, assuming that a temporary repose would not lead to an increase in fishing effort in fisheries that were not affected. This is also assuming that vessels were not being used for purposes other than fishing. These effects would be minor and short-term because they would be small, localized, and only occur when boats are not being used for fishing.

Removal of debris would require the use of equipment and vehicles, emission from which could result in minor adverse impacts to air quality in the project vicinity. The use of gasoline and diesel-powered equipment would contribute to an increase in GHG emissions. Based on the small scale of projects and the short timeframe, impacts would be short-term and minor. No long-term impacts are anticipated.

6.4.7.4 Noise

Temporary reductions in fishing effort could have minor short-term beneficial effects on noise by temporarily reducing the number of boats on the water and reducing the ambient noise level in the area. This reduction in ambient noise levels assumes that those vessels would not increase their fishing effort in areas that were not part of the repose or be used for purposes other than fishing. These effects would be minor and short-term because they would be small, localized, and only occur when boats are not being used for fishing.

The removal of debris could require the use of equipment, which would result in short-term minor to moderate impacts to ambient noise levels. The severity of impacts would depend to a large degree on the location of the project and the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. The effects from noise levels produced by equipment use would be minor and short-term because the noise levels would be localized and only occur when equipment was in use.

6.4.7.5 Habitats

Removal of debris from marine, estuarine, and freshwater environments could result in minor short-term adverse effects to these habitats as a result of the use equipment, displacement of substrate, and increase in turbidity in the removal area. These effects would be minor and short-term because they would be limited to the local area. There would be long-term beneficial impacts to these habitat from the removal of debris. Removal of any debris that may leach or otherwise adversely affect water quality or sediments within these habitats would also result in a long-term beneficial effect because it would remove a potential source of contamination.

6.4.7.6 Living Coastal and Marine Resources

Direct impacts on living coastal and marine resources from a voluntary and temporary reduction in fishing effort or the use of technological innovations would be based on project-specific considerations to determine the magnitude and duration. A voluntary reduction in fishing effort and/or the use of technological innovations could result in the following beneficial impacts:

- Increased finfish population levels of both commercial and recreational fisheries resources by reducing fishing and bycatch mortality;
- Reduced bycatch mortality of sea turtle, marine mammal and bird species as a result of reduced fishing pressure effort and use of technological innovations;

Minor long-term adverse impacts could result from removing a food source for certain gulls, terns, and pelicans that have adapted to following fishing boats in order to forage on the discarded bycatch. A voluntary reduction in fishing effort could also result in adverse effects to biological resources if fishing effort is displaced to another location. Debris such as derelict fishing gear may result in adverse effects to finfish, invertebrates (such as crabs), sea turtles, marine mammals, and birds that are caught, stranded, and killed in this equipment. Removal of this equipment could result in long-term moderate beneficial effects to these species that are susceptible to entanglement and mortality by derelict fishing gear by reducing incidental entanglement and mortality. The beneficial effect to these species would depend on the amount and areas of removal of derelict fishing gear.

Removal efforts may also result in short-term minor adverse effects to living coastal and marine resources present in the removal area due to temporary increases in activity, noise, vibration, and turbidity. Activities are anticipated to be short-term based on the type and size of the project. This could result in temporary displacement of individuals from the work area or mortality of individual species. The equipment that would be used to remove debris would not be anticipated to produce sound levels that would adversely affect fish or marine mammals. Temporary increases in turbidity and alteration of water quality in the work area may result in short-term minor adverse impacts. If eggs and larvae are present in the project area, they are more likely to be negatively impacted and killed by debris removal activities. Minor and short-term disturbances may impact pelagic microfaunal communities in the area from increased turbidity near in-water work, which decreases available light necessary for photosynthesis. Also, disruption in the water column and surface water would disturb or kill some pelagic microfaunal individuals. These impacts could be reduced by avoiding activities during critical spawning and rearing periods for sensitive species. BMPs and other mitigation measures that may be employed to further minimize or contain adverse impacts are detailed in Appendix 6-A. Overall, living coastal and marine resources would have a long-term beneficial effect from removal of derelict fishing gear and other types of debris from fishery habitats.

6.4.8 Project Type 8: Restore and Protect Birds

This project type involves restoring habitat that would support bird populations and implementing measures that would protect bird habitat or reduce direct impacts to nesting populations. Appropriate restoration/protection techniques for this project type (described in more detail in Chapter 5) include but are not limited to:

- Create or enhance bird nesting and/or foraging habitat;
- Protect bird foraging and nesting habitat, including the use of predator control;
- Control existing encroachment of invasive species and prevent further spread.

6.4.8.1 Geology and Substrates

Creating or enhancing bird habitat by constructing new nesting or foraging habitat such as barrier islands, beaches or wetlands could benefit geology and substrates by adding sediments into the system.

Re-planting of shoreline vegetation could result in long-term benefits to soils because native plants could help stabilize shorelines and reduce erosion. These effects would be long-term because they would last beyond the construction period.

Protecting bird habitat from development would benefit geology and substrates by preventing disturbance, loss of soil, and reducing erosion. No adverse effects from protecting bird habitat on geology and substrates would occur.

Efforts to remove and limit the further spread of invasive species could have a long-term benefit to soil substrates since some invasive plant species displace native vegetation that are better suited to prevent erosion. Some invasive plants prevent the colonization of native understory plants with root systems that have evolved to prevent beach sand and soil erosion. No adverse impacts to geology or substrate would occur by limiting invasive species introduction or spread. Controlling invasive plant species entails physical cutting/removal, application of herbicides, and biological control. These techniques would have no impact on geology, but the use of equipment to remove existing vegetation could leave soils vulnerable to erosion until replacement vegetative cover is provided. This would be a short-term minor adverse effect. Herbicides or biological control methods can have a similar effect but the physical presence of dead vegetation may provide short-term erosion control.

6.4.8.2 Hydrology and Water Quality

Creating and enhancing bird nesting and foraging habitat through construction of barrier islands, beaches, and wetlands could result in shoreline stabilization that reduces erosion and reduces adverse impacts to water quality. These would be long-term beneficial effects because they would extend beyond the construction period. Some short-term adverse impacts due to turbidity could occur in the immediate vicinity of the work area. These effects would be minor and short-term as turbidity would dissipate shortly after placement activities are completed. Development of herbaceous wetlands would produce long-term benefits to hydrology and remove nutrients and other impurities from the water which improve water quality. If creation of wetlands requires excavation short-term adverse impacts could occur, but be local and temporary.

Protecting nesting and foraging habitat for birds would have long-term benefits by preventing development and disturbances, which can reduce runoff and benefit water quality.

Preventing the invasion of exotic species could have a long-term benefit to hydrology, since many non-native plant species have higher water requirements and can deplete soil moisture more rapidly than native species. The use of pesticides or herbicides could have an adverse minor short-term impact on water quality if they are applied where they can enter the aquatic ecosystem. Long-term minor adverse impacts could occur with continued exposure. Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion.

The use of heavy equipment to remove existing vegetation could leave soils vulnerable to erosion if replacement vegetative cover is not provided. This could result in a short-term adverse, but local impact on water quality.

6.4.8.3 Air Quality and Greenhouse Gases

During dredging, excavation or placement of materials to restore or enhance beaches, barrier islands and wetlands for bird habitat there could be short-term minor to moderate adverse impacts to air quality from the use of heavy equipment and vehicles. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions.

6.4.8.4 Noise

During the construction period to create or enhance bird habitat, minor to major short-term adverse impacts to ambient noise levels may occur, particularly at barrier islands and beaches where beach re-nourishment activities would take place. The severity of impacts would depend to a large degree on the location of the project, type of equipment, the amount of noise that these activities would generate, and the distance to sensitive receptors such as recreational users or wildlife. Impacts on noise would be short-term during the construction period.

Predator control would have no discernible benefit or adverse impact to noise. To the extent that bird habitat is protected through land acquisition, development or potential activities which could in turn cause noise impacts may be limited.

6.4.8.5 Habitats

Creating and enhancing bird habitat would create long-term benefits from increasing stability and resiliency of barrier islands and beaches. Re-nourishment of beaches and barrier islands can enhance beach habitat and provide benefits to other habitats such as wetlands through storm surge protection. Adverse effects to wetlands could occur if existing wetland vegetation were present in the project area and would be disturbed. Short-term adverse impacts to beaches, dunes and barrier islands could occur during construction from the use of heavy equipment and from construction activities on the beach area, dunes, barrier islands, and to coastal transition zones.

Bird habitat restoration activities such as creation of wetlands, beach enhancements or re-nourishment and dune planting could have short-term to long-term minor adverse impacts on habitats from:

- Filling, disruption, or alteration of wetlands;
- Increased soil erosion, vegetation trampling, vegetation removal, or other human activity from project staging or construction, or implementation of restoration activities on adjacent uplands, coastal transition zones, barrier flats, dunes and beaches;
- Limited cover or loss of SAV populations in areas where in-water construction work, dredging, or placement of an underwater pipeline occurs (noting that pre-construction SAV surveys would be conducted) ; and
- Changes in water quality from turbidity and substrate disturbance from in-water work with construction activities or re-vegetation activities.

Protecting bird habitat from disturbance or development provides long-term benefits for habitat.

Restrictions on seasonal or overall human use reduce stress on habitat and reduce habitat degradation.

Some predator control could have a long-term benefit to habitat; for example, if fencing eliminates disturbance and protects sensitive habitat. Adverse short-term impacts to local habitat could occur from the disturbance associated with the construction barriers such as fencing.

Long-term benefits to habitat could occur from the prevention and control of invasive plants that contribute to the loss of habitat quality. Use of heavy equipment and herbicides could have a short-term adverse impact on habitat since some species use habitat colonized by non-native vegetation. Replacement of non-native with endemic species would have a long-term benefit to habitat. Use of herbicides and pesticides could have a short-term adverse impact to aquatic habitat if they are applied where they can enter wetlands or water bodies, and impacts to non-target vegetation or species also could occur.

Construction of islands and beaches could have an adverse impact if materials covered existing SAV populations. These impacts would be considered minor and short-term because they would occur in discrete areas. SAV habitat could be avoided through proper survey and selection of project sites. Herbicides used to control invasive plants could also enter the waterway through air dispersion, by leaching into groundwater sources, or by stormwater runoff, which would result in a moderate, short-term impact to local SAV populations.

6.4.8.6 Living Coastal and Marine Resources

Sediment deposition on beaches to create or enhance bird habitat could provide erosion protection for back-bay habitats where pelagic microfaunal communities may be present. Overall, this could result in a long-term benefit to pelagic microfaunal communities and a long-term benefit to the food chain to which pelagic microfaunal communities contribute. Beaches contribute to the quantity and quality of adjacent shallow water soft-bottom habitats that serve as nurseries or forage areas for some finfish. A larger beach area also enables improved food and nutrient exchange to aquatic habitats. Re-nourishment of beaches could be a long-term benefit to terrestrial wildlife by protecting valuable beach and dune habitat. These beaches are essential for a number of endangered beach mice, protected sea turtles and other protected species. This project type targets the improvement for bird habitat, therefore long-term benefits to birds would occur including enhanced habitat for shorebirds. Some species that nest or winter on barrier islands or sandy beaches could benefit long-term due to the restoration of habitat that has been disappearing from development along the coasts. These beaches are essential stopover areas for migratory birds to rest and feed during migration. Re-nourishment of beaches through sediment addition and restoration of barrier islands could be a long-term benefit to wildlife populations, and could be a long-term benefit by creating new habitat suitable for beach mice and other terrestrial species that utilize beach habitats.

Some short-term adverse impacts could occur from dredging and other borrowing techniques which result in suspended sediments and increased near-site turbidity. Adverse effects from dredging may include:

- Sediment removed from nearshore waters could impact local oyster populations or other benthic communities near the borrow site from increased turbidity, substrate disturbances or siltation, which could locally increase mortality and inhibit spawning activities in the short-term until silt dissipated.

- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb or kill some pelagic microfaunal communities. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once the turbidity dissipates.
- Fish present in the dredging area could be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could result in mortality of individual finfish. This would be a minor short-term adverse effect that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Sea turtle and marine mammal individuals present in project areas where dredging or underwater use of equipment is occurring could be subject to temporary increased noise, turbidity, and water quality changes as well as alteration or loss of forage or nesting habitat, all of which could temporarily displace individuals or prey during construction and could result in short-term, minor impacts. If projects could incidentally harass marine mammals or adversely affect ESA-listed marine mammals or sea turtles, consultation or authorizations with appropriate agencies would be required prior to project implementation.
- Birds that forage in or near the dredge site could be temporarily affected. However, these effects would be short-term and minor as birds would be expected to move away to forage in other readily available foraging habitat during the dredging. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

Creating herbaceous wetlands could have long-term benefits to terrestrial and aquatic wildlife by increasing habitat quantity and quality. Planting marsh habitats could result in short-term adverse effects to pelagic microfaunal communities due to turbidity and temporary reduction of light availability. Any finfish or other animal species present in the marsh planting areas may also be temporarily disturbed by turbidity or other in-water activities that would cause species to disperse to other areas. These effects would be short-term during planting activities only and limited to the localized construction area only.

Planting native vegetation on dunes and in back barrier marshes would restore plant communities and could provide additional habitat and foraging area for other shoreline organisms. Shoreline grasses and other plants tolerant of a dune environment could be used to stabilize dunes. Replanting dune and back-barrier marsh areas could create suitable habitat for birds, benthic communities, finfish, pelagic microfaunal communities, manatees and sea turtles and also stabilize the dune or marsh area. Shoreline habitats landward of the beach could benefit from beach, dune, and back-barrier marsh restoration because restoring these areas could provide protection from storm surge and reduce erosion. This technique could provide long-term indirect benefits to migratory and resident birds as well as nesting sea turtles and beach mice or other terrestrial wildlife by expanding or stabilizing habitat. Additionally, reducing erosion could benefit oyster populations that can be adversely affected by excessive sediment in nearshore waters. Some minor short-term displacement of local birds or wildlife could occur during

planting operations. However, increased vegetation in dune and marsh areas could improve habitats that are essential for migratory birds and terrestrial species and provide a long-term benefit.

Protecting bird habitat would have long-term benefits to living coastal and marine resources. No adverse impacts to living coastal and marine resources would be expected from protecting bird habitat. Predator control could have an adverse impact to some species, since these efforts such as constructing barriers could also exclude other non-target species that utilize those areas. Exclusion fencing may be buried in wetlands or shallow water habitat, which could result in short-term adverse effects from turbidity and substrate disturbance.

Use of pesticides, herbicides and other chemicals to control invasive species could result in the contamination of habitat through air dispersion, by leaching into adjacent waters, or by stormwater runoff. Use of pesticides and herbicides can have a minor short-term direct effect if wildlife is exposed. For example, removal of rats and other potential predators could have a long-term benefit to many birds and a long-term benefit to rare or sensitive species where predation limits increases in population. Contamination by ingesting treated seeds or insects could cause stress and even mortality for birds and some small mammals. Coastal and marine resources such as finfish, sea turtles, and marine mammals are likely to avoid an area of contamination. If potential for adverse effects to protected finfish, sea turtles or marine mammals from pesticide use existed, consultation with appropriate agencies would occur prior to project implementation.

Use of herbicides to control invasive vegetation could result in a minor long-term benefit to local bird populations if accompanied by efforts to restore native plant communities. Some species may have adapted to using invasive plant communities for nesting, and therefore treatment or removal of this vegetation may have a short-term minor impact.

Non-lethal management methods include fencing, providing artificial nest structures, protecting isolated peninsulas, or constructing islands that exclude predators from a single bird nest or from the entire area surrounding a colony. Predator control could result in long-term benefits to many species, including sensitive or rare bird species whose populations could increase with reduced predation.

6.4.9 Project Type 9: Restore and Protect Sea Turtles

This project type involves restoring and protecting sea turtles through activities that enhance sea turtle habitat, increase the survival of sea turtles, or both. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

- Improve nesting beaches;
- Protect and conserve nesting beaches;
- Expand existing stranding networks and rehabilitation capabilities;
- Enhance compliance monitoring through gear monitoring team coordination and enhanced observer monitoring;
- Enhance training and outreach for enforcement personnel to improve expertise in compliance requirements and increased enforcement activities.

6.4.9.1 *Geology and Substrates*

Nesting beaches could be conserved and protected by purchasing beach-front properties. This could allow beach and dune migration and sediment migration in response to future climate and weather, which would have long-term beneficial effects on geology and substrates over the life of the project. Nest relocations could have a short-term minor impact to affected substrates but excavated sites would be backfilled immediately after the removal of turtle eggs. No impact on geology and substrate would occur from expanding stranding networks, enhancing compliance monitoring, or enhancing training and outreach. However, if new facilities are constructed, there could be effects on geology and substrate during the construction period which will be evaluated on a site-specific basis.

6.4.9.2 *Hydrology and Water Quality*

Beach-front properties could be purchased to conserve and protect nesting sea turtle habitat and to allow future upland migration of the beach (i.e. nesting habitat) as sea-levels rise. Land acquisition could also help limit coastal development's effects on water quality, depending on land acquisition goals. Beach re-nourishment activities to improve sea turtle nesting habitat could also benefit hydrology and water quality by stabilizing sediments, and reducing storm surges. These beneficial effects would be long-term because they would occur over the life of the project. No impact on hydrology and water quality would occur from expanding stranding networks, enhancing compliance monitoring, or enhancing training and outreach. However, if new facilities are constructed, there could be effects on geology and substrate during the construction period which will be evaluated on a site-specific basis.

6.4.9.3 *Air Quality and Greenhouse Gases*

During restoration activities, there could be short-term minor to moderate adverse impacts to air quality from emissions generated by construction equipment and vehicles. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions.

6.4.9.4 *Noise*

Minor to major short-term adverse impacts to ambient noise levels could occur during implementation of restoration activities, particularly at beaches where sea turtle improvement and conservation activities would take place. The severity of impacts would depend to a large degree on the location of the project, the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. The manual implementation of predator controls, lighting, and other nesting site enhancements could result in temporary changes to the soundscape, which would be only slightly apparent to visitors while this technique is being constructed, and would not attract attention, dominate the soundscape, or detract from current user activities or experiences. In these instances, impacts to noise would be minor. Any use of construction equipment, by contrast, could result in short-term moderate to major impacts to noise.

6.4.9.5 *Habitats*

Restoration efforts to protect and conserve sea turtle nesting beaches and populations could provide numerous long-term benefits to beach and barrier island habitats, as described below:

- Depending on the restoration site and project goals, barrier islands, beaches, coastal transition zones, or other habitats could experience a long-term benefit from being protected and conserved through acquisition and proper management. Conservation could also allow for upland migration as sea level rises and could limit development encroachment.
- Shoreline habitats landward of the beach (e.g., wetlands) could benefit from adjacent beach and dune area protection because these areas provide protection from storm surge and reduce erosion.

Human activity and/or the use of equipment during installation of predator control and turtle-friendly lighting, mobilization of stranding and response efforts, and monitoring could result in short-term minor to moderate adverse effects to beaches. Long-term minor to moderate adverse effects to beaches could also occur if any permanent structures were erected for equipment storage.

6.4.9.6 Living Coastal and Marine Resources

Protection and conservation of sea turtle nesting beaches would minimize development encroachment on nesting and foraging habitat, which would be a long-term benefit to birds, sea turtles, terrestrial wildlife, and other species that use the beach habitat. For rare wildlife species such as beach mice that depend on beach or dune habitat, protection and conservation of habitat could have a long-term benefit.

Restoration efforts to protect and conserve nesting beaches could also benefit pelagic microfaunal communities and finfish populations. Beach habitats contribute to the quantity and quality of adjacent shallow water habitats that serve as nurseries or forage areas for some finfish species. The beach-shallow water interface also provides nutrient exchange to aquatic habitats. Protecting and restoring these habitats could result in a long-term benefit to these species and indirectly benefit the food chain that relies on the health of adjacent shallow water areas.

Nesting beach improvement via predator control and use of turtle-friendly lighting, as well as nest detection, monitoring, and protection, such as nest marking or relocation, could provide a long-term benefit to sea turtles by increasing nesting success and hatchling survivorship, resulting in a higher number of sea turtles surviving to adulthood and reproductive life stages. For example, turtle-friendly lighting would reduce artificial light sources to minimize the potential for both nesting females and hatchlings to become disoriented or misoriented. Predator control on the beaches could also have a long-term benefit for nesting birds by reducing predation, while increased hatchling survivorship would improve food sources for bird species that prey on hatchlings.

Expansion of existing stranding networks and rehabilitation capabilities would include monitoring and improved response time, particularly in underserved areas, and also benefit stranded marine mammals. Other restoration actions could include additional funding, responder training, or construction of equipment and rehabilitation facilities. Depending on the location of facility construction, the latter action could result in adverse effects to sea turtles from associated noise, human activity, and habitat disturbance or removal. However, improved stranding response would provide a long-term benefit to sea turtle and marine mammal populations. Increased stranding monitoring and expanded rehabilitation capabilities could help sea turtle and marine mammal populations improve as sick and injured individuals are rehabilitated and released to the wild. Faster response times and more rehabilitation

facilities could also result in quicker responses that would reduce the number of dead or euthanized animals and also provide important data necessary to identify causes of mortality and inform future management decisions. If potential for adverse effects to protected species may occur as a result of proposed activities, consultations with the appropriate agencies would occur prior to project implementation.

Increased coordination of NOAA's monitoring teams with other state and federal agencies, providing additional trained observers dedicated for bycatch monitoring, and increased at-sea and dockside inspections by NMFS gear specialists and marine law enforcement personnel could result in a long-term benefit to sea turtle and marine mammal populations across the Gulf Coast. Enhanced training, funding, staffing, and outreach for enforcement personnel to reduce bycatch mortality in shrimp trawl or other fisheries and to ensure compliance with existing state and federal regulations could also provide a long-term benefit to sea turtle and marine mammal populations throughout the Gulf Coast.

Adverse effects to sea turtles or other present species could result from restoration activities requiring human activity and vehicle traffic on nesting beaches. Nest relocation, if necessary, could result in a variety of short-term to long-term adverse effects, including survey errors that inadvertently miss or misidentify nests; egg loss due to handling mortality; lower hatching and emerging success; and increased predation of concentrated nests. Any such efforts would be subject to consultation under ESA to assess the level of effect.

However, conservation measures (such as those in the Appendix to Chapter 6 and others developed through the ESA section 7 consultations) and standard practices for nest relocation would avoid or minimize most adverse effects to sea turtles.

Adverse effects from implementation of exclusion fencing or predator control could occur to species that use the affected area. Poison baits could enter the waterway through air dispersion, leaching into adjacent waters, or by stormwater runoff causing a potential short-term minor adverse impact, but these effects would be minimized through proper use following any required permits. Predator control on the beaches could also have a long-term minor impact on terrestrial wildlife by eliminating a potential prey source and directly causing mortality to some species.

6.5 Alternatives 2 (and 4): Human Uses and Socioeconomics

This section describes the environmental consequences of Alternative 2 for human uses and socioeconomics.⁴ These impacts consider the nine relevant project types that are identified in Chapter 5 together by resource area. Because Alternative 4 is inclusive of Alternative 2, the analysis of environmental consequences for these project types is the same for Alternative 4 as Alternative 2.

⁴ The term "human use" in this chapter, and in chapters 8-12, is specific to the evaluation under NEPA of the potential impacts on those aspects of the human environment not addressed in the assessment of the physical and biological environments. The term 'human use' here is not intended to address or substitute for an evaluation of human use in the context of OPA or the OPA implementing regulations.

6.5.1 Socioeconomics and 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.

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 project types proposed under Alternatives 2 and 4 are not, in general, expected to create a disproportionately high and adverse effect on a minority or low-income population; however, population characteristics, including race and ethnicity and per-capita income as it relates to the poverty level as well as effect determinations are considered for the environmental justice analyses in Chapters 8 through 12 and would be considered in future phases of Early Restoration.

Under Alternatives 2 and 4, project spending associated with the implementation and construction of a number of the project types would benefit regional economies. Project construction or implementation spending is likely to occur under project types to create and restore wetlands; protect shorelines and reduce erosion; restore barrier islands and beaches; restore and protect SAV; restore oysters; and restore and protect finfish, birds, and turtles. Project spending would include and contribute to support

of the workforce needed to design, engineer, manage, and carry out the projects. Additionally, locally purchased (or rented) equipment and materials would also benefit regional economies.

The duration of project construction and implementation would vary by project. Generally, the higher the project cost and associated project spending, the greater the economic benefits to the region. However, the distribution of economic benefits within the region would also depend on the locations or sourcing of labor, supplies, materials, and equipment. The extent to which labor, equipment, supplies, and materials can be sourced locally or from within the region would increase the economic benefits within the region. These regional economic benefits would include jobs, income, sales, and tax receipts.

Various industries would benefit from the projects, depending on the types of activities occurring. Construction, dredging, vegetation management, and marine and ecosystem planning and science consulting industries are likely to benefit from many of the Alternative 2 project types, including wetland restoration, protecting shorelines, restoring barrier islands and beaches, among others.

Short-term beneficial impacts to the local and regional economies would occur from increases in construction jobs and demand for workforce to support the restoration projects. These jobs would provide income, sales, and downstream economic activity in the region. The level of benefit would be related to the size, duration, and level of effort necessary for each project, as well as the size of the economy in which the project is located. The degree of beneficial impact would also depend on the extent to which the workers and other project materials and equipment are supplied from the region. Non-local workers, brought in for a short period of time, would bring in additional spending as workers stay in local hotels and eat in local eating and drinking establishments, although they typically spend most of their non-per diem income in their home location. In more remote communities, these workers may bring proportionally more benefits in terms of jobs and income to the economy than in large urban areas.

There could be other factors that relate to socioeconomic characteristics that could impact residents and property owners. These could include changes to land use that could affect property taxes or otherwise affect property associated with conserving habitat projects and changes in access to natural resources associated with protecting finfish, birds, and turtles (see 6.6.5, Tourism and Recreational Use). Depending on the type and location of the project, these implications could have a beneficial or at most a minor adverse impact on socioeconomic characteristics. For example, acquisition of lands for conservation or protection purposes could reduce the tax base for property tax collections; however, improvements in habitat associated with this project may draw additional visitors to the area with associated visitor spending, increasing sales and tax receipts on retail purchases. Adverse impacts to property taxes would vary by the property involved and would depend on the assessed value of the property, which would vary depending on its location. The relative importance of the taxes to the county would also affect the level of impact. It is anticipated that only a few properties would be impacted.

Long-term job creation could also occur under Alternatives 2 and 4. This type of benefit would be associated with project types that have the potential to increase tourism and visitation to an area, such as restoring beaches or islands and protecting shorelines. Additionally, projects that require additional

staffing, specialists, and others in the support of new programs, such as turtle monitoring and responders to restore and protect turtles, would have beneficial impacts to the regional economy.

6.5.2 Cultural Resources

All projects conducted as part of Early Restoration would secure all necessary state and federal permits, authorizations, consultations or other regulatory processes related to sensitive habitats (e.g. wetlands or Essential Fish Habitat) and protected species (e.g. marine mammals such as manatee, federal or listed species such as sea turtles, etc.), and other applicable requirements. In particular, a complete review of proposed projects under Section 106 of the NHPA will be completed as environmental review continues. Tribal Consultations would be initiated with all interested federally recognized tribes. Projects will be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Project-specific analyses of potential impacts to cultural resources are presented in Chapters 8 through 12 and would be for future phases of Early Restoration.

While the potential for impacts to cultural resources should be mitigated through BMPs and the section 106 process, some projects have the potential to adversely impact cultural resources. In particular, under Alternatives 2 and 4, project types involving the removal and placement of dredged materials, and ground or substrate disturbing construction activities have the potential to lead to short and long-term minor to moderate impacts to cultural resources stemming from the potential for inadvertent damage to unknown sites, buildings, structures, or objects. In addition, the use of oyster shells to construct reefs raises the possibility of inadvertent site destruction, because some shell deposits along the coast have accumulated due to prehistoric human activity. Potential source areas of oyster shell would have to be assessed for human or natural accumulations before they are used for construction. Similarly, projects requiring the filling of canals would need to ensure that the canals do not qualify as being historically significant canals under section 106.

If not properly conducted, activities conducted under Alternatives 2 and 4 have the potential to compromise a site's integrity and cause a loss of cultural information. BMPs and other mitigation measures that may be employed, depending on site-specific considerations, to further minimize or contain adverse impacts to cultural resources are detailed in Appendix 6-A.

These same project types under Alternatives 2 and 4 could lead to long-term beneficial impacts through the identification of cultural resources. Cultural or historical sites that may otherwise have been unknown or unprotected may benefit from the NHPA Section 106 review process that could require it be avoided and preserved in its natural state. In this manner, some information may be retrieved and future impacts could be avoided.

6.5.3 Infrastructure

Under Alternatives 2 and 4, project types involving the removal and placement of dredged materials, such as wetland restoration, barrier island restoration, and beach nourishment, and projects involving ground- or substrate-disturbing construction activities, such as the placement of engineered shoreline protection structures, could lead to short and long-term minor to major adverse impacts to infrastructure. These impacts would result if there were inadvertent damage to unknown submerged offshore pipeline infrastructure or buried onshore utility infrastructure. An analysis describing the probability and severity of such potential incidents has not been conducted at the programmatic level

for this document. As appropriate on a project-specific basis, surveys would be conducted to locate and aid in avoiding or minimizing potential impacts to buried and submerged infrastructure as a result of specific project activities.

Projects requiring land-based construction activities and associated movement of construction materials and equipment by road could lead to short and long-term minor to major adverse impacts to infrastructure. Project types that enhance public access to natural resources for recreational use, enhance recreational experiences, and/or promote environmental and cultural stewardship, education, and outreach, may include construction activities such as backfilling of canals and shallow water bodies to create wetlands; removal of bulkheads, rip rap and other structures to restore hydrologic connectivity; dune restoration; or the placement of breakwaters or other engineered erosion control structures on the shoreline. Impacts would result from increases in construction traffic; temporary or permanent closure of roads or parking lots; or damage to roadways. These would range in intensity based on the duration of road or parking lot closure, the importance of individual roadways as regional transportation arterials; and the extent and duration of roadway damage.

Similarly, projects requiring the permanent removal or relocation of infrastructure, such as the alteration of land cover for habitat conservation or the removal of piers or other coastal fixtures that are affecting SAV beds targeted for restoration, could lead to short and long-term minor to major adverse impacts on infrastructure.

Projects that stabilize and protect shorelines, reduce erosion, or reduce the effects of wave activity, such as the construction of groins or breakwaters; beach re-nourishment; oyster reef placement; and restoration of SAV beds would have potential long-term beneficial impacts for infrastructure. These would result from the protection of roadways, parking lots, utilities, and other nearshore infrastructure from the effects of storm waves and associated shoreline erosion.

Project types discussed under Alternative 2 that do not involve physical construction activities, including voluntary reductions in fishing effort and voluntary use of improved fishing technology, would have no impact to infrastructure.

6.5.4 Land and Marine Management

Project types implemented under Alternative 2 would have varying impacts on land and marine management depending on the type of management or land ownership applicable to the project site. Most of the project types that would be implemented under Alternative 2 would have no impact to land and marine management, since projects would generally be consistent with the prevailing management plans and direction governing the use of the land and marine areas where the projects would take place.

Projects implemented at national, state and local parks, wildlife refuges, and wildlife management areas could have short-term minor to moderate adverse impacts to land and marine management. These impacts would be temporary, and would occur if activities such as creation or restoration of wetlands; beach re-nourishment; placement of erosion control and shoreline protection; or other projects requiring construction activities result in partial or full closure of these areas during construction. Impacts could include the interruption of park operations; furlough of park staff; assignment of staff to duties not normally associated with their jobs; interruption of interpretive programs; and similar

impacts. In the long-term, projects implemented under Alternative 2 would have beneficial impacts on land and marine management at parks, wildlife refuges wildlife management areas because these restoration activities would help park management and staff fulfill their obligations to manage these properties for the benefit of the environment and human enjoyment.

Projects that result in changes in ownership and/or permitted uses, such as the fee acquisition of a parcel or conservation easement held by a land trust, could have long-term impacts to land management. For restoration activities that involve the fee acquisition of land to create wetlands, restore wildlife habitat, protect shorelines, or other types of activities included under Alternative 2, land ownership and potentially zoning would change. Deed restrictions would permanently limit the amount and type of development that would be permitted on these lands and the management and the intensity of use on these properties would likely change. The transfer of fee title to lands and creation of conservation easements, however, are transactions negotiated or arranged between willing parties and as such would not give rise to adverse impacts to land and marine management.

Projects implemented within marine protected areas under Alternative 2 would be designed to restore habitat and conserve living coastal and marine resources and would therefore align with the management goals of these areas. Restoration of SAV, construction of oyster reefs, finfish restoration efforts, and efforts to protect bird and turtle nesting, among other efforts, could have some short-term minor to moderate adverse impacts if these activities require temporary closure of areas that are managed for fishing or recreational use. In the long-term, because projects aimed at habitat restoration and conservation of living resources would align with and further the management goals of marine protected areas, these projects are expected to have beneficial impacts on marine management.

6.5.5 Tourism and Recreational Use

Under Alternatives 2 and 4, project types involving the removal and placement of dredged materials, ground or substrate disturbing construction activities as well as restoration activities could result in some short-term minor to moderate adverse impacts to wildlife viewing, short-term minor to moderate adverse impacts to hunting, beach and waterfront visitors, and tourism and short-term minor to moderate adverse impacts to fishing. Impacts to these different resource areas stem from (1) temporary site closures enacted to protect public safety; and (2) construction activities and associated wildlife disturbances. These activities may result in limits tourism and recreational uses accessibility and opportunities. Degrees of impacts to the various aspects of tourism and recreation are highly dependent on the proximity of projects to the proposed recreation and tourism resources, with impacts likely being highly localized to specific project areas. Impacts as a result of these project types are experienced at greater levels in areas with limited tourist and recreation options, including barrier islands and less populated and/or rural areas leading to short-term minor to moderate adverse impacts in these types of locations. Impacts as a result of these project types could be particularly perceptible to hunting, fishing, tourism and beach and waterfront visitation as a result of the temporary fish and wildlife (particularly waterfowl) displacement due to disturbances from construction and the loss of tourism and visitors to beach and waterfront areas. If these closures occur in areas with high levels of hunting, fishing, and tourist activity such as beach and waterfront visitation occurs, adverse impacts would be readily apparent to resource users, who may choose to pursue these recreational activities in different locations.

Alternative 2 project types could also result in long-term beneficial impacts to wildlife viewing, hunting, beach and waterfront visitors, tourism and fishing. Long-term beneficial impacts to tourism and wildlife viewing from these restoration projects would occur as a result of the improvement of wildlife and aquatic species habitat and associated increases in wildlife and aquatic species populations, diversity and viewing opportunities. In addition, benefits to beach and waterfront recreation could occur from increased opportunities for swimming, snorkeling, and sightseeing. Similarly, long-term beneficial impacts to hunting and recreational fishing could occur as a result of increases in the wildlife and aquatic species populations. Overall, improvements to habitat quantity and quality could occur over time under such project types and could result in long-term beneficial impacts to the above-mentioned resources through increased opportunities to view more abundant wildlife and enhanced recreational experiences.

6.5.6 Fisheries and Aquaculture

Construction or implementation of project types under Alternative 2 have the potential to adversely impact commercial fisheries through activities that involve the use of in-water equipment, dredging, construction of groins and breakwaters, transplanting and vegetating SAV beds, installation of water signage, and reef placement activities. The potential for turbid waters; displacement of sand and sediment during construction, dredging, and placement; as well as potential for spills and leaks from equipment used in these activities could affect water quality and adversely impact fish and shellfish habitat, resulting in temporary adverse impacts to commercial fisheries in areas where these activities occur. Therefore any impacts would be localized and short-term, and construction activities would only result in disruptions to fishing operations if operations were in close proximity to the restoration projects. Depending on the location of project activities and their proximity to commercially important fisheries, short-term impacts could range from none to moderate.

No long-term impacts to commercial fisheries are anticipated with projects to conserve habitat. Project types intended to further sea turtle conservation may result in additional on-board observers and monitoring of commercial fishery by-catch that could affect commercial fishing operations. The development and implementation of projects to restore and protect finfish would require project-specific considerations of their economic effects on commercial fisheries.

Additionally, the restoration of bird or sea turtle nesting habitat would not result in any foreseeable short-term or long-term impacts to commercial fisheries.

In the long-term, projects to restore and protect wetlands, protect shorelines and reduce erosion, restore and protect SAV, and restore oysters could provide forage, shelter areas, or improved habitat for commercially important fish and shellfish species. This could potentially benefit certain commercial fisheries that land, harvest, sell, and process these resources.

There are no anticipated short- or long-term impacts on land-based aquaculture operations associated with the project types under Alternative 2; some in-water operations located in proximity to planned projects may experience short-term disruptions related to construction activities resulting in short-term minor adverse impacts.

6.5.7 Marine Transportation

Under Alternative 2, impacts could occur from increases in marine traffic if there were sufficient numbers of barges involved and utilizing a congested shipping route. This could result in minor adverse impacts occurring in highly localized areas. Shipping routes would need to be properly identified prior to the selection of borrow sites for dredge and fill material.

Projects including wetlands, beaches, and barrier islands restoration and shoreline would reduce erosion and provide wave attenuation which would provide a long-term benefit for marine transportation infrastructure such as the Gulf Intracoastal Waterway, ports, and harbors. Long-term beneficial impacts could also result from proper planning and coordination of dredging activities in ways that allow for the dredging of fill material from borrow sites that provide opportunities to improve navigational channels.

6.5.8 Aesthetics and Visual Resources

Under Alternative 2, project types involving the use of construction equipment, including equipment used for the movement and placement of materials (i.e. barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas. Over the short-term, there would be a change in the viewshed that would be readily apparent and that would attract attention. Although such changes would not dominate the viewscape, they would detract from current user activities or experiences. The severity of impacts would depend to a large degree on the location of the proposed projects, the degree to which these activities would be visible, the duration of the construction activities and how commonplace these activities and equipment are in certain areas. Impacts would likely be greatest in areas frequented by large groups of visitors and in areas where more natural viewsheds exist (i.e. barrier islands). In the event that construction and ground disturbing projects result in the long-term placement of structures and signage, long-term minor adverse impacts to aesthetics would occur, though these types of objects are often commonplace and would become less intrusive over time.

Project types involving dredging activities associated with projects centered on beach re-nourishment, by contrast, could result in restricted access to scenic viewsheds within the area where such activity was occurring. These activities would adversely impact the scenic character of natural areas by introducing mechanical dredging, a readily observable visual contrast into the natural setting which would dominate and detract from current user activities or experiences. In these instances, short-term impacts to aesthetics could rise to major. More typically, impacts would be expected to range from minor to moderate.

Restoration, improvement and wetland and habitat creation project types would lead to long-term beneficial impacts from the increased visual character of the landscape occurring from the projects restoring or enhancing areas to their natural conditions and over-time increasing the scenic quality of the project area.

Project types involving the identification and nomination of specific habitat areas for fee title acquisition or conservation easement would lead to long-term beneficial impacts to aesthetics and visual quality as

over time as these restoration techniques would lead to the acquisition and enhancement of natural areas.

6.5.9 Public Health and Safety, Including Flood and Shoreline Protection

Under Alternative 2, project types involving construction and construction activities could result in short-term minor adverse impacts to public health and safety as a result of the operation of heavy equipment and construction materials. In addition, if hazardous chemicals or other materials are unintentionally released into the environment, soils, groundwater, and surface waters would be adversely impacted. Similarly, construction projects involving the use of boats and barges, and associated equipment, for the placement of materials to create habitat could impact the public through construction activities and the potential to contaminate surface waters, resulting in short-term minor adverse impacts. During implementation of land management plans, fire management activities could cause minor health and safety impacts. Measures to avoid risk to public health and safety would include, but not be limited to, approved burn plans/permits; assistance from local fire departments; and monitoring of weather conditions. BMPs and other mitigation measures that may be employed to further minimize or contain adverse impacts are listed in Appendix 6-A.

Long-term beneficial impacts from restoration and rehabilitation projects could reduce the risk of potential hazards, such as storm surges, to visitors, residents, and workers from improved shoreline integrity and additional buffer and flood storage from storms. Project types that include restoring wetlands and submerged aquatic vegetation could reduce water contamination currently present in the localized areas and help to alleviate potential future water contamination, also resulting in long-term beneficial impacts.

6.6 Alternatives 3 (and 4): Physical and Biological Environments

This section describes the environmental consequences of Alternative 3 for physical and biological environments. Impacts for physical and biological environments are disaggregated by each of the three project types identified in Chapter 5 under this Alternative. For each project type, potential restoration techniques are noted. Because Alternative 4 is inclusive of Alternative 3, the analysis of environmental consequences for these project types is the same for Alternative 4 as Alternative 3.

6.6.1 Project Type 10: Enhance Public Access to Natural Resources for Recreational Use

This project type would involve enhancing recreational users' experiences by creating new or improved access to natural resources. Access to recreational areas can be improved by enhancing or constructing infrastructure and by providing or improving access to natural resources in publicly owned areas (parks, marinas, etc.). Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

1. Improving access to natural resources for recreational use through the construction or enhancement of infrastructure
2. Purchase of access rights, easements, and/or property in areas to increase access to resources for recreational purposes

6.6.1.1 Geology and Substrates

Recreational enhancement projects could provide long-term beneficial effects on geology and substrate where existing degraded infrastructure (such as damaged piers or dilapidated public facilities) was improved or enhanced. These types of projects would result in long-term beneficial effects because they would extend beyond the construction period.

Enhancing or constructing infrastructure could require work with heavy equipment in construction or staging areas that would temporarily disturb soils and sediments in upland, shallow water areas or nearshore habitats. These construction activities could result in the local removal, compaction, and erosion of upland, shallow-water, and nearshore substrates in construction/development areas. These would be minor to moderate short- to long-term adverse effects because they would be localized and could have readily apparent effects on local soils, substrates and/or geologic features, with some effects lasting only during the construction period (heavy equipment use) and others extending beyond the construction period (compaction and displacement resulting from infrastructure).

6.6.1.2 Hydrology and Water Quality

Recreational enhancement projects have the potential to have minor to moderate long-term beneficial effects on water quality depending on the proposed activity. If recreational enhancements occurred at an existing site where ongoing degradation is occurring (e.g. unimproved or failing parking areas with poor stormwater management near coastal waters), there could be long-term benefits to water quality. Other projects may have beneficial effects by improving access to marine pump-out stations and reducing marine discharges of waste. Navigational aids would also tend to reduce the risk of boating accidents and associated fluid releases and spills. Projects that reduced degradation of water quality would result in long-term beneficial effects because they would extend beyond the construction period.

Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion. Conversion of natural areas to impervious surfaces could increase, which could increase stormwater runoff and pollutants to the receiving water body and cause minor long-term adverse effects. Long-term decreases in surface water quality could occur from increased use and presence of boats and equipment within the project area, which would be minor and long-term because the effects would be localized and would extend beyond the construction period. Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion.

6.6.1.3 Air Quality and Greenhouse Gases

During construction activities, short-term impacts to air quality and GHGs would occur from the use of gasoline and diesel powered construction vehicles and equipment, including barges, and exhaust produced by the use of this equipment. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. Long-term minor adverse effects from these enhancements due to increased recreational use and associated vehicle traffic may occur.

6.6.1.4 Noise

During the construction period, adverse impacts to ambient noise levels could occur, particularly along shorelines where construction activities would take place. The severity of impacts would depend to a large degree on the location of the project and the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. Installation activities, equipment operation, and vehicle or boat traffic associated with the construction activities could result in short-term minor to major adverse impacts to noise, especially if they occurred in natural areas. For example, during the use of motorized heavy equipment such as cranes and barges, noise would be created which would be readily apparent and attract attention. Although such changes would not dominate the soundscape and some sounds could be dampened or masked by ambient wave or ship noise, these actions could detract from the current user activities or experiences and create audible contrast for visitors in the project area.

Over the long-term, the addition of infrastructure into the existing setting would present some amount of increase in ambient noise levels. For example, a new boat ramp would result in increased noise associated with boat launching. Long-term adverse effects of these enhancements could range from minor to moderate depending on the existing noise level of the surrounding landscape, the location and distance to sensitive receptors, and the anticipated increase in use.

6.6.1.5 Habitats

Not all public access projects necessarily result in benefits to habitats. While some of these projects do result in benefits, benefit from Alternative 3 to these resources is not specifically tied to this project type in Table 6-3. Some recreational enhancement projects may have long-term beneficial effects on wetlands, barrier islands, beaches, coastal transition zones, SAV and shallow water habitats. For example, enhancement projects could reduce degradation and recreation use in habitats in settings where recreation usage that is currently diffuse is redirected to a site that is more appropriate and conducive to recreational activities. Enhancing or constructing infrastructure could require in-water work with heavy equipment and long-term operation and maintenance of these facilities. These activities could result in the following short and long-term minor to moderate adverse impacts:

- Filling, disruption, or alteration of wetlands;
- Soil erosion, vegetation trampling, vegetation removal, or other human activity from project staging or construction, or implementation of recreational enhancements;
- Permanent shading of SAV or other habitats from placement of structures;
- Filling of shallow water areas, and the conversion of upland pervious areas to impervious surfaces (parking areas, buildings, etc.) related to the placement of piers, foundations, or other permanent structures;
- Localized plant species displacement or loss, introduction of invasive species, and degradation of habitats as a result of an increase recreational activity and human encroachment in habitats, such as beaches or wetlands;
- Increased human-related disturbances of fish, birds or marine mammals in the long-term that may be present in the waterway related to facilities that include in-water activities;
- Cover or loss of SAV populations in areas where in-water construction work occurs. However, turbidity would dissipate quickly and effects from this water quality change would be minor and

short-term. Adverse effects from covering SAV would be minimized due to pre-construction surveys in specific project locations; impacts to SAV could be minor and would be avoided and minimized to the maximum extent practicable.

These effects would depend on the size and scale as well as the location of facilities. Effects would also vary depending on presence of sensitive habitats and availability of other similar sensitive habitats in the project vicinity.

6.6.1.6 Living Coastal and Marine Resources

Some public access projects might have long-term beneficial effects on living coastal and marine resources (e.g., by reducing degradation and recreation use in habitats or on populations in settings where recreation usage that is currently diffuse is redirected to sites that are more appropriate and conducive to recreational activities). In some cases, degradation and recreational use that may have been wide spread, thus affecting a larger geographic region, could be focused on areas that can be managed for the recreational impact and that are not sensitive or important habitats for living coastal and marine resources. These projects could subsequently result in a long-term benefit through the stabilization and protection of sensitive habitats and biological resources. However, not all public access projects necessarily result in these types of benefits to living coastal and marine resources, and the summary Table 6-3 assignment of benefit from Alternative 3 to these resources is not specifically tied to this project type. Enhancing or constructing infrastructure could require in-water work with heavy equipment and long-term operation and maintenance of these facilities. These activities could result in the following adverse impacts:

- Short-term, minor disturbance or loss of pelagic microfaunal and benthic communities from increased turbidity, which decreases available light necessary for photosynthesis, and disruption in the water column and surface water. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once turbidity dissipates;
- Short-term, minor displacement of finfish individuals or mortality of individual finfish, including adults, eggs, or larvae, could occur during construction, depending on timing and location of construction and affected species. However, it is anticipated that finfish would move away to other readily available aquatic habitats during the construction period. Fish present in the dredging or fill-placement area could be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and removal of benthos from dredged areas. Sound pressure level increases or entrainment could result in mortality of individual finfish. This would be a minor short-term adverse effect that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Short-term, minor to moderate displacement of sea turtle and marine mammal individuals from the work area due to increase in activity, noise, vibration, and turbidity during construction. Removal or cover of existing foraging habitat (SAV) by suspended sediments during in-water activities could present another potential adverse effect to sea turtles or manatees. However the extent of covered SAV would be limited to the local area and sediments would be expected to settle quickly once construction was completed. Therefore, these impacts would be short-

term and minor. If projects may incidentally harass marine mammals or adversely affect ESA-listed marine mammals or sea turtles, consultation or authorizations with appropriate agencies would be required prior to project implementation.

- Long-term, minor to moderate displacement or loss of nesting/rearing and foraging habitat for sea turtles, birds, or terrestrial wildlife as a result of recreational activity and encroachment on beaches and shallow waters used by these species.
- Short-term minor displacement of local birds and terrestrial species or mortality of intertidal invertebrates could occur during construction, although most wildlife would be expected to move away to forage in other readily available foraging habitat during this activity. Structures that extend above the water surface could also potentially improve predator access to nesting birds, resulting in a minor long-term adverse impact. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation;
- Short-term to long-term, minor displacement or loss of oyster populations or other benthic organisms from increased turbidity, substrate disturbance, or siltation of any hard substrate areas that house oyster populations during construction, loss of habitat from placement of permanent structures on soft sediments or hard substrates, damage to habitats from contact with vessels or from biofouling from leaked or otherwise discharged fluids (oil, gas, and diesel).

6.6.2 Project Type 11: Enhance Recreational Experiences

This project type involves a variety of techniques that could be implemented to enhance recreational experiences. Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

- Re-nourish beaches through sediment addition;
- Place stone, concrete, or permissible materials to create artificial reefs;
- Construction to enhance recreational experiences;
- Research and development to enhance management of recreational fisheries;
- Enhance recreational fishing opportunities through aquaculture techniques; and
- Reduce and remove land-based debris.

6.6.3 Geology and Substrates

Sediment deposition on beaches or creation of shallow and/or inshore artificial reefs could result in a benefit to local geology and substrates by reducing erosion, as well as reducing wave action and inducing sediment deposition. These beneficial effects would be long-term because they would extend beyond the construction period. However, these actions also carry the long-term minor to moderate risk of interrupting geomorphic processes. This could include erosion or deposition outside the targeted area to be protected. Beach re-nourishment would require heavy equipment and construction activity that could result in increased sedimentation, compaction, or rutting. These adverse effects would be minor to moderate and short- to long-term because they could occur during the construction period and beyond the construction period. The construction and use of temporary pipelines to deliver sediment could also disturb substrates along the pipeline corridor and increase erosion temporarily. This adverse effect would be minor and short-term because it would be localized and generally would not extend beyond the construction period. Sediment deposition could require periodic maintenance on beaches

that have degraded due to ongoing conditions (such as lack of sand deposition due to breakwaters or jetties and limitation of beach/dune migration due to development) which could result in minor, short-term adverse effects to local substrates through equipment operation and human activity.

Creation of artificial reefs could result in long-term moderate benefits on geology and substrate. Placement of an artificial structure would create more substrate in an area which may or may not be hard-bottom habitat limited. Adverse effects could occur to geology and substrates from installation of artificial reefs. The creation of artificial reefs could cause short-term minor adverse impacts on geology and substrate due to initial placement of the vessel or other man made structure materials. Placement could cause loosening of sediments and may negatively impact any seafloor features; however, these impacts are anticipated to be temporary in nature. Placement of an artificial reef structure could also cause a loss in soft-bottom habitat. Placement of structures would permanently cover existing geology and substrates, which would be a long-term minor effect.

Constructing facilities such as wildlife viewing platforms or dune walkovers adjacent to Gulf waters could result in work with heavy equipment in construction or staging areas; this work could temporarily or permanently affect geology and substrates. These activities would result in removal, displacement, and compaction of geology and substrates, causing minor to moderate short- to long-term adverse effects.

The effects that removal of land-based debris during construction would have on geology and substrates would need to be considered in project-specific analyses. For example, if new recycling facilities are constructed, then minor short-term adverse effects on substrates could occur during construction activities. These effects would be minor and short-term because they would be localized and would occur during the construction period. However, other components of this technique (e.g., developing marine debris reduction programs, encouraging local businesses to recycle) would not likely have any effects on geology and substrates.

6.6.3.1 Hydrology and Water Quality

Beach re-nourishment (depending on design) could help reduce storm surges on coastal wetlands and associated surface water resources, and limit the shoreward extent of saltwater flow. This could provide short-term beneficial effect to hydrology and water quality because it would extend beyond the construction period. Since not all techniques and project types within alternative 3 would be capable of providing this same benefit to hydrology and water quality, Table 6-3 does not reflect a benefit to hydrology and water quality for this alternative.

Artificial reef construction could result in short-term minor adverse impacts on water resources, as placement of the material could cause short-term suspension of sediments at the restoration site. These impacts are expected to be temporary in nature, and have no significant impact on water quality. Any structure used for this technique should be properly cleaned of any contaminants. However, minor adverse impacts to water resources could occur if contaminants are released during the ship cleaning process. Indirect impacts would be determined based on site-specific and project-specific considerations.

Turbidity curtains could be utilized to decrease turbidity associated with placement of structures. Turbidity curtains are floating impermeable barriers that are constructed of flexible material with an

upper hem containing floatation material and a lower hem that is weighted. They effectively minimize sediment transport from the area of disturbance by allowing suspended sediment to settle out of the water column in a controlled area (Southeast Florida Coral Reef Initiative 2008).

Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion. Construction of recreational or aquaculture facilities could result in additional impervious surface, which could increase runoff and reduce infiltration. These would be minor long-term effects because they would be small, localized, and extend beyond the construction period. Other adverse facility construction-related effects could include short to long-term minor to moderate decreases in water quality from disruption of sediments, increased turbidity, and increased fluid spill risk from equipment. Additionally, aquaculture facilities or research and development laboratories along the Gulf Coast could adversely affect water quality through the discharge of fish hatchery effluent. This would be a minor long-term adverse effect because effects would be localized and extend beyond the construction period. Increased human activity or vehicle traffic as a result of improved recreation facilities could also result in minor, long-term adverse effects to water quality.

The effects that removal of land-based debris during construction would have on hydrology and water quality would need to be considered in project-specific analyses. For example, if new recycling facilities are constructed, then minor short-term adverse effects on groundwater could occur during construction activities. These effects would be minor and short-term because they would be localized and would occur during the construction period. However, other components of this technique (e.g., developing marine debris reduction programs, encouraging local businesses to recycle) would not likely have any effects on groundwater. In some cases removal of debris could result in a long-term benefit to water quality and hydrology. For example, if debris was disrupting or otherwise affecting surface flow in a small waterway, removal could result in beneficial effects to hydrology.

6.6.3.2 Air Quality and Greenhouse Gases

During construction activities, short-term impacts to air quality and GHGs would occur from the use of gasoline and diesel powered construction vehicles and equipment, including barges, and exhaust produced by the use of this equipment. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions. Long-term minor adverse effects from these enhancements due to increased recreational use and associated vehicle traffic may occur.

6.6.3.3 Noise

During implementation of restoration actions, adverse impacts to the environment due to an increase in the ambient noise level could occur. The severity of impacts would depend to a large degree on the location of the project and the amount of noise that these activities would generate and the distance to sensitive receptors such as recreational users or wildlife. Installation activities, equipment operation, and vehicle or boat traffic associated with the construction of artificial reefs, beach re-nourishment, or

facility construction could result in short-term minor to major adverse impacts to noise, especially if they occurred in natural areas. For example, during the use of motorized heavy equipment such as cranes and barges, noise would be created which could be readily apparent and attract attention. Although such changes would not dominate the soundscape and some sounds could be dampened or masked by ambient wave or ship noise, these actions could detract from the current user activities or experiences and create audible contrast for visitors in the project area.

For projects that would increase motorized use or result in operational noise, long-term adverse changes to the ambient noise levels would be minor to moderate. For projects that would not create an increase in motorized use or operational sound, such as beach re-nourishment, long-term impacts to the ambient noise levels would be unlikely.

6.6.3.4 Habitats

The creation and restoration of beaches could result in a long-term benefit to habitats including wetlands, barrier islands, beaches and dunes, SAV, and coastal transition zones. These activities could help stabilize substrates, support sediment deposition, and reduce erosion. Since not all techniques and project types within Alternative 3 would be capable of providing this same benefit to habitats, the assignment of Alternative 3 benefits to habitats is not specifically associated with this project type.

Adverse effects could occur to these habitats from different restoration activities such as dredging, placement of sediment transport pipeline, placement of sediment, or facility construction. Adverse impacts from these activities could include:

- Filling, disruption, or alteration of adjacent habitats;
- Increased soil erosion, vegetation trampling, vegetation removal, or other human activity from project staging or construction, or implementation of restoration activities on adjacent uplands, coastal transition zones, barrier flats, dunes and beaches;
- Cover or loss of SAV populations in areas where in-water construction work, dredging, or placement of an underwater pipeline occurs; turbidity would dissipate quickly and effects from this water quality change would be minor and short-term. However, adverse effects from covering SAV would be minimized due to pre-construction surveys in specific project locations; impacts to SAV could be minor and would be avoided and minimized to the maximum extent practicable; and
- Change in water quality from turbidity and substrate disturbance from in-water work with heavy equipment or leaching of construction fluids.

These impacts would be, for the most part, minor to moderate and would take place over the short-term, during the construction activity.

The creation of artificial reefs could benefit sessile and benthic encrusting organisms and forage fish by providing substrate and interstitial spaces for use as habitat and forage areas. The benefits from artificial reefs depend on site-specific and project-specific considerations.

Construction of wildlife viewing platforms, dune walkovers or other features for recreational users could result in adverse short-term and long-term minor to moderate adverse impacts, including:

- Increases in sedimentation and turbidity during construction;
- Fluid spills (e.g. oil, diesel, gasoline, etc.) in or near wetlands or shallow water areas from equipment usage and other construction activities;
- Soil erosion, vegetation trampling, vegetation removal, or other human activity from project staging or construction, or implementation of recreational enhancements on uplands, coastal transition zones, barrier flats, dunes and beaches;
- Permanent conversion of pervious areas to impervious surfaces (parking areas, buildings, etc.) related to the placement of piers, foundations, or other permanent structures, fill of shallow water areas;
- Conversion of upland habitats from placement of structures or facilities;
- Degradation of habitats and/or introduction of invasive or exotic species as a result of increased recreational activity and human encroachment in habitats, such as beaches or wetlands;
- Facilities that included in-water activities could increase long-term human-related disturbances of fish, birds or marine mammals that may be present in the waterway.

These effects would depend on the size, scale, and placement of facilities, presence of sensitive habitats and availability of other similar sensitive habitats in the project vicinity. Placement of structures could also cause permanent shading of SAV or other habitats. There could be short-term adverse disruption of habitats during construction from use of heavy equipment and staging of construction activities.

The effects of removal of land-based debris on Gulf Coast habitats would need to be considered in project-specific analyses. For example, if new recycling facilities are constructed, adverse effects could occur as a result of vegetation clearing, grading, or other actions. These effects would be minor and short-term because they would be localized and would occur during the construction period. However, other components of this technique (e.g., developing marine debris reduction programs, encouraging local businesses to recycle) would not likely have any effects.

6.6.3.5 Living Coastal and Marine Resources

Beach re-nourishment could protect eroding beaches and shallow water habitats. These actions would provide long-term benefits to benthic populations, pelagic microfaunal communities, and finfish, by providing forage areas and habitat. Restored beaches are intended for public use, potential benefits of restored beaches to birds, terrestrial wildlife and other species are not assumed here, but could be an outcome depending on location and level of use.

Some short-term minor adverse effects could occur if resources, including oysters, fish, sea turtles, marine mammals, benthic communities, and pelagic microfaunal communities, were present in the construction area. Possible impacts could include increased turbidity, reduction of water quality, noise pollution, vibration, and disruption to the water column and habitat. In particular, in-water dredging, reef construction, and recreation or aquaculture facility construction activities could result in the following adverse impacts:

- Short-term to long-term, minor displacement or loss of oyster populations or other benthic organisms from increased turbidity, substrate disturbance, leaching of equipment fluids or siltation of any hard substrate areas that house oyster populations during construction;

- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb or kill some pelagic microfaunal communities. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once the turbidity dissipates;
- Fish present in the work area could be temporarily displaced, or eggs and larvae could be killed due to smothering or crushing by equipment, human activity, or sediment. Fish could also be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and alteration or removal of habitat. Sound pressure level increases or entrainment could also result in mortality of individual finfish. These would be minor short-term adverse effects that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation;
- Sea turtle and marine mammal individuals present in project areas where dredging or underwater use of equipment is occurring could be subject to temporary increased noise, turbidity, and water quality changes as well as alteration or loss of forage or nesting habitat, all of which could temporarily displace individuals or prey during construction and result in short-term, minor impacts. If projects have potential for adverse effects to marine mammals or sea turtles, consultations or incidental harassment authorizations with appropriate agencies would be required prior to project implementation;
- Construction in upland habitats could result in short-term impacts due to operation and staging of heavy equipment which can create noise, reduce or remove available habitat or disrupt normal movement of wildlife. As such, bird and terrestrial wildlife individuals that forage or nest in or near the work area could be temporarily disturbed or displaced. Effects could vary from minor and short-term to major and long-term depending on the effect of the action. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation;
- Stormwater runoff from impervious surfaces could enter waterways and increase turbidity as well as carry pollutants that could affect benthic organisms, fish or foraging bird species; and
- Increase in visitation could result in noise and other disturbances as well as degradation of upland areas used by wildlife in the vicinity.

The creation of artificial reefs could result in short-term minor adverse impacts on biological resources as the initial placement of the reef could disturb fauna at the site. While the reduction of the available soft bottom habitat would be a long-term impact it is expected to be insignificant in relation to the amount of that habitat available in the Gulf. If a vessel is being placed as an artificial reef, a higher disturbance of benthic fauna could be likely, as it would cover a larger area of the seafloor. There could be long-term minor to moderate benefits to benthic encrusting, sessile, and mobile epifauna, and small forage fishes.

The creation of artificial reefs could provide indirect benefits to marine fish, marine mammals, sea turtles, and potentially oysters and shallow water coral. A created artificial reef provides benefit to marine fish, marine mammals, and sea turtles, all of which would utilize a well-colonized reef for food, shelter, or spawning areas. If the reef is placed in shallow enough water, oysters or shallow water coral

would also potentially colonize the structure. Long-term minor to moderate benefits could occur if artificial reefs provide habitat for larger resident fishes and temporary foraging sites for larger migratory fishes. When overfishing is a problem, however, artificial reefs may aggravate the overfishing problem by concentrating remaining fishes and making them more vulnerable to fishing pressure, which could be an adverse impact. Whether the availability of new habitat will serve to increase fish and/or invertebrate biomass or will only serve to concentrate organisms at the site, is likely dependent on where the reef is sited and how it is designed.

Sea turtle and marine mammal individuals present in project areas where use of explosives to sink a vessel for creation of an artificial reef could be subject to temporary increased noise, turbidity, and water quality changes, all of which could temporarily displace individuals or prey during construction and could result in short-term, minor impacts. If projects have potential for adverse effects to marine mammals or sea turtles, consultations with appropriate agencies would be required prior to project implementation.

Adverse minor long-term impacts could occur if restoration activities 1) placed materials or sediment directly on top of resources (e.g. existing oyster reef/substrates); 2) removed foraging or nesting habitat, such as replacing vegetation with a permanent structure; 3) provided access for native and non-native terrestrial animals that could increase predation of local nesting birds; or 4) increased recreational use and access of habitats that were previously undisturbed. Some hatcheries/aquaculture operations could result in a long-term minor adverse effect to marine mammals or fish through unintentional exposure of wild organisms to disease through release of contaminated effluent or infected animals. Stocking of hatchery-reared finfish could also, long-term, negatively impact the genetic diversity of the wild stock. Development and implementation of a genetics management plan or release of only sterile individuals may decrease the chance of long-term negative impacts on native populations. Stocked fish could also affect the balance of the fish community, competing for food and habitat resources with finfish species present in the receiving waters. Implementation of stocking management plans with consideration of the location of sensitive finfish species could prevent disruption to the native finfish populations through competition or predation. BMPs and other mitigation measures that may be employed, depending on site-specific considerations, to further minimize or contain adverse impacts to cultural resources are detailed in Appendix 6-A.

The effects of removal of land-based debris on living coastal and marine species would need to be considered in project-specific analyses. For example, if new recycling facilities are constructed, then adverse effects to some species' foraging or nesting habitat could occur as a result of vegetation clearing, grading, or other actions. These effects would be minor and short-term because they would be localized and would occur during the construction period. However, other components of this technique (e.g., developing marine debris reduction programs, encouraging local businesses to recycle) would not likely have any effects.

6.6.4 Project Type 12: Promote Environmental and Cultural Stewardship, Education, and Outreach

This project type would facilitate environmental and cultural stewardship, education, and outreach through a variety of different mediums that concentrate on the coastal resources of the Gulf of Mexico.

Appropriate restoration techniques (described in more detail in Chapter 5) for this project type include but are not limited to:

1. Create or enhance natural resource-related education facilities
2. Create or enhance natural resource-related education programs

6.6.4.1 Geology and Substrates

Construction of new or improved educational facilities could result in local removal, displacement, and compaction of geology and substrates. These effects would be minor to moderate and short to long-term because they would be localized and could have readily apparent effects on local substrates/geologic characteristics, with some effects lasting only during the construction period and others extending beyond the construction period (i.e. compaction and displacement resulting from infrastructure).

6.6.4.2 Hydrology and Water Quality

Construction of educational facilities in, or directly upstream of, freshwater or brackish water could result in short-term decreases in water quality from disruption of sediments, and/or increased turbidity. Equipment usage and other construction activities in wetland recharge areas could result in short-term adverse impacts to surface water related to sediment compaction, disturbance, and erosion. Conversion of pervious areas to impervious surfaces could reduce infiltration while increasing stormwater runoff and pollutants to the receiving surface water body. These effects would be minor and long-term because they would be localized and extend beyond the construction period.

6.6.4.3 Air Quality and Greenhouse Gases

During construction activities, short-term impacts to air quality and GHGs would occur from the use of gasoline and diesel powered construction vehicles and equipment, including barges, and exhaust produced by the use of this equipment. Examples of project-specific projected emissions are located in Chapters 8 through 12. The severity of impacts would be highly dependent on the length and type of construction required and the location of the project. There is a slight potential for fugitive dust creation from construction activities, resulting in minor adverse impacts. The use of gasoline and diesel-powered construction vehicles and equipment could contribute to a short-term and minor increase in GHG emissions. Long-term minor adverse effects from these enhancements due to increased recreational use and associated vehicle traffic may occur.

6.6.4.4 Noise

Adverse impacts to the ambient environment during the construction of education facilities would be short-term and minor to moderate from noise disturbances such as the operation of bulldozers, front-loaders and other large earth moving equipment required for construction of new or improved recreational facilities. Depending on the surrounding environment, distance to sensitive receptors and ambient noise conditions, these construction sounds could potentially dominate the soundscape and detract from current user activities or experiences.

An increase in education programs could also have long-term minor to moderate adverse noise effects due to increases in motorized use or human activity, if resulting activity occurred in areas of previously undisturbed, quiet settings.

6.6.4.5 Habitats

Providing educational features for both the public and students through coastal exhibits and collections, hands-on activities, educational outreach programs related to coastal resources, and other interactive activities could increase public awareness of wetlands, barrier islands, beaches, and other habitats, as well as highlight their value to the overall ecosystem. The facilitation of educational outreach and interactive activities would be a long-term benefit to the environment by increasing public knowledge of, and support for, preservation and conservation of these habitats, as well as potentially resulting in behavioral changes during future public encounters with sensitive habitats. However, increased visitation to barrier islands, dune areas, or other habitats as a result of educational programs could have long-term minor to moderate adverse effects to previously minimally used or visited habitats.

Enhancing or constructing educational infrastructure could require work with heavy equipment and long-term operation and maintenance of these facilities. Adverse construction and operational habitat effects could include short to long-term minor to moderate adverse effects including:

- Short-term minor to moderate increases in sedimentation and turbidity during construction;
- Filling, disruption, or alteration of wetlands;
- Soil erosion, vegetation trampling, vegetation removal, or other human activity from project staging or construction or implementation of recreational enhancements on uplands, coastal transition zones, barrier flats, dunes and beaches;
- Permanent shading of SAV or other habitats from placement of structures;
- Filling of shallow water areas, and the conversion of upland pervious areas to impervious surfaces (parking areas, buildings, etc.) related to the placement of piers, foundations, or other permanent structures;
- Localized plant species displacement or loss, introduction of invasive species, and degradation of habitats as a result of an increase recreational activity and human encroachment in habitats, such as beaches or wetlands;
- Increased human-related disturbances of fish, birds or marine mammals in the long-term that may be present in the waterway related to facilities that include in-water activities;
- Cover or loss of SAV populations in areas where in-water construction work occurs. However, turbidity would dissipate quickly and effects from this water quality change would be minor and short-term. Adverse effects from covering SAV would be minimized due to pre-construction surveys in specific project locations; impacts to SAV could be minor and would be avoided and minimized to the maximum extent practicable.

6.6.4.6 Living Coastal and Marine Resources

Providing educational features for both the public and students through coastal exhibits and collections, hands-on activities, educational outreach programs related to coastal resources, and other interactive activities could increase public awareness of marine resources and of their value to the ecosystem, potentially leading to greater support for resource management and conservation. This could result in a long-term benefit to nearshore benthic communities, oysters, marine mammals and other species beyond the lifespan of the project. However, increased visitation to barrier islands, beaches, or other habitats as a result of educational programs could have long-term minor to moderate adverse effects to local marine resources via localized species displacement or loss and degradation of habitats.

Enhancing or constructing infrastructure to promote environmental and cultural features could require work with heavy equipment or operations and maintenance in areas where nearshore benthic communities, finfish, oysters, sea turtles, or other species are present. Adverse construction effects to these species could include short to minor to moderate effects, including:

- Displacement or loss of oyster populations or other benthic organisms from increased turbidity, substrate disturbance, leaching of equipment fluids or siltation of any hard substrate areas that house oyster populations during construction.
- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb or kill some pelagic microfaunal communities. These impacts would be short-term and minor because pelagic microfaunal communities would re-establish once the turbidity dissipates.
- Fish present in the work area could be temporarily displaced, or eggs and larvae could be killed due to smothering or crushing by equipment, human activity, or sediment. Fish could also be subject to a temporary increase in sound pressure levels, a decrease in water quality, entrainment in dredge sediments, and alteration or removal of habitat. Sound pressure level increases or entrainment could also result in mortality of individual finfish. These would be minor short-term adverse effects that would not be expected to reduce local fish populations or designated EFH. If projects have potential to adversely affect protected fish species, consultations with the appropriate agencies would be required prior to project implementation.
- Sea turtle and marine mammal individuals present in project areas where dredging or underwater use of equipment is occurring could be subject to temporary increased noise, turbidity, and water quality changes as well as alteration or loss of forage or nesting habitat, all of which could temporarily displace individuals or prey during construction and result in short-term, minor impacts. If projects have potential for adverse effects to marine mammals or sea turtles, consultations or incidental harassment authorizations with appropriate agencies would be required prior to project implementation.
- Construction in upland habitats could result in short-term impacts due to operation and staging of heavy equipment which can create noise, reduce or remove available habitat or disrupt normal movement of wildlife. As such, bird and terrestrial wildlife individuals that forage or nest in or near the work area could be temporarily disturbed or displaced. Effects could vary from minor and short-term to major and long-term depending on the effect of the action. If projects have potential to adversely affect protected bird species, consultations with the appropriate agencies would be required prior to project implementation.

Additional long-term minor to moderate adverse effects to species could result from the placement of piers, foundations, or other permanent structures; fill of shallow water areas; increased human traffic, and the conversion of pervious areas to impervious surfaces (parking areas, buildings, etc.). These actions could result in disturbance or displacement of local species. Construction of educational or cultural facilities could result in operational effects that could affect living coastal and marine resources, including:

- Stormwater runoff from impervious surfaces could enter waterways and increase situation and turbidity as well as carry pollutants that could affect benthic organisms, fish or foraging bird species;
- Increase in visitation could result in noise and other disturbances as well as degradation of upland areas used by wildlife in the vicinity;
- Potential for introduction of exotic or invasive species may increase;
- Facilities that included in-water educational activities could increase human-related disturbances of fish, birds or marine mammals that may be present in the waterway.
- If projects have potential to adversely affect protected species, consultations with the appropriate agencies would be required prior to project implementation.

6.7 Alternatives 3 (and 4): Human Uses and Socioeconomics

This section describes the environmental consequences of Alternative 3 for human uses and socioeconomics.⁵ These impacts consider the three relevant project types that are identified in Chapter 5 together by resource area. Because Alternative 4 is inclusive of Alternative 3, the analysis of environmental consequences for these project types is the same for Alternative 4 as Alternative 3.

6.7.1 Socioeconomics and 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.

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

⁵ The term "human use" in this chapter, and in chapters 8-12, is specific to the evaluation under NEPA of the potential impacts on those aspects of the human environment not addressed in the assessment of the physical and biological environments. The term 'human use' here is not intended to address or substitute for an evaluation of human use in the context of OPA or the OPA implementing regulations.

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 project types proposed under Alternatives 3 and 4 are not, in general, expected to create a disproportionately high and adverse effect on a minority or low-income population; however, population characteristics, including race and ethnicity and per-capita income as it relates to the poverty level as well as effect determinations are considered for the environmental justice analyses in Chapters 8 through 12 and would be considered in future phases of Early Restoration.

Project spending under Alternative 3 (and 4) would also benefit regional economies. Project construction or implementation spending is likely to occur under projects to enhance public access to natural resources for recreational use and to enhance recreational experiences, including creating new and improved infrastructure for public access, improvements to parks and marinas, renourishing beaches, placing materials to create reef structures, construction of new facilities (bathrooms, lodging, piers, ramps), and removing land-based debris. Project spending would support workforce to design, engineer, manage, and carry out the projects. Additionally, locally purchased (or rented) equipment and materials would also benefit the regional economy.

A number of industries would benefit from the Alternative 3 (and 4) project types, including construction, dredging, recreation service providers, and natural resources educational and outreach consultants.

Short-term beneficial impacts to the local and regional economy would occur from construction jobs and workforce for Alternative 3. These jobs would support income, sales, and downstream economic activity in the regional economy. The level of regional benefit would vary by project and would depend on the magnitude and level of effort necessary for each project, the sourcing of labor and materials, and the size of the economy in which the project is located. In smaller or more remote communities, these project workers may bring proportionally more benefits in terms of jobs and income to the economy than in large urban areas.

Depending on the type and location of the project, these implications could have a beneficial or at most a minor adverse impact on socioeconomic characteristics. For example, acquisition of lands for conservation or protection purposes could reduce the tax base for property tax collections; however, improvements in habitat associated with this project may draw additional visitors to the area with associated visitor spending, increasing sales and tax receipts on retail purchases. Adverse impacts to

property taxes would vary by the property involved and would depend on the assessed value of the property, which would vary depending on its location. The relative importance of the taxes to the county would also affect the level of impact. It is anticipated that only a few properties would be impacted.

Long-term job creation could also occur under Alternative 3. This type of benefit would be associated with project types and techniques that have the potential to increase tourism and visitation to an area, such as creating or improving new recreational facilities and infrastructure and renourishing beaches, and improving the quantity and quality of recreational opportunities such as the installation of artificial reefs. Long-term moderate benefits to socioeconomic characteristics could be anticipated as a result of artificial reef creation from increased recreational opportunities such as fishing, diving, and snorkeling. Additionally, long-term job creation could also occur with project types that increase public access for recreational use and support facilities and programs for environmental and cultural stewardship, education, and outreach. These projects may require additional staffing, specialists, and others in the support of new programs or facilities, which would have beneficial impacts to the regional economy.

6.7.2 Cultural Resources

Project types under Alternative 3 that are centered on the enhancement of public access and recreational experiences could potentially have a minor to moderate long-term adverse impact on cultural resources from ground and substrate disturbing construction activities and dredging activities, as discussed for Alternative 2. In addition, the likely increase in visitor use, over time, could lead to the inadvertent discovery of newly exposed cultural resource sites and an increase in the frequency of unauthorized collection of artifacts and vandalism. Long-term beneficial impacts could occur if discoveries follow proper procedures leading to their protection.

All projects conducted as part of Early Restoration would secure all necessary state and federal permits, authorizations, consultations or other regulatory processes related to sensitive habitats (e.g. wetlands or Essential Fish Habitat)) and protected species (e.g. marine mammals such as manatee, federal or listed species such as sea turtles, etc.), and other applicable requirements. In particular, a complete review of proposed projects under Section 106 of the NHPA will be completed as environmental review continues. Tribal Consultations would be initiated with all interested federally recognized tribes. Projects will be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Project-specific analyses of potential impacts to cultural resources are presented in Chapters 8 through 12 and would be for future phases of Early Restoration.

While the potential for impacts to cultural resources should be mitigated through BMPs and the section 106 process, some projects have the potential to adversely impact cultural resources. In particular, under Alternatives 3 and 4, project types involving the removal and placement of dredged materials and ground or substrate disturbing construction activities have the potential to lead to short and long-term minor to moderate impacts to cultural resources stemming from the potential for inadvertent damage to unknown sites, buildings, structures, or objects. In addition, the use of oyster shells to construct reefs raises the possibility of inadvertent site destruction, because some shell deposits along the coast have accumulated due to prehistoric human activity. Potential source areas of oyster shell would have to be assessed for human or natural accumulations before they are used for construction. Similarly, projects

requiring the filling of canals would need to ensure that the canals do not qualify as being historically significant canals under section 106.

If not properly conducted, activities conducted under Alternatives 3 and 4 have the potential to compromise a site's integrity and cause a loss of cultural information. BMPs and other mitigation measures that may be employed, depending on site-specific considerations, to further minimize or contain adverse impacts to cultural resources are detailed in Appendix 6-A.

These same project types under Alternatives 2 and 4 could lead to long-term beneficial impacts through the identification of cultural resources. Cultural or historical sites that may otherwise have been unknown or unprotected may benefit from the NHPA Section 106 review process that could require it be avoided and preserved in its natural state. In this manner, some information may be retrieved and future impacts could be avoided.

6.7.3 Infrastructure

Project types implemented under Alternative 3 (and 4) that involve ground- and substrate- disturbing construction activities could lead to short and long-term minor to major adverse impacts to infrastructure. Such impacts could include damage to unknown submerged infrastructure resulting from dredging associated with navigational channel improvements or damage to buried onshore infrastructure associated with the construction boat ramps, piers, public bathrooms, camp sites, or other recreational and public access facilities. An analysis describing the probability and severity of such potential incidents has not been conducted at the programmatic level for this document. As appropriate on a project-specific basis, surveys would be conducted to locate and aid in avoiding or minimizing potential impacts to buried and submerged infrastructure as a result of specific project activities.

Many of the project types discussed under Alternative 3 would involve the transport of construction vehicles, equipment, and materials. These project types, which include techniques such as placement of artificial reef structures; construction of boardwalks, trails, roads, bridges and other types of public access; and the construction of boat ramps, piers, public bathrooms, lodging facilities and similar amenities, could lead to short and long-term minor to major impacts on infrastructure. The impacts associated with these projects would result from increases in construction traffic; temporary or permanent closure of roads, parking lots, or facilities; or damage to roadways or other infrastructure that provides access to the shoreline. These impacts would range in intensity based on the duration of road, parking lot or public access closure, the importance of individual roadways as regional transportation arterials; and the extent and duration of damage to roadways, facilities or access points.

Projects that upgrade existing infrastructure or add new infrastructure, such as navigational improvements; construction of boat ramps, piers, public bathrooms, and lodging facilities; the construction of trails, boardwalks, and similar types of public access; and many of the other project types discussed above, would have long-term beneficial impacts to infrastructure.

Projects that enhance public access to natural resources for recreational use, enhance recreational experiences, and/or promote environmental and cultural stewardship, education, and outreach, that would not involve construction activities, such as the development of natural resource-related

educational programs or research and development to enhance management of recreational fisheries, would have no impacts on infrastructure.

6.7.4 Land and Marine Management

Projects implemented under Alternative 3 would have varying impacts on land and marine management depending on the type of management or land ownership applicable to the project site. Projects would generally be consistent with the prevailing management plans and direction governing the use of the land and marine areas where the projects would take place; therefore, the project types that would be implemented under Alternative 3 are generally expected to have no adverse impacts to land and marine management.

Projects implemented at national, state and local parks, wildlife refuges, and wildlife management areas could have short-term minor to moderate adverse impacts to land and marine management. These impacts would be temporary, and would occur as a result of construction activities related to projects such as the construction of new roads, trails, boardwalks, and other public access improvements; or the construction of boat ramps, piers, lodging facilities, public restroom, campgrounds, and similar facilities. Impacts would be related to temporary, full or partial closures of parks and refuges. In the long-term, projects implemented under Alternative 3 would have beneficial impacts on land and marine management at parks and wildlife refuges, and wildlife management areas because these activities would improve public access and amenities, helping park management and staff fulfill their obligations to manage these properties for the benefit of the environment and human enjoyment.

Most land trusts in the northern Gulf of Mexico region are focused on conservation of critical natural habitat; some land trusts also promote educational and recreational opportunities. Therefore, it is unlikely that projects implemented under Alternative 3 would have impacts to land and marine management on trust lands. Short-term minor to moderate adverse impacts could occur during construction activities to the extent that those activities interfere with the trusts' abilities to fulfill their management obligations as set forth in the trusts' charters or in the deeds to the specific parcels of land. In the long-term, there would be beneficial impacts to land and marine management from projects aimed at providing and enhancing access and recreational opportunities.

Projects that may be implemented within marine protected areas under Alternative 3, such as the placement of artificial reef structures, could have some short-term minor to moderate adverse impacts if these activities require temporary closure of areas that are managed for fishing or other types of recreation. However, because those projects would need to conform to the management plans and direction governing where reef materials may be placed, the impacts to marine management in those cases would be beneficial.

6.7.5 Tourism and Recreational Use

Under Alternative 3, project types that involve the removal and placement of dredged materials and ground or substrate disturbing construction activities including access improvement projects would result in some short-term minor to moderate adverse impacts to wildlife viewing, hunting, beach and waterfront access, fishing and tourism. The intensities of impact to the various resources are highly dependent on the proximity of projects to the affected resources, with impacts being highly localized to specific project areas. Impacts such as site closures as a result of these project types would be

experienced at greater levels in areas with fewer alternate tourism and recreation options, including barrier islands and less populated and/or rural areas leading to short-term minor to moderate adverse impacts in these types of locations. Impacts as a result of these project types could be particularly perceptible to people engaged in hunting, fishing, tourism and beach and waterfront visitation as a result of the temporary displacement of wildlife (particularly waterfowl) due to disturbances from construction. If these closures occur in areas with high levels of hunting, fishing, and tourist activity such as beach and waterfront visitation occurs, adverse impacts would be readily apparent to resource users, who may choose to pursue these recreational activities in different locations.

Project types that include techniques for improving public access would result in long-term beneficial impacts to tourism and recreational experiences by creating new or improved infrastructure and connectedness to these resource areas and amenities.

Recreational enhancement project types that include techniques such as beach re-nourishment, placing materials to create reef structures, and enhancing recreational infrastructure could provide long-term benefits to tourist and recreational uses by improving wildlife habitat, and increasing recreational amenities (such as beach facilities). As a result, these types of projects would enhance wildlife viewing, hunting, beach and waterfront visitors, fishing and tourist experiences and provide additional areas in which to experience these opportunities.

Project types designed to promote environmental and cultural stewardship, education and outreach are not anticipated to have adverse effects on tourism, other than minor disruptions that could be associated with construction of new facilities. This Alternative is anticipated to lead to long-term beneficial impacts through the expansion of education and stewardship programs.

6.7.6 Fisheries and Aquaculture

Alternative 3 project types intended to enhance recreational experiences, such as those to re-nourish beaches and place stone and materials may result in short-term adverse impacts to nearshore fisheries from construction and restoration activities involving the use of in-water equipment, dredge and placement activities, or creating and placing reef structures. The potential for the displacement of sand and sediment causing increased turbidity and the potential for spills and leaks from equipment could affect water quality and aquatic habitat. The degree to which these effects would create tangible impacts to fisheries is dependent on the actual location of project activities and the proximity to fishery operations, ranging from no short-term impacts to moderate short-term adverse impacts.

Projects to enhance recreational experiences may include stock enhancement, which could result in additional catch for commercial fishing benefitting harvest, landings, sales, and processing industries. In addition, the use of aquaculture operations to rear finfish and shellfish for release could result in refinement and improvement of aquaculture techniques for future use, which would benefit future aquaculture operations.

6.7.7 Marine Transportation

Alternative 3 project types involving dredging, trenching, and ground or substrate disturbing construction activities and debris removal would have short-term minor adverse impacts to marine transportation in the event that shipping routes are blocked or obstructed by dredging equipment or

barges or from increases in marine traffic. These impacts would occur in highly localized areas and would be within marine transportation operational capacities to withstand. Project types that enhance or increase public access or enhance recreational experiences could result in long-term minor adverse impacts to marine transit from increased recreational boat traffic and ferry traffic obstructing or slowing of commercial shipping traffic. However, given the low likelihood of recreational use of commercial shipping channels in general, it is anticipated that any such impacts would be minor. In addition, placement of signage, buoys, or other markers to alert recreational boaters to the location of commercial navigation channels would likely reduce these long-term impacts.

Although all of these project types are geared toward recreational rather than purely commercial uses, some could have long-term beneficial impacts to marine transportation if existing navigational infrastructure is improved. The construction of navigational aids, safe harbor improvements, and the dredging of navigational channels in particular would have long-term beneficial impacts on marine transportation.

6.7.8 Aesthetics and Visual Resources

All project types under Alternative 3 would have minor to moderate short-term adverse impacts from the temporary landscape during the construction period from the presence of bulldozers, front-loaders and other large earth moving equipment required for upgrades or new facilities. These impacts would constitute a change in the viewshed that is readily apparent and which would attract attention in the short-term. Although such changes would not dominate the viewscape, they could detract from the current user activities or experiences. Over the long-term, the addition of infrastructure and facilities into the existing setting would present some degree of visual contrast. Long-term adverse effects of these enhancements would range from minor to moderate, depending on the existing aesthetic character of the surrounding landscape. Where the addition of these facility enhancements into the existing setting would present a large degree of visual contrast, impacts would be moderate because they would detract from the current user activities or experiences. Where the additional infrastructure would be incorporated into landscapes that are already characterized by human-made features, impacts would be at most minor.

Projects that enhance public access and recreational experiences may have some long-term visual and aesthetic benefits (e.g., conducting beach renourishment; removal of land-based debris). However, as noted above, other projects may not have benefits to aesthetic resources, and may result in long-term minor to moderate adverse impacts (e.g, infrastructure enhancement such as improvement or expansions of boat ramps).

6.7.9 Public Health and Safety, Including Flood and Shoreline Protection

Project types under Alternative 3 involving construction and construction activities would result in short-term minor adverse impacts to public health and safety as a result of the operation of heavy equipment and construction materials as well as the potential of hazardous waste and materials contaminating soils, groundwater, and surface waters. Projects would be designed using similar safety-related BMPs to reduce hazards.

Projects centered on enhancing public access of areas would likely lead to long-term beneficial impacts to public safety by providing access to sites that currently lack infrastructure or require infrastructure improvements. However, projects that result in hardening of the shoreline, e.g., boat ramp improvements, would also lead to long-term minor adverse impacts related to flood and shoreline protection.

Long-term beneficial impacts to public health and safety could be experienced through the promotion environmental and cultural stewardship, education and outreach project types in the event that users of the sites are more knowledgeable about potential harms in the project areas.

6.8 Range of Direct and Indirect Impacts of Alternatives

Previous sections of Chapter 6 assessed the direct and indirect impacts associated with each proposed project type, organized by action alternative. In Table 6-3, these project type analyses are consolidated to give an overview of the potential impacts to key resource areas for each alternative. Because this PEIS identifies a number of types of potential projects that may occur, a range of impacts is anticipated for each resource. The range presented here represents the range of impacts estimated for each resource (e.g., minor to moderate) that is reported in each of the more specific project-type-level analyses. For example, if analyses for Project Types 1 through 4 report “minor” effects to a particular resource is likely under alternative 2, but project types 5-9 found that effects were likely to be moderate to major for that resources, Table 6-3 would report “minor to major” impacts for that resource. In a few cases, possible but rare or improbable impacts are described in the text, but are not shown in the table.⁶ Specific impacts of Alternatives, when implemented, would depend on where individual projects may occur, the timing of proposed construction and other activities, and the scale of the proposed activities. This table provides a basis for comparing the ranges for the environmental impacts of the alternatives. Section 6.9 describes potential cumulative impacts of the Alternatives by resource.

As shown in Table 6-3, most resources are expected to experience benefits across all alternatives. However, Table 6-3 does not capture the magnitude or duration of potential benefits. The Table also does not identify benefits relative to potential adverse impacts, i.e., it is not intended to represent “net” benefits attributed to individual project types or alternatives. As reported in the detailed text in above sections, benefits may include direct benefits, such as habitat improvements that are the focus of a particular restoration activity (e.g., wetland restoration), as well as indirect benefits to other resources that may occur as a result of the habitat improvement (e.g., improvements to water quality and aesthetics). Because of their defined focuses, Alternative 2, in general, has more direct benefits to physical and biological environments, while Alternative 3 has more direct benefits to human use and socioeconomic environments. Indirect effects vary widely, and are described in more detail in above sections.

⁶ In particular, refer to the Hydrology and Water Quality (Enhance Public Access to Natural Resources for Recreational Use), and the Living Coastal and Marine Resources and Habitats discussions for Project Types 10 (Enhance Public Access to Natural Resources for Recreational Use) and 11 (Enhance Recreational Experiences).

Table 6-3. Summary of Benefits and Adverse Impacts by Resource and Alternative

		Long-term Benefit	No Effect	Minor	Minor to Moderate	Moderate	Minor to Major	Moderate to Major	Major				
		1	0	1	2	3	4	5	6				
RESOURCES	RESOURCES	ALTERNATIVE 1			ALTERNATIVE 2			ALTERNATIVE 3			ALTERNATIVE 4		
		SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL
Geology and Substrates	Upland Geology and Soil; Nearshore Coastal Geology and Sediment	0	0	0	2	2	B	2	2	B	2	2	B
Hydrology and Water Quality	Freshwater and Coastal Water Environments	0	0	0	1	0	B	1	1	0	1	1	N
Air Quality	-	0	0	0	2	0	0	2	1	0	2	1	0
Noise	-	0	0	0	2	0	0	4	3	0	4	3	0
Habitats	Wetlands, Barrier Islands; Beaches and Dunes; Submerged Aquatic Vegetation; Other Habitats in the Coastal Environment of the Northern Gulf of Mexico	0	0	0	2	2	B	2	2	0	2	2	B
Living Coastal and Marine Resources	Nearshore Benthic Communities; Oysters; Pelagic Microfaunal Communities; Sargassum; Finfish; Sea Turtles; Marine Mammals; Birds; Terrestrial Wildlife	0	0	0	2	1	B	2	2	B	2	2	B
Socioeconomics and Environmental Justice	-	0	0	0	1	1	B	2	0	B	2	1	B
Cultural Resources	-	0	0	0	2	2	0*	2	2	0*	2	2	0*
Infrastructure	-	0	0	0	4	4	B	4	4	B	4	4	B
Land and Marine Management	National and State Parks; Refuges and WMAs; Land Trusts;	0	0	0	2	0	B	2	0	B	2	0	B

		Long-term Benefit	No Effect	Minor	Minor to Moderate	Moderate	Minor to Major	Moderate to Major	Major				
		0	1	2	3	4	5						
RESOURCES	RESOURCES	ALTERNATIVE 1			ALTERNATIVE 2			ALTERNATIVE 3			ALTERNATIVE 4		
		SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL	SHORT-TERM	LONG-TERM	BENEFICIAL
	Marine Protected Areas												
Tourism and Recreation Use	Wildlife Observation; Hunting; Beach and Waterfront (swimming, sightseeing, etc.); Boating; Recreational Fishing; Tourism; Museums, Cultural Resources, and Education Centers	0	0	0	2	0	B	2	0	B	2	0	B
Fisheries and Aquaculture	Commercial Fishing; Shellfish Fishery; Seafood Processing and Sales; Aquaculture	0	0	0	3	0	B	3	0	B	3	0	B
Marine Transportation	-	0	0	0	1	0	B	1	1	B	1	1	B
Aesthetics and Visual Res.	-	0	0	0	3	1	B	3	1	B	3	1	B
Public Health and Safety, including Flood and Shoreline	-	0	0	0	1	0	B	1	1	B	1	1	B

Notes: These project type analyses are consolidated to give an overview of the potential impacts to key resource areas for each alternative. Because this PEIS identifies a number of types of potential projects that may occur, a range of impacts is anticipated. The range presented here represents the range of impacts estimated for each resource based on the more specific project-type-level analysis. In a few cases, possible but rare or improbable impacts are described in the text, but are not shown in the Exhibit. In particular, refer to the Hydrology and Water Quality section for Project Type 10 (Enhance Public Access to Natural Resources for Recreational Use), and the Living Coastal and Marine Resources and Habitats discussions for Project Types 10 (Enhance Public Access to Natural Resources for Recreational Use) and 11 (Enhance Recreational Experiences). Specific impacts would depend on where individual projects may occur, the timing of proposed construction and other activities, and the scale of the proposed activities.

* Project types under all Alternatives could lead to long-term beneficial impacts through the identification of cultural resources. Cultural or historical sites that may otherwise have been unknown or unprotected may benefit from the NHPA Section 106 review process that could require it be avoided and preserved in its natural state. In this manner, some information may be retrieved and future impacts could be avoided.

Adverse impacts for all Alternatives range from No Effect to Major impacts, depending on the resource. Impacts to habitats, hydrology and water quality, and noise are anticipated to be higher in Alternatives 3 and 4 than in Alternative 2. Adverse impacts that affect socioeconomics are expected to range from minor to moderate under alternatives 3 and 4, as opposed to minor under Alternative 2.

6.9 Potential Cumulative Impacts

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects, plans, and programs. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 C.F.R. §1508.7). As stated in the CEQ handbook, “Considering Cumulative Effects” (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts should be considered for all alternatives, including Alternative 1 - No Action.

The cumulative impacts analysis considers a number of past, present and reasonably foreseeable future actions and their associated effects throughout the northern Gulf of Mexico region. Because examining impacts at the scale of the Gulf of Mexico is so broad as to dilute any potentially measurably cumulative impacts, the evaluation in this PEIS focuses on areas where Early Restoration projects would likely occur.

The following analysis considers cumulative impacts from a programmatic perspective (see section 6.9.5 for discussion of proposed Phase III project cumulative impact analyses). The following section describes the multi-step approach used for evaluating cumulative impacts in this document.

6.9.1 Methodology for Assessing Cumulative Impacts

The analyses of cumulative impacts are typically accomplished using four steps:

Step 1 — Identify Resources Affected

In this step, each resource affected by the alternatives is identified. It is important to note that when direct and indirect impact analyses conclude that a particular resource is not affected, a cumulative impact analysis for that resource is not required. This approach is relevant to the cumulative impact analyses in Chapters 8 through 12, and would be considered in future phases of Early Restoration. In this Draft Phase III ERP/PEIS, cumulative impacts include all of the resources identified in the environment/affected resources sections. The following cumulative impact analysis is organized in tables corresponding to specific affected resources.

Step 2 — Establish Boundaries

In order to identify the past, present, and reasonably foreseeable actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries must be identified. The spatial boundary is the area where past, present, and reasonably future actions have, are, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the alternatives being considered. The temporal boundary describes how far into the past and forward into

the future actions should be considered in the impact analysis. Appropriate spatial and temporal boundaries may vary for each resource.

Step 3 — Identify Cumulative Action Scenario

In this step, the past, present, and reasonably foreseeable future actions to be included in the impact analysis for each specific affected resource are identified. These actions fall within the spatial and temporal boundaries established in Step 2. The following programmatic analysis groups specific actions by cumulative action categories. These action categories are listed and described below. The more specific actions within each action category are listed in Appendix 6-B.

Step 4 — Cumulative Impact Analysis

This final step develops the analysis that considers the incremental impact of the proposed action (X) when added to the impacts from applicable cumulative actions (Y) to understand the potential cumulative impacts to an affected resource (Z), or more simply $X+Y=Z$.

6.9.2 Boundaries of Analysis and Cumulative Action Scenario (Steps 1 and 2)

The resources described in Chapter 3 (Affected Environment) are considered in this cumulative impact analysis. The following cumulative impact analysis is organized in tables corresponding to specific affected resources.

The determination of what past, present, and reasonably foreseeable future actions to consider in the impact analysis is based on the resources being affected by the proposed action or its alternatives. As discussed above, the spatial boundary used to provide the necessary context of the cumulative impact analysis typically is defined based on the particular resource being assessed. For the purpose of this analysis, the spatial boundary includes those areas where project types described in each alternative could likely occur, which is assumed to be the northern Gulf of Mexico region). Chapters 8 through 12 describe more specific areas of analysis based on affected resources and project groupings. For this ERP/PEIS, future actions are primarily those expected to occur prior to finalization of the NRDA restoration plan.

Guidance on determining what actions to consider in the cumulative impact analysis comes from a variety of sources. The CEQ has produced several guidance documents, including a memorandum entitled “Guidance on Consideration of Past Actions in Cumulative Effects Analysis” (CEQ 2005). This CEQ document states that consideration of past actions is only necessary in so far as it informs agency decision-making. Typically the only types of past actions considered are those that continue to have present effects on the affected resources.⁷ This present effect will dictate how far into the past actions are considered and the how typically the impacts of these past actions are largely captured in the discussion of the affected environment Chapter for each resource. The guidance states that “[a]gencies

⁷ Note that the proposed Early Restoration actions are specifically intended to contribute to restoring for injuries resulting from this Spill. In addition, work continues on the injury assessment, as described in Chapter 4, and the actions proposed in this document consider the assessment described in Chapter 4. Therefore, the cumulative impact assessments (both programmatic and project-level) appropriately do not separately analyze the effects of the Spill itself.

are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions.” Agencies are allowed to aggregate the effects of past actions without delving into the historical details of individual past actions. Courts have agreed with this approach giving deference to CEQ’s interpretation of NEPA and stating that, as it relates to past actions, NEPA requires “adequate cataloging of relevant past projects in the area” (*Ecology Center v. Castaneda*, 574 F.3d 652, 667 (9th Cir. 2009)).

Present actions are those that are currently occurring and also result in impacts to the same resources that the alternatives impact. Reasonably foreseeable future actions are those actions that are likely to occur and affect the same resource as the proposed alternatives. The determination of what future actions should be considered requires a level of certainty that they will occur to ensure that the consideration of future actions is not overly speculative. This level of certainty could be met by a number of factors such as the completion of permit applications, the subject of approved proposals or planning documents, or other similar evidence. Determining how far into the future to consider actions is based on the impact of the alternatives being considered. Once the impacts of the alternatives are no longer experienced by the affected resource then future actions beyond that need not be considered.

6.9.3 Categories of Cumulative Actions in the Northern Gulf of Mexico Region (Step 3)

In order to effectively consider the potential cumulative impacts at a programmatic level, categories of similar actions have been identified. Within these categories, examples of actual past, present, and reasonably foreseeable future actions are described. There may be additional small scale activities not currently identified; however, the categories and their associated described actions should provide the necessary information to fully understand the potential cumulative impacts that may be experienced by specific affected resources.

6.9.3.1 Non-NRDA Restoration Related to the Spill

There are a number of past, present or future restoration efforts and actions responding to the oil spill, but are not conducted under the Oil Pollution Act’s Natural Resource Damage Assessment effort. Although the full extent of these restoration actions are not known at this time, multiple large-scale restoration efforts occurring in the Gulf are anticipated in coming years, and coordination between Phase III Early Restoration will be important. A brief description of some of these programs is below.

Restore Act. The Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012, or the RESTORE Act, was passed by Congress on June 29, 2012, and signed into law by President Obama on July 6, 2012. The RESTORE Act envisions a regional approach to restoring the long-term health of the natural ecosystems and economy of the northern Gulf of Mexico region. The RESTORE Act dedicates 80 percent of any civil and administrative penalties paid under the Clean Water Act, after the date of enactment, by responsible parties in connection with the *Deepwater Horizon* oil spill to the Gulf Coast Ecosystem Restoration Trust Fund for ecosystem restoration, economic recovery, and tourism promotion in the Gulf Coast region. Due to uncertainty around a variety of factors associated with ongoing litigation, the ultimate amount of administrative and civil penalties that may be available to the Trust Fund and the timing of their availability are unknown. However, as a result of the settlement of Clean Water Act civil claims against Transocean Deepwater Inc. and related entities, a total of \$800 million, plus interest, will be deposited in the Trust Fund within the

next two years – approximately \$320 million of which has already been deposited. Thus, based upon the RESTORE Act and the payment schedule agreed to by the court for the Transocean settlement, by February 20, 2015, thirty percent of that total amount – \$240 million, plus interest – will be deposited in the Trust Fund for allocation by the Gulf Coast Ecosystem Restoration Council under the Council-selected Restoration Component. Additional funding is dependent upon settlement or adjudication of civil or administrative claims against other parties responsible for the oil spill. A Draft Initial Comprehensive Plan (Gulf Coast Ecosystem Restoration Council 2013), developed by the Council, provides a framework to implement a coordinated, Gulf Coast region-wide restoration effort in a way that restores, protects, and revitalizes the Gulf Coast.⁸

Gulf Environmental Benefit Fund. In early 2013, a U.S. District Court approved two plea agreements resolving the criminal cases against BP and Transocean which arose from the oil spill. The agreements direct a total of \$2.544 billion to the National Fish and Wildlife Foundation (NFWF) to fund projects benefiting the natural resources of the northern Gulf of Mexico region that were impacted by the spill. NFWF is a non-profit organization created by Congress in 1984 “to protect and restore fish and wildlife and their habitats.” Over the next five years, NFWF’s newly established Gulf Environmental Benefit Fund will receive a total of \$1.272 billion for barrier island and river diversion projects in Louisiana, \$356 million each for natural resource projects in Alabama, Florida, and Mississippi, and \$203 million for similar projects in Texas. The first 22 projects supported through the Fund were announced in November 2013 after consultation with state and federal resource agencies, and are distributed across the 5 Gulf States (a list of projects by state is included at the end of Chapters 8 through 12). The total value of the initial projects is more than \$100 million.⁹ The initial NFWF projects were recently announced; as more information becomes available the Trustees will continue to consider the potential implications of these projects that may contribute to cumulative impacts of proposed Early Restoration.

North American Wetlands Conservation Fund. The North American Wetlands Conservation Fund (NAWCF) provides funding for wetlands conservation projects. As part of a criminal fine that BP agreed to pay for one misdemeanor count of violating the Migratory Bird Treaty Act, NAWCF will receive a total of \$100 million over the next five years. The money will be used to fund “wetlands restoration and conservation projects” located in the Gulf or projects that would “benefit migratory bird species and other wildlife and habitat affected by” the oil spill. Specific projects are not yet identified. As more information becomes available, the Trustees will consider the potential for cumulative impacts associated with Early Restoration proposed actions.

National Academy of Sciences. The National Academy of Sciences (NAS) is a private, non-profit institution created by Congress in 1863 “to provide independent advice to the government on matters related to science and technology.” NAS includes the National Research Council, the National Academy of Engineering, and the Institute of Medicine. NAS will receive a total of \$500 million over the next five years. This includes other criminal recoveries to be paid by BP (\$350 million) and Transocean (\$150

⁸ <http://www.restorethegulf.gov/sites/default/files/Gulf%20Restoration%20Council%20Draft%20Initial%20Comprehensive%20Plan%205.23.15.pdf>

⁹ <http://www.nfwf.org/gulf/Pages/home.aspx>

million) under their respective criminal settlements. The money will be used for a 30-year “program focused on human health and environmental protection, including issues relating to offshore oil drilling” and the production and transportation of hydrocarbons in the Gulf and the outer continental shelf. More specificity on the program will be considered by the Trustees as the information becomes available.

6.9.3.2 Military Operations

Military operations in the Gulf of Mexico are undertaken primarily by the U.S. Air Force and the U.S. Navy within federally designated areas for the purposes of training personnel and research, design, testing, and evaluation activities. There are 18 U.S. military bases along the northern Gulf of Mexico and more than 40 military warning areas designated by the U.S. Air Force for conducting various testing and training missions, and by the U.S. Navy for various naval training and testing operations (BOEM 2011).

The Gulf of Mexico Range Complex is a combined air, land, and sea space that provides realistic training areas for U.S. Navy personnel. In coastal and marine areas, the Gulf of Mexico Range Complex includes military operations areas and overlying special use airspaces, the Naval Support Activity Panama City Demolition Pond, security group training areas, and supporting infrastructure. Four offshore operating areas located in the northern Gulf of Mexico—Corpus Christi, New Orleans, Pensacola, and Panama City—define where the U.S. Navy conducts surface and subsurface training and operations. The Security group training areas are also located in marine waters of the Gulf of Mexico Range Complex. There are two group training areas: off the coast of Panama City, Florida, and off the coast of Corpus Christi, Texas. These areas are used for machine gun and explosives training. Naval Support Activity, Panama City, Florida, conducts diver training and underwater research as well as ship salvage and submarine rescue exercises.

U.S. Fleet Aircraft operated by all Department of Defense (DoD) units train within a number of special use airspace locations that overlie the military operations areas, as designated by the Federal Aviation Administration. Special use airspaces are largely located offshore, extending from 3.5 miles out from the coast over international waters and in international airspace (BOEM 2011). Examples of actions considered in this cumulative action category are found in Appendix 6-B.

6.9.3.3 Marine Transportation

When considering the potential cumulative impacts associated with marine transportation, port development, shipping and maritime services, and associated navigation, channel construction, and maintenance are important. The Gulf of Mexico coast encompasses a comprehensive system of ports and waterways that provide the facilities and logistics for import and export of foreign and domestic goods, as well as intermodal transport between vessels, trucks, and railroads. Major shipping lanes run throughout the Gulf ecosystem and the volume and value of shipping and port activities is continually increasing. Marine transportation planning has been occurring to improve traffic congestion and other shipping issues. Additional examples of actions considered in this cumulative action category are found in Appendix 6-B. Some of these include:

- **Present Action:** The M-10 Marine Highway Corridor includes the Gulf of Mexico, the Gulf Intracoastal Waterway, and connecting commercial navigation channels, ports, and harbors from Brownsville, Texas, to Jacksonville and Port Manatee, Florida. The M-10 connects to other

Marine Highway Corridors: the M-49 Corridor at Morgan City, Louisiana; the M-65 Corridor in Mobile, Alabama; and the M-55 in New Orleans, Louisiana.

- **Future Action:** For example, U.S. Department of Transportation's Maritime Administration (MARAD) has identified marine corridors, projects, and initiatives to establish all water routes to serve as extensions of the surface transportation system. These corridors are planned to ease traffic congestion and reduce air emissions resulting from truck traffic along the interstates and other roadways, particularly within the major cities along established transportation routes (MARAD n.d.).
- **Future Action:** Corridor traffic via land is expected to grow significantly by 2025 and the M-10 route would provide a maritime route that could ease congestion (including freight rail congestion) around Houston and along 400 miles of the corridor already operating at an unacceptable level of service (MARAD n.d.). The M-10 route is expected to provide public benefits by reducing congestion on roadways, reducing greenhouse gas emissions, and reducing road maintenance costs (MARAD n.d.).
- **Future Action:** Two projects are associated with the M-10 Marine Highway Corridor. The Cross Gulf Container Expansion Project will expand the frequency and capacity of container-on-barge traffic. The Gulf Atlantic Marine Highway Project is a public-private venture that would distribute containers between the Gulf, mid-Atlantic, and south Atlantic coasts of the U.S via the M-10 and M-95 Corridors from Brownsville, Texas, to South Carolina. Estimated load volumes between Brownsville and Port Manatee are expected to increase from approximately 300 in 2011 to 345-405 in 2020; connecting transport service to the M-95 corridor (Delaware to Houston) is estimated to increase from 500 to 675 (MARAD 2011). To accommodate the planned traffic for distribution of containers, 10 vessels could be manufactured (MARAD n.d.).
- **Ongoing and Future Actions:** In anticipation of the potential for increased maritime commerce as a result of the 2014 expansion of the Panama Canal, ports along the Gulf of Mexico have signed Memoranda of Use with the Panama Canal Authority and are expanding and upgrading their infrastructure. Memoranda of Use have been signed between the ports of Freeport, Galveston, Houston, and the Port of Corpus Christi Authority, Texas; Port of New Orleans, Louisiana; Alabama State Port Authority; Mississippi State Port Authority at Gulfport; and Broward County (Port Everglades Department), Manatee County Port Authority, and Tampa Port Authority, Florida (Panama Canal Authority 2012). Many of the ports are deepening and widening channels, improving existing facilities and developing new terminals, berths, and container storage areas in order to attract additional markets and maintain competitiveness.

6.9.3.4 Energy Activities

The Gulf of Mexico is one of the most important regions for energy and chemical resources. This sector is supported by numerous facilities including: platform fabrication yards, shipyards, support and transport facilities, pipelines, pipe coating yards, liquefied natural gas (LNG) processing and storage facilities, refineries, petrochemical plants, and waste management facilities, among others. Examples of actions considered in this cumulative action category are found in Appendix 6-B.

Offshore Oil Production. Management of the oil and gas resources of the outer continental shelf (OCS) is governed by the Outer Continental Shelf Lands Act, which sets forth procedures for leasing, exploration, and development and production of those resources. The BOEM within the Department of

the Interior is responsible for implementing the requirements of the Act related to preparing the leasing program (BOEM 2011). Pursuant to the OCS Lands Act, BOEM has prepared *A Proposed Outer Continental Shelf Oil and Gas Leasing Program for 2012-2017*. The five-year proposed program includes a schedule of offshore oil and gas lease sales on the U.S. OCS. Of the 15 proposed lease sales included in the proposed program, 12 are in the Gulf of Mexico and include:

- Western Gulf of Mexico: A total of five annual area-wide lease sales began in the fall of 2012 that made available all un-leased acreage.
- Central Gulf of Mexico: A total of five annual area-wide lease sales beginning in the spring of 2013 that make available all un-leased acreage.
- Eastern Gulf of Mexico: A total of two sales, in 2014 and 2016, in areas of the Eastern Gulf of Mexico.

Transportation for most oil and gas from the Gulf of Mexico Proposed Planned Leasing Program is anticipated to be accomplished by extending and expanding existing offshore pipeline systems with some transport from barge and shuttle tankers.

Offshore Natural Gas Facilities. LNG facilities on the OCS are currently in various stages of the permitting process. The Bienville Offshore Energy Terminal approved in 2010, is a planned LNG facility located 63 mi south of Mobile Point, Alabama. In Louisiana, the Main Pass Block 299 mine, operated by Freeport-McMoRan, is leased to mine sulphur and salt in Federal waters of the Gulf of Mexico (lease OCS-G9372). The mine is located about 26 km (16 mi) offshore, east of Plaquemines Parish, Louisiana. Currently, the mine site is under development by Freeport-McMoRan and United LNG as the Main Pass Energy Hub (United LNG 2012). The development will contain a LNG liquefaction facility, and hydrocarbon and LNG storage in the salt caverns (United LNG 2012). It is expected to be operational by 2017.

State Oil and Gas Activities. All Gulf States, with the exception of Florida, have active oil and natural gas programs in offshore State waters and onshore areas. Texas and Louisiana have the highest levels of oil and gas activity in the Gulf of Mexico, and this is predicted to continue into the foreseeable future. Oil production in Texas has declined over the past decade from 449 thousand barrels (Mbbbl) in 1999 to 404 Mbbbl in 2009, but production in offshore Texas waters increased during the same period from 475,000 Mbbbl to 897,000 bbl. Texas's offshore gas withdrawals totaled 38 billion cubic feet from 2005-2009. Over 151,000 oil wells and 66,951 gas wells are active in the State. Louisiana oil and gas production increased from 2010 to 2011 by 6 percent (68.1 Mbbbl) in oil and 33.4 percent (2.9 trillion cubic feet (Tcf)) of natural gas. Oil production is forecasted to decrease slightly through 2030; however, natural gas production is expected to increase through 2020 to over 3 Tcf and then decrease to approximately 2.5 Tcf by 2030 (Louisiana Department of Natural Resources 2012). Mississippi Development Authority (MDA) has issued proposed rules for seismic exploration and state leasing for offshore oil and gas drilling in the State's coastal waters. Drilling of new wells for oil and gas has increased substantially from 1999 to present, and the number of producing wells increased to 6929 in 2010, up from 564 wells in 1970 (Alabama Oil and Gas Board 2011). Expansion of offshore oil and gas production is increasing shipbuilding along the Alabama coast due to demand for offshore supply and rig-tending vessels and

infrastructure associated with repairing drilling rigs (GCERTF 2011). Examples of actions considered in this cumulative action category are found in Appendix 6-B.

6.9.3.5 Marine Mineral Mining, Including Sand and Gravel Mining

BOEM has authority to lease mineral resource deposits within coastal Gulf waters for phosphate, oyster shell, limestone, sand and gravel, and magnesium (MMS 2004). However, sand and gravel are the minerals that are primarily mined in Gulf of Mexico. Limitations of sand, both the correct composition and quantity, can be an issue in many areas of the Gulf. The BOEM Marine Minerals Program (MMP) is observing an increase in the requests for outer continental shelf sand because suitable state resources are becoming depleted. Examples of actions considered in this cumulative action category are found in Appendix 6-B.

6.9.3.6 Coastal Development and Land Use

The landscape of the northern Gulf of Mexico has been altered and will continue to be altered as a result of land use activities that include coastal development and redevelopment for residential, commercial, industrial, recreational, agricultural, and forestry purposes. Changes in land use patterns that result from a need for economic development, such as tourism-related coastal development, intensify demand on coastal resources and can lead to environmental degradation and natural hazard risks. Increasing populations within coastal communities such as resort and retirement communities can change the historic water-dependent land uses, which include public access for recreation, commercial and recreational fishing, and ship-building. Examples of actions considered in this cumulative action category are found in Appendix 6-B.

Based on building permit numbers, construction of single-family homes decreased in Louisiana after Hurricanes Katrina and Rita in 2005 and in Texas after Hurricane Ike in 2008. Mississippi and Alabama continue to have a low, but consistent level of building permits issued (NOAA 2011g). Development within the South Padre Island and Port Aransas areas of Texas and the Tampa Bay region of Florida is principally residential and mixed use development; however, many construction projects have been cancelled, reduced in scope, or timeframes extended to build-out as a result of the post 2008 economy.

Seasonal and retirement communities have also grown within the Gulf of Mexico region, especially in Gulf communities of Florida and Texas. Over 500,000 seasonal homes are located within the region, distributed as follows: Texas (14 percent); Louisiana (7 percent); Mississippi (1 percent); Alabama (4 percent) and Florida (74 percent) (NOAA 2011g).

6.9.3.7 Fisheries and Aquaculture

The Gulf of Mexico Fishery Management Council (GMFMC or Council) is one of eight regional Fishery Management Councils established by the Fishery Conservation and Management Act of 1976. The Council prepares fishery management plans which are designed to manage fishery resources within the 200-mile limit of the Exclusive Economic Zone (EEZ) in the Gulf of Mexico. Under the Magnuson-Stevens Fishery Conservation and Management Act, the GMFMC has authority to regulate fisheries in federal waters, including aquaculture. Federal waters begin three to nine nautical miles offshore and extend to outer edge of the 200 mile EEZ. From Texas and Florida federal waters begin nine nautical miles out, and from Mississippi, Louisiana and Alabama, federal waters begin three nautical miles out (Gulf of Mexico Fishery Management Council 2013).

Currently, the Council manages and regulates commercial and recreational fishing in federal waters. It sets closures for sensitive and marine sanctuaries, quotas, trip limits, and minimum size limits for coastal migratory fish, reef fish, shellfish, and other fish. For recreational fishing, the Council regulates fishing activities, including setting seasons and closure; permitting activities; and setting daily and bag limits, and minimum size requirements. Currently no aquaculture activity occurs within federal waters, although an Aquaculture Fishery Management Plan (FMP) has been developed that would permit and regulate these operations. Examples of actions considered in this cumulative action category are found in Appendix 6-B.

The Council and NOAA National Marine Fisheries Service (NMFS) developed the Aquaculture FMP to maximize benefits to the Nation by establishing a regional permitting process to manage the development of an environmentally sound and economically sustainable aquaculture industry in federal waters of the Gulf of Mexico. The primary goal of the proposed aquaculture permitting program is to increase the maximum sustainable yield and optimum yield of federal fisheries in the Gulf of Mexico by supplementing the harvest of wild caught species with cultured products. While the Aquaculture FMP has been approved, it has not been implemented. Implementation regulations are currently being developed for the Aquaculture FMP.

If the Aquaculture FMP is implemented, an estimated 5 to 20 offshore aquaculture operations would be permitted in the Gulf over the next 10 years, with an estimated annual production of up to 64 million pounds (NOAA 2009). The plan prohibits shrimp farming, and only allows the raising of native Gulf species.

Various state agencies are responsible for regulating recreational, commercial, and aquaculture activities within state waters, including: Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Service Division of Aquaculture; Alabama Department of Conservation and Natural Resources Marine Resources Division; Louisiana Department of Wildlife and Fisheries; Mississippi Department of Environmental Quality; Mississippi Department of Marine Resources ; Mississippi Department of Agriculture and Commerce; Mississippi Department of Wildlife, Fisheries, & Parks; and Texas Parks and Wildlife Department. These agencies manage, monitor, and regulate commercial fisheries and aquaculture within their state waters. Requirements from the agencies include licensing and permitting activities and operations; leasing of coastal submerged land for aquaculture; setting catch limits, quotas, and seasons, regulating harvesting and processing; and providing technical assistance.

As described on their website, the Gulf States Marine Fisheries Commission was established by an act of Congress (P.L. 81-66) in 1949 as a compact of the five Gulf States. Its charge is: "to promote better utilization of the fisheries, marine, shell and anadromous, of the seaboard of the Gulf of Mexico, by the development of a joint program for the promotion and protection of such fisheries and the prevention of the physical waste of the fisheries from any cause." The Commission is composed of three members from each of the five Gulf States. The head of the marine resource agency of each state, a member of the legislature, and a citizen with knowledge of marine fisheries appointed by the governor.

6.9.3.8 *Tourism and Recreation*

The tourism industry in the Gulf region offers a wide variety of activities such as golfing, gambling, beach recreation, boating, ecotourism (wildlife watching, birding, visiting parks, beaches and wildlife refuges, scenic viewing), hunting and fishing. Many of these activities are directly dependent upon the coastal ecosystems of the Gulf of Mexico. Access to the waters, beaches, wildlife and scenic views in each of the five Gulf States supports a multi-billion dollar regional tourism industry (GCERTF 2011). Examples of actions considered in this cumulative action category are found in Appendix 6-B.

Efforts to promote and increase tourism in the Gulf States include marketing and advertising incentives, casino resort development, wildlife and cultural festivals, and golf tournaments. There are activities for increasing and diversifying passive recreation and tourism in the Gulf. These activities include birding, wildlife viewing, cultural heritage enjoyment, and water trails that can be traversed by canoe or kayak.

6.9.4 *Cumulative Impact Analysis (Step 4)*

The following section and associated tables describe the cumulative impacts of the alternatives being considered when combined with other past, present, and reasonably foreseeable future actions. The analysis provided below considers the impacts of the cumulative actions identified above. It recognizes that in most cases the contribution to the cumulative impacts for a given resource from implementing the action alternatives would be difficult to discern, at a broad programmatic level across the Gulf of Mexico, given the context and intensity of impacts from the other past, present, and future actions. In many situations, implementation of one of the action alternatives would likely help reduce overall long-term adverse impacts by providing a certain level of offsetting benefits, especially when considered in concert with other actions of similar nature (e.g., stewardship programs, non-NRDA restoration, etc.). The cumulative impact analysis is evaluated by affected resource.

There are several ways in which effects may come together to result in cumulative effects. For purposes of the following analysis, cumulative effects have been identified and may fall under one or more of the following categories, which are defined, for purposes of this analysis, as:

- **Additive adverse effect:** Negative impact on a resource that adds to adverse effects from other actions;
- **Synergistic beneficial effect:** Beneficial impact on a resource is greater than the sum of the benefits from other actions;
- **Antagonistic effect:** Two or more actions that, in combination, have an overall effect that is less than the sum of their individual effects because they have opposing effects.

It is important to identify the nature of the cumulative effect if possible as it provides a baseline against which the proposed action and alternatives relative contribution can be determined.

6.9.4.1 *Physical Environment*

As described in Chapter 3, the nearshore, marine environment is comprised of the coastline and the inner continental shelf, extending to depths of 600 feet. The offshore, marine environment consists of portions of the Gulf of Mexico that are more than 600 feet deep including the outer shelf, continental slope, and abyssal plain. Coastal transition areas typically include tidally influenced areas (e.g., marshes,

estuaries, and coastal wetlands). Finally, upland environments are those habitats that are adjacent to coastal transition, but are not subject to a tidal regime or regularly inundated by water.

Construction and operation of energy and mining facilities (offshore and onshore), marine transportation facilities, commercial, industrial and residential development in coastal habitats, corridor improvements, etc. are detailed in Appendix 6-B (hereinafter “ongoing activities”). These actions may alter, damage or destroy elements in the physical environment through impacts including water quality degradation, substrate disturbances, and conversion of habitats to residential, commercial or industrial uses or other human disturbances. There are also many environmental stewardship and restoration projects that have occurred or are underway in the region (see Appendix 6-B) that may affect the physical environment.

6.9.4.1.1 Geology and Substrates

The northern Gulf of Mexico region includes upland surface soils, subsurface rock features, and submerged coastal and oceanic sediments. Sediment resources are particularly important along the areas dominated by deltaic processes (e.g., Mississippi River Delta), and where land building and erosion are dynamic and dependent on the availability of sediment resources. Ongoing activities (Appendix 6-B) have resulted in varying degrees of damage to geology and substrates. Table 6-4 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on geology and substrates.

Table 6-4. Cumulative Impacts to Geology and Substrates

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast geology and substrates. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include restoration being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to geological resources, in terms of reducing erosion or increasing sediment availability in some areas. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast geology or substrates.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term and long-term adverse impacts, but are expected to result in long-term benefits to geology and substrates. Restoration activities under Alternative 2 would result in long-term benefits to geology and substrates, such as supporting geomorphic processes, preventing erosion of natural geological substrates, and stabilization of substrates. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in a specific or smaller geographical area (single water body or watershed). Because of the geographic boundary, effects may be more readily apparent at the smaller spatial scale. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to synergistic effects where the total effect of multiple Alternative 2 projects combined with other restoration activities undertaken within the same geographic area is greater than the sum of the effects taken independently. This may result in a greater incremental beneficial contribution to regional geological resources.</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impact to geological resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse geology and substrates during construction. In some cases, these effects may persist beyond the construction period. For example, placement of infrastructure could result in the local removal, compaction, and erosion of upland, shallow-water, and nearshore substrates in development areas. This could have readily apparent effects on local soils, substrates and/or geologic features such as compaction and soil displacement.</p> <p>However, Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts due to the relative small size and scope of the actions conducted when compared to the Gulf Coast region and other ongoing activities (Appendix 6-B). Similar to the scenario described in Alternative 2, the additive effect or contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close proximity to one another (affecting the same geographic area), the relative contribution or additive potential to adverse effects may be greater. In localized areas, effects of multiple Alternative 3 actions may result in a greater relative contribution to cumulative adverse impacts.</p> <p>Although Alternative 3 could result in additive effects to geological resources, especially if multiple infrastructure projects occurred in the same geographic area. However, individual projects proposed under Alternative 3 would typically be small in size and scope. Therefore, Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to geological resources. Cumulative impacts to geographic resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to geological resources with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Ecological projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to geology and substrates. As discussed in Alternative 2 above, multiple projects implemented within resource specific geographic area could result in a larger beneficial contribution for a particular water body or watershed. These regional scale benefits would be more prevalent if other environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to Gulf Coast geological resources associated with them. In cases where multiple projects under Alternative 3 are proposed in the same geographic area, the incremental contribution to a cumulative adverse effect may be greater, especially in areas where ongoing non-restoration activities are concentrated. However, Alternative 4 includes activities that are intended to stabilize geologic resources (e.g. placement of living shorelines, beach re-nourishment, etc.), which may result in antagonistic effects to activities such as</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>infrastructure placement which could adversely affect geologic resources.</p> <p>Because activities under Alternative 4 would typically be small in scope even when looking at a smaller geographic area, Alternative 4 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to geological resources.</p>

6.9.4.1.2 Hydrology and Water Quality

Ongoing activities (Appendix 6-B) have resulted in varying degrees of damage to hydrology and water resources on the Gulf Coast region. Gulf Coast hydrology and water quality are mainly affected by freshwater inputs (from inland waters of the Gulf of Mexico Watershed) and the movement of salt water. As stated in Chapter 3, the quantity and rate of freshwater inputs through contributing rivers can be altered by a number of natural and anthropogenic factors such as changes in rainfall and land cover; flood control practices; spillway operation; navigation structures such as locks, dams, weirs and other water control structures; consumption of freshwater by agriculture, municipal, and industrial interests; and the development of stormwater infrastructure. Freshwater inflows to the northern Gulf of Mexico contribute nutrients, sediments, and pollutants from upstream agriculture, stormwater runoff, industrial activities, and wastewater discharges. The influx of these constituents is further affected by currents and surface winds. In addition, the nearshore environment, including tidal marsh areas, has been physically modified (e.g., through channelization and canal construction), allowing saltwater intrusion, which impacts both surface and sub-surficial groundwater resources. These alterations can affect the influx of freshwater into the northern Gulf of Mexico resulting in alterations to salinity regimes in nearshore areas potentially increasing the frequency and magnitude of hypoxic events. On balance, the inflow of freshwater provides the freshwater and sediment inputs necessary for maintaining healthy nearshore salinity regimes and coastal landscapes, and offshore currents generally improve water quality through mixing and dilution. However, offshore currents can also serve as a conduit for pollution that can contribute to water quality degradation.

Table 6-5 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on hydrology and water quality.

Table 6-5. Cumulative Impacts to Hydrology and Water Quality

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast hydrology and water quality. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to hydrological resources, in terms of reducing turbidity and increasing overall water quality. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast hydrological resources or water quality.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	Under Alternative 2, Phase III Early Restoration projects specifically directed at restoring, enhancing and conserving Gulf Coast sensitive habitats would be undertaken. Alternative 2 includes project types such as create wetlands, restore SAV, restore barrier islands and beaches and conserve habitats. These actions could cause short-term and long-term adverse impacts, such as increasing turbidity, but are expected to result in long-term benefits to hydrology and water quality. Restoration activities under Alternative 2 would result in long-term benefits to hydrology

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>and water quality, including improving wetland function, reduction in the inland flow of salt water, reduction in nutrient and sediment runoff, and reduction in erosion/loss of wetlands. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in a specific geographic area. This may lead to synergistic effects where the total effect of multiple Alternative 2 projects undertaken within the same geographic area is greater than the sum of the effects taken independently. Because of the geographic boundary, effects may be more readily apparent and the additive effects may be greater. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may result in a greater incremental beneficial contribution to hydrology and water quality in the Gulf Coast region because of the potential for synergistic effects of Alternative 2 projects with these other environmental stewardship and restoration activities.</p> <p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impacts to hydrology and water quality. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions.</p> <p>Alternative 3 projects may result in adverse impacts to hydrology and water quality during construction. In some cases, these effects may persist beyond the construction period. For example, increasing impervious surfaces from infrastructure construction may result in localized but long-term adverse impacts. However, individual projects proposed under Alternative 3 would typically be small in size and scope, even when proposed on a smaller geographic area.</p> <p>However, Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts due to the relative small size and scope of the actions conducted when compared to the Gulf Coast region and other ongoing activities (Appendix 6-B). Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close proximity to one another (in the same geographic area), the relative contribution to adverse effects may be greater. In localized areas, effects of multiple Alternative 3 actions combined with other past, present and ongoing development activities may result in additive effects and a greater relative contribution to cumulative adverse impacts.</p> <p>As stated above, Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to hydrology and water quality. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to Gulf Coast hydrology and water quality with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Ecological projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to hydrology</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>and water quality. As discussed in Alternative 2 above, multiple projects implemented within a specific geographic area could result in a larger beneficial contribution to that region. These regional scale benefits would be more prevalent if other environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to Gulf Coast hydrology and water quality associated with them. In cases where multiple projects falling under Alternative 3 are proposed within or on the same geographic area, the incremental contribution to a cumulative adverse effect may be greater, especially in areas where ongoing non-restoration activities are concentrated and additive effects may occur resulting in greater cumulative adverse impacts to hydrology and water quality.</p> <p>Alternative 4 includes activities that are intended to improve water quality (create wetlands, reduce erosion, etc.) which may result in antagonistic effects to activities such as infrastructure placement that may result in adverse effects to water quality and hydrology through reduction of pervious area, increased runoff, etc.). Because activities that could adversely affect hydrology and water quality under Alternative 4 would typically be small in scope, even when looking at a smaller geographic area, Alternative 4 is would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to hydrology and water quality.</p>

6.9.4.1.3 Air Quality and Greenhouse Gases

Ongoing activities (Appendix 6-B) have resulted in varying degrees of impacts to air quality throughout the Gulf Coast region. All of the Gulf Coast counties meet the NAAQS for nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter, and lead. However, the Houston-Galveston-Brazoria area has been listed by EPA as nonattainment for existing ozone standards (U.S. EPA 2013) (IPCC 2013). Greenhouse gas emissions over a recent five year period (2007-2011) for the five state area has varied by state and overtime from 1,364.6 – 1,316.9 million metric tons of CO2 Eq. (U.S. EPA 2013). National emissions in 2011 totaled 6,702 million metric tons CO2 Eq. (U.S. EPA 2013). This was a 1.6 percent reduction from 2010. Globally, greenhouse gas emissions rose by 4.6% in 2010 and increased by 1.3 gigaton (Gt) of CO2 Eq. between 2009 and 2010 (IEA 2012) reaching 30.3 Gt. Of CO2 Eq. Levels are expected to rise up to 37 Gt. by 2035 (IEA 2012).

Table 6-6 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on air quality and greenhouse gas emissions.

Table 6-6. Cumulative Impacts to Air Quality and Greenhouse Gas Emissions

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, ongoing activities would continue to adversely affect air quality and the level of greenhouse gas emissions in the region. Ongoing activities that are major contributors to air quality impacts at the regional level (such as those included in Appendix 6-B) and greenhouse gas emission at the regional level are likely to continue. However, Alternative 1 would not contribute to cumulative adverse effects to air quality and greenhouse gas emissions.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine	Under Alternative 2, Phase III Early Restoration projects specifically directed at restoring, enhancing and conserving Gulf Coast sensitive habitats would be undertaken. Alternative 2 includes project types such as create wetlands, restore SAV, restore barrier islands and beaches and conserve habitats. These actions could cause in short-term emissions resulting in adverse

ALTERNATIVES	CUMULATIVE IMPACTS
Resources	<p>impacts to air quality and GHG .</p> <p>Because of size and scale of Alternative 2 projects, activities would not contribute to cumulative adverse impacts to air quality and greenhouse gas emissions. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would be similar to those for Alternative 2 described above, resulting from construction activities.</p> <p>In addition, project types of Alternative 3 are expected to in increased recreational use and visitation which would contribute to air quality and greenhouse gas emission rates in the long-term from the use of recreation equipment and vehicles (e.g., boats, cars, RVs). However, Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to air quality and greenhouse gas emissions. Cumulative impacts to air quality and GHG emissions related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to Gulf Coast habitats with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Ecological projects proposed under Alternative 4 would primarily result in construction-related GHG and other emissions that may result in adverse impacts to air quality. These emissions would be limited to the construction phase.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to air quality and greenhouse gas emission rates in the long-term from the use of recreation equipment and vehicles (e.g., boats, cars, RVs).</p> <p>Alternative 4 could have an incremental contribution to adverse cumulative impacts on air quality and greenhouse gas emission rates. However, because of the relatively small size and scope of projects that would occur under alternative 4, it would not result in a substantial contribution to cumulative adverse impacts to air quality and greenhouse gas emissions.</p>

6.9.4.1.4 Noise

Noise levels in areas of the Gulf Coast region are affected by a number of ongoing activities (Appendix 6-B). The primary sources of terrestrial noise in the coastal environment are transportation and construction-related activities. In the marine environment, sounds are also introduced from marine transportation, military activities, energy development and mineral-related activities (e.g., oil and gas exploration, drilling and production), among others.

Table 6-7 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on noise.

Table 6-7. Cumulative Impacts to Noise

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, ongoing activities would continue to adversely affect noise levels in the Gulf Coast region. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide some short-term adverse impacts to noise levels from construction related activities, but these impacts would cease when construction ends. Alternative 1 would not contribute to cumulative adverse effects to noise levels in the Gulf Coast region.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Under Alternative 2, Phase III Early Restoration projects specifically directed at restoring, enhancing and conserving Gulf Coast sensitive habitats would be undertaken. Alternative 2 includes project types such as create wetlands, restore SAV, restore barrier islands and beaches and conserve habitats. These actions could cause short-term adverse impacts as a result of noise-generating construction activities.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in resource smaller geographic area. This may lead to additive effects that may be more readily apparent at the smaller spatial scale, which could result in a short-term adverse impacts. Over the long-term, Alternative 2 would not contribute to cumulative adverse impacts to noise levels. Cumulative impacts related to currently proposed Phase III Early Restoration projects in specific geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions.</p> <p>Alternative 3 projects may result in adverse impacts to noise levels during construction. In some cases, these effects may persist beyond the construction period as additional users are attracted to the sites.</p> <p>Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close proximity to one another, the relative contribution to adverse effects may be greater in a localized area. In localized areas, effects of multiple Alternative 3 actions may result in additive effects and a greater relative contribution to cumulative adverse impacts than Alternative 2.</p> <p>Overall, Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to noise because of the relative small size and scale of projects that would occur under Alternative 3. Cumulative impacts related to currently proposed Phase III Early Restoration projects in specific geographic areas proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to noise levels in the Gulf Coast region with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>Ecological projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to noise levels. Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to noise levels in the short and long-term. In cases where multiple projects falling under Alternative 3 are proposed within the same geographic or localized area, the incremental contribution to a cumulative adverse effect may be greater, especially in areas where ongoing non-restoration activities are concentrated.</p> <p>Alternative 4 may have an incremental contribution to adverse cumulative impacts on noise levels depending on spatial scale and level of construction-related activities and recreational use.</p>

6.9.4.2 Biological Resources

Biological resources include habitats, as well as the plants and animal species (living coastal and marine resources) that utilize those habitats. Gulf Coast habitats and living coastal and marine resources vary throughout the region. Habitats discussed in Chapter 3 provide important habitat to protected species (e.g. SAV is considered a sensitive habitat that has declined and is protected that provides foraging to listed manatees) and have experienced degradation and losses over time. Construction and operation of energy and mining facilities (offshore and onshore), marine transportation facilities, commercial, industrial and residential development in coastal habitats, corridor improvements, etc. are detailed in Appendix 6-B. These actions may alter, damage or destroy sensitive habitats through impacts including water quality degradation, substrate disturbances, conversion of habitats to residential, commercial or industrial uses or other human disturbances. These activities also affect the species that rely on sensitive habitats. There are also many environmental stewardship and restoration projects that have occurred or are underway in the Gulf Coast region (see Appendix 6-B) focused primarily on sensitive habitats and protected species.

6.9.4.2.1 Habitats

The Gulf Coast habitats are a mosaic of environments that include wetlands (marshes, mangrove stands, tidal wetlands, etc.), beaches, barrier islands and coastal transition zones (terrestrial and riparian areas, bottomland forests, etc.). These habitats (described fully in Chapter 3) provide key functions and resources required by the high diversity of plants and animals that depend on these habitats and their interconnections. Ongoing activities (Appendix 6-B) have resulted in varying degrees of damage to, and losses of, all Gulf Coast sensitive habitats. Impacts to one habitat may result in cascading adverse effects to an array of other habitat types. For example, development in coastal transition zones may affect stormwater runoff, increased volume and rates of stormwater runoff and excessive sedimentation in receiving water bodies. This in turn, can result in sedimentation and impacts to coastal wetlands which, when intact, can protect shorelines and beaches from excessive erosion by slowing wave action, reducing storm surges and providing water surface area for high tides. Table 6-8 summarizes cumulative impacts of the Draft Phase III ERP/PEIS on habitats.

Table 6-8. Cumulative Impacts to Habitats

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast habitats. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Phase I and Phase II efforts focused on marsh and dune habitat restoration as well as nesting bird and sea turtle habitat restoration (discussed in Chapter 2). These actions are providing benefits to sensitive habitats, particularly in the areas where the activities occur. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast habitats.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Under Alternative 2, Phase III Early Restoration projects specifically directed at restoring, enhancing and conserving Gulf Coast sensitive habitats would be undertaken. Alternative 2 includes project types such as create wetlands, restore SAV, restore barrier islands and beaches and conserve habitats. Ongoing activities described in Appendix 6-B would be expected to continue, and adverse effects associated with those activities would continue to affect Gulf coast sensitive habitats.</p> <p>Although Alternative 2 is intended to contribute to restoring habitats and living coastal and marine resources, construction activities as part of projects proposed under Alternative 2 could result in adverse effects to Gulf Coast habitats. These adverse effects would be temporary, occurring primarily during the construction period.</p> <p>The benefits derived from Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, quality of the existing habitat (or surrounding habitat) and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in a specific geographic area. This may lead to synergistic effects that may be more readily apparent at the smaller spatial scale which could provide a greater incremental beneficial contribution to a regional resource. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may result in synergistic effects that when combined, provide a greater incremental beneficial contribution to Gulf Coast habitats.</p> <p>Because these project types are directed at habitat restoration, Alternative 2 would not contribute to cumulative adverse impact to these habitats over the long-term. Cumulative impacts related to currently proposed Phase III Early Restoration projects in specific geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse effects to habitats during construction. In some cases, these effects may persist beyond the construction period. For example, placement of piers, piles or other hard structures in-water for promenades, fishing piers or other structures, would permanently convert soft marine substrates to hard surfaces and over water structures may cause permanent shading of wetlands or nearshore habitats.</p> <p>Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts due to the relative small size and scope of the actions conducted when compared to the Gulf Coast region and other ongoing activities (Appendix 6-B). Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>proximity to one another and affect the same geographic area the relative contribution to adverse effects may be greater. However, projects under Alternative 3 would typically be small in size and scope. In localized areas where ongoing activities have or are occurring, potential for additive effects from multiple Alternative 3 actions increases and may result in a greater relative contribution to cumulative adverse impacts.</p> <p>Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to Gulf Coast habitats even in areas where additive effects may occur due to the anticipated size and scope of typical Alternative 3 projects. Cumulative impacts related to currently proposed Phase III Early Restoration projects proposed on smaller geographic areas as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to Gulf Coast habitats with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Alternative 4 actions (also proposed under Alternative 2) would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to Gulf Coast habitats. As discussed in Alternative 2 above, multiple projects implemented in the same geographic or localized area could result in a larger beneficial contribution for that particular water body or watershed. These regional scale benefits would be more prevalent if other environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area resulting in synergistic beneficial effects.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to Gulf Coast habitats associated with them. In cases where multiple recreational use projects under Alternative 4 are proposed within the same geographic or localized area, the incremental contribution to a cumulative adverse effect may be greater, especially in areas where ongoing non-restoration activities are concentrated.</p> <p>Alternative 4 is may also result in antagonistic effects due to implementation of Alternative 2 projects in proximity to Alternative 3 projects. Overall, Alternative 4 would not be expected to result in a substantial contribution to cumulative adverse effects to habitats and could result in incremental beneficial effects to habitats in localized areas.</p>

6.9.4.2.2 Living Coastal and Marine Resources

The Gulf Coast is home to a host of living coastal and marine resources that includes a diversity of plant and animal species. Some Gulf Coast species spend the vast majority of their live-cycle in a single habitat type (e.g., oysters on a reef). These species may be more vulnerable to habitat destruction than other species that utilize this habitat type intermittently. Other species utilize many Gulf Coast habitats for portions of their life cycle (e.g. many juvenile fish species utilize estuaries until they reach maturity when they migrate to the open waters of the Gulf of Mexico). Other species, such as migratory birds, spend only part of the year in the Gulf Coast. More detail on species and their habitat needs is located in Chapter 3.

Ongoing activities have resulted in varying degrees of damage to, and losses of, Gulf Coast species and their habitats. For example, residential and commercial development that fills wetland habitat, would reduce available nursery and foraging areas for some aquatic species, which could cause species to

relocate. Coastal development may also result in water quality degradation in nearshore waters due to storm water runoff that may persist over the long-term. Table 6-9 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on living coastal and marine resources.

Table 6-9. Cumulative Impacts to Living Coastal and Marine Resources

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	<p>Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast living coastal and marine resources. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Phase I and Phase II efforts focused on marsh and dune habitat restoration as well as nesting bird and sea turtle habitat restoration (discussed in Chapter 2). These actions are providing benefits to sensitive species and their habitats, particularly in the areas where the activities occur. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast living coastal and marine resources.</p>
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	<p>Under Alternative 2, Phase III Early Restoration projects specifically directed at restoring, enhancing and conserving Gulf Coast living coastal and marine resources would be undertaken. Alternative 2 includes project types such as restore and protect sea turtles, restore finfish, restore oysters and restore and protect birds, among others. Ongoing activities described in Appendix 6-B would be expected to continue, and adverse effects associated with those activities would continue to affect Gulf coast sensitive habitats.</p> <p>Although Alternative 2 is intended to contribute to restoring habitats and living coastal and marine resources, construction activities as part of projects proposed under Alternative 2 could result in adverse effects to Gulf Coast habitats and the species that utilize them. These adverse effects would be primarily temporary, occurring during the construction period.</p> <p>The benefits to species derived from Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, quality of the existing habitat (or surrounding habitat) and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in resource specific geographic area. This may result in effects that may be more readily apparent at the smaller spatial scale which could provide a greater incremental beneficial contribution to a smaller geographic area or localized habitat relied upon by plant or wildlife species. For example, if a living shoreline, wetland creation and habitat conservation occurred in the same water body, the incremental benefit to species that rely on these habitats could be greater, at least on the smaller spatial scale. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to synergistic effects and a greater incremental beneficial contribution to regional living coastal and marine resources.</p> <p>Because these project types are directed at improving existing conditions of Gulf Coast species populations and the sensitive habitats they utilize, Alternative 2 would not contribute cumulative adverse impact to these habitats over the long-term. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of living coastal and marine resources. Cumulative effects associated with Alternative 3 projects vary widely in both scope and severity depending on location of proposed activities and the presence of living coastal and marine resources, particularly protected species. Alternative 3 projects may result in adverse effects to species or their habitats during construction, and in some cases, adverse effects may persist beyond construction. For example, construction of boat ramps could increase recreational</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>usage in that area which may provide habitat for nearshore or marine species.</p> <p>Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts due to the relative small size and scope of the actions conducted when compared to the Gulf Coast region and other ongoing activities (Appendix 6-B). Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close proximity to one another and affect the same geographic or localized area, the relative contribution to adverse effects may be greater. In localized areas, effects of multiple Alternative 3 actions may result in a greater relative contribution to cumulative adverse impacts compared to Alternative 2 and in areas where ongoing activities are occurring that result in adverse effects to species, additive effects may occur. However, projects that would typically occur under alternative 3 would be small in size and scope and would not be expected to provide a substantial incremental contribution to cumulative adverse impacts to living coastal and marine resources.</p> <p>Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on specific geographic areas proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to living coastal and marine resources with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Alternative 4 actions (also proposed under Alternative 2) would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to Gulf Coast habitats. As discussed in Alternative 2 above, multiple projects implemented within or on a single regional resource could result in a larger beneficial contribution for that particular geographic or localized area and the species that rely on it. These regional scale benefits would be more prevalent if other synergistic environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to Gulf Coast living coastal and marine resources. In cases where multiple projects under Alternative 4 are proposed within geographic or localized area, the incremental contribution to a cumulative adverse effect may be greater. In areas where ongoing non-restoration activities are concentrated, the additive effects of alternative 3 type projects may also be greater. Alternative 4 also includes projects that may provide incremental benefits to living coastal and marine resources especially in cases where multiple ecological projects were conducted in the same geographic area. Alternative 4 would not be expected to result in a substantial contribution to cumulative adverse effects to living coastal and marine resources.</p>

6.9.4.3 Human Use and Socioeconomics

As described in Chapter 3, millions of people live, work, and recreate in the northern Gulf of Mexico region, and therefore, rely on the natural and physical resources the Gulf’s environment provides. Land use in the region comprises a heterogeneous mix of industrial activities: manufacturing, marine, shipping, agricultural, and petrochemical industry activities; recreation; and tourism. Along the northern Gulf Coast there are numerous state-managed, protected areas and recreational sites (such as State Parks and beaches) as well as units of both the National Park Service (NPS) and the USFWS.

Construction and operation of energy and mining facilities (offshore and onshore), marine transportation facilities, commercial, industrial and residential development in coastal habitats, corridor improvements, etc. are detailed in Appendix 6-B (hereinafter “ongoing activities”). These actions may provide benefits to a number of Human Use Resources while also potentially adversely affecting other resources such as commercial fisheries and recreation.

There are also many environmental stewardship and restoration projects that have occurred or are underway in the Gulf Coast region (see Appendix 6-B) that may affect the human use and socioeconomics.

6.9.4.3.1 Socioeconomics and Environmental Justice

The population of the Gulf coastal counties and parishes was nearly 17 million in 2010 according to the U.S. Census. In 2009, the total economy of the Gulf of Mexico region supported over 22 million jobs (17.2% of all jobs in the U.S.), and produced over \$2 trillion in GDP (16.7% of all GDP produced in the U.S.). In the same year, six ocean-dependent sectors of the regional economy (living marine resources, marine construction, marine transportation, offshore mineral extraction, ship and boat building, and marine-related tourism and recreation) accounted for 480,000 jobs (2.2% of all jobs in the region) and produced about \$100 billion in GDP (4.3% of total regional GDP) (NOAA 2012).

Executive Order 12898 (Feb. 11, 1994) states that, to the greatest extent practicable, federal agencies must “identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” None of the alternatives presented below would contribute to adverse cumulative impacts to environmental justice issues.

Table 6-10 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on socioeconomics.

Table 6-10. Cumulative Impacts to Socioeconomics.

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, ongoing activities would continue to result in short-and long-term adverse and beneficial impacts from the creation or reduction of workforce labor, income, sales, and tax receipts. These impacts would affect regional economies to a different degree depending on location of the action, its economic impacts, and regional economic conditions. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to regional economy. Alternative 1 would not contribute to cumulative adverse effects to socioeconomics.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term benefits to local economies, depending on the types of activities occurring. Workforce employment in construction, dredging, and barge operation activities would benefit regional economies from projects occurring under Alternative 2. Locally purchased (or rented) equipment and materials would benefit the regional economy, including increased jobs, income, sales, and tax receipts.

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in the same geographic or localized area). This may lead beneficial effects that may be more readily apparent at the smaller spatial scale, which could provide a greater incremental beneficial contribution to a local economy. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to synergistic effects and a greater incremental beneficial contribution to Gulf Coast socioeconomics.</p> <p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impact to socioeconomics. Cumulative impacts to socioeconomics related to currently proposed Phase III Early Restoration projects in smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Similar to Alternative 2, workforce employment in infrastructure construction would benefit regional economies from projects occurring under Alternative 3. Locally purchased (or rented) equipment and materials would benefit the regional economy, including increased jobs, income, sales, and tax receipts.</p> <p>Alternative 3 would not be expected to contribute to cumulative adverse impacts due to the development of recreational opportunities and associated potential for employment and revenue. Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale</p> <p>As stated above, Alternative 3 would not be expected to result in an incremental contribution to cumulative adverse impacts to socioeconomics. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for alternatives 2 and 3. As described above, both Alternative 2 and Alternative 3 projects would be expected to provide at least short-term incremental contributions to cumulative benefits to socioeconomics on a local level as a result of employment and other economic gains associated with the activities. Although the impacts would vary based on regional economic conditions, the types of activities, their economic impacts, and their location, Alternative 4 would not be expected to result in an incremental contribution to cumulative adverse impacts to socioeconomic and may also have an incremental benefit to socioeconomics depending on spatial scale.</p>

6.9.4.3.2 Cultural Resources

As stated in Chapter 3, people have lived in the coastal region of the Gulf of Mexico for more than 10,000 years. Today many unique and diverse cultures call the Gulf coast home. These cultures, past and present, are often closely linked to the environmental and natural resources that comprise the Gulf Coast ecosystem, and which these projects seek to help restore. Cultural resources encompass a range of traditional, archeological, and built assets. Historic properties in the affected coastal communities date from both the prehistoric and historic periods. Ongoing activities (Appendix 6-B) have resulted in varying degrees of damage to cultural resources. Table 6-11 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on cultural resources.

Table 6-11. Cumulative Impacts to Cultural Resources

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, some ongoing activities would continue to affect Gulf Coast cultural resources. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to cultural resources, in terms of identifying unknown resources allowing for their preservation. Alternative 1 would not contribute incrementally to cumulative adverse impact to Gulf Coast cultural resources.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Ongoing activities described in Appendix 6-B have resulted in cumulative adverse effects to cultural resources and would be expected to continue. Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. If these actions occurred in areas with cultural resources, Alternative 2 projects would contribute to a cumulative adverse effect.</p> <p>Alternative 2 projects would be analyzed for potential effects to cultural resources prior to being implemented and adverse effects to cultural resources were expected to be avoided or minimized. Therefore, Alternative 2 would not incrementally to cumulative adverse impacts to cultural resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Projects proposed under Alternative 3 occurring throughout the region could all have similar impacts on cultural resources in the short-term as they would result in construction-related activities that could impact cultural resources.</p> <p>Alternative 3 projects would be analyzed for potential effects to cultural resources prior to being implemented and adverse effects to cultural resources were expected to be avoided or minimized. Therefore, Alternative 3 would not contribute to cumulative adverse impacts to cultural resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts from the implementation of Alternative 4 would reflect those impacts described above for alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of cultural resources within project areas.</p> <p>Alternative 4 projects would be analyzed for potential effects to cultural resources prior to being implemented and adverse effects to cultural resources were expected to be avoided or minimized. Therefore, Alternative 4 would not contribute to cumulative adverse impacts to cultural resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>

6.9.4.3.3 Infrastructure

The amount and placement of infrastructure and public service development depend heavily on population and migration patterns, and employment trends. Ongoing activities (Appendix 6-B) have

resulted in varying degrees of damages and benefits to infrastructure, benefits are derived from a variety of infrastructure improvements. Table 6-12 summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on infrastructure.

Table 6-12. Cumulative Impacts to Infrastructure

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	<p>Under Alternative 1, ongoing activities would continue to affect Gulf Coast infrastructure. Many on-going activities may result in long-term improvement to infrastructure in the region. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. The activities include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to coastal infrastructure through shoreline protection from erosion and storm surge. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast infrastructure.</p>
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. Construction activities resulting from restoration actions proposed under Alternative 2 could have short-term adverse impacts to infrastructure related to road closures, utility service interruptions, and similar impacts during construction. Other ongoing activities described in Appendix 6-B would be expected to continue. The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. However, potential effects to infrastructure (roadways, utility service interruptions, etc.) from Alternative 2 projects would not likely persist after construction. Alternative 2 projects that included shoreline protection could provide an incremental benefit to coastal infrastructure by reducing wave, wind and storm event damage. ,</p> <p>Overall, Alternative 2 would not contribute to cumulative adverse impact to infrastructure and certain project types (e.g. living shorelines, created wetlands, etc.) could provide an incremental benefit through additional protection of coastal infrastructure. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on smaller geographic areas proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in short-term adverse impacts to infrastructure during construction for the same reasons as Alternative 2.</p> <p>However, long-term benefits resulting from infrastructural improvements associated with enhancement of recreational opportunities would provide overall benefits to regional infrastructure. If multiple projects are proposed in close proximity to one another, the relative contribution to beneficial effects to infrastructure may be greater. Conversely, multiple Alternative 3 projects that increased use of infrastructure such as roadways or parking areas adjacent to the sites could result in additive effects to adverse cumulative effects.</p> <p>Overall, Alternative 3 would not be expected to result in a substantial incremental contribution to cumulative adverse impacts to infrastructure and may result in a cumulative benefit to infrastructure on a localized level. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects on a smaller geographic area proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
Alternative 4 - Contribute to Restoring Habitats, Living Coastal	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for alternatives 2 and 3. Cumulative adverse and beneficial impacts associated with ongoing activities would likely continue.</p>

ALTERNATIVES	CUMULATIVE IMPACTS
and Marine Resources, and Recreational Opportunities	<p>Projects proposed under Alternative 4 (also proposed under Alternative 2) would primarily result in short-term construction-related adverse impacts and would not be expected to contribute to a cumulative adverse impact to infrastructure. Projects intended to improve shoreline protection would also benefit associate coastal infrastructure.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast, which may have construction related impacts to infrastructure, Over the long-term, benefits would be realized through projects that improve recreational facilities and associated infrastructure. There could also be an incremental contribution to cumulative adverse effects to infrastructure such as roadways and parking areas from increased use of facilities or recreation sites. However, his would not be a substantial incremental contribution to a cumulative adverse effect.</p> <p>Alternative 4 would not substantially contribute incrementally to cumulative adverse impact to infrastructure and cold result on an incremental benefit to infrastructure in localized areas.</p>

6.9.4.3.4 Land and Marine Management

As stated in Chapter 3, land marine areas may be set aside for a variety of active and passive recreational purposes. Land may be managed for wildlife and habitat protection and conservation, and/or scenic, cultural, and historical values. Land management may be at the Federal, State, local government levels, or by private organizations.

Ongoing activities (Appendix 6-B) have resulted in varying degrees of impacts to land and marine management. Table 6-13. summarizes cumulative impacts of the Draft Phase III ERP/PEIS Alternatives on land and marine management.

Table 6-13. Cumulative Impacts to Land and Marine Management.

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, some ongoing activities such as coastal development, oil and gas development, etc. would continue to adversely affect Gulf Coast land and marine management directed at conservation or recreational uses. . Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These activities include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to land and marine management, in terms of fulfilling obligations to manage certain properties for the benefit of the environment and human enjoyment. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast land and marine management.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term adverse effects to disrupting management activities during implementation of Alternative 2 projects. However, areas managed for conservation purposes could benefit long-term from Alternative 2 projects implemented within their jurisdiction due to improved habitats and ecosystems. Other ongoing activities described

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, spatial scale, and existing land and marine management. Potential exists for multiple Alternative 2 projects to be conducted in a single water body or watershed. If Alternative 2 activities occurred in or nearby managed areas, benefits may be more readily apparent. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to a greater incremental beneficial contribution to Gulf Coast land and marine management in terms of fulfilling obligations to manage certain properties for the benefit of the environment and human enjoyment associated with passive recreation activities such as wildlife viewing. Alternative 2 projects could result in additional land or marine management restrictions on other types of recreation activities such as boating or recreational fishing in areas managed for conservation purposes. This would not be a substantial contribution to cumulative adverse effects to these and other non-passive recreation activities because other Gulf Coast areas are expected to remain available for those activities.</p> <p>Over the long-term, Alternative 2 would not substantially contribute to cumulative adverse impacts to land and marine management and may provide incremental benefits to areas managed for conservation purposes at the applicable geographic area. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in short-term adverse impacts to land and marine management if projects resulted in area closures and associated interruption of operations, increased management responsibilities, or furloughs or layoffs of staff.</p> <p>However, Alternative 3 would not be expected to contribute incrementally to cumulative adverse impacts due to the relative small size and scope of the actions conducted when compared to the Gulf Coast region and other ongoing activities (Appendix 6-B), and the likelihood that projects would be consistent with underlying land and marine management efforts. In some cases, Alternative 3 projects would benefit or promote land and marine management goals particularly in areas managed for recreational uses.</p> <p>Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats,</p>	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location.</p>

ALTERNATIVES	CUMULATIVE IMPACTS
Living Coastal and Marine Resources, and Recreational Opportunities	<p>Projects proposed under Alternative 4 could result in adverse impacts if construction resulted in area closures, additional recreational use restrictions, interruption of operations, increased management responsibilities, or furloughs or layoffs of staff. However, most project types would be intended to further existing land and marine management in terms of fulfilling obligations to manage certain properties for the benefit of the environment and human enjoyment.</p> <p>Alternative 4 would not contribute to cumulative adverse impact to land and marine management. Alternative 4 projects that coincide with or occur on managed lands would be expected to be consistent with existing land management plans and may incrementally benefit to land and marine management.</p>

6.9.4.3.5 Tourism and Recreational Use

Outdoor recreation, broadly defined, is any leisure time activity conducted outdoors for pleasure or sport, including activities from wilderness camping to watching outdoor performances. Other examples of recreational pursuits in the region include onshore and offshore wildlife observation, hunting, beach and other waterfront use, boating, and recreational fishing.

Ongoing activities (Appendix 6-B) have resulted in varying degrees of damage and benefits to tourism and recreational use. Table 6-14 summarizes cumulative impacts of the Phase III ERP/PEIS Alternatives on tourism and recreational use.

Table 6-14. Cumulative Impacts to Tourism and Recreational Use

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	<p>Under Alternative 1, ongoing activities would continue to affect Gulf Coast tourism and recreational use. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These activities include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to tourism and recreational use, such as water quality improvements and opportunities for wildlife viewing. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast tourism and recreational use.</p>
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. During the construction and implementation period for projects conducted under Alternative 2, there would be short-term adverse impacts to recreation and tourism from temporary recreational site closures and adverse impacts on recreational experiences associated with noise, wildlife disturbances, view sheds, and other adverse impacts on recreational experiences. The effects of restoration actions would vary depending on their location and the rate of usage by tourists or recreation users. However, Alternative 2 projects that result in higher quality habitats such as beach nourishment, living shorelines that that may be used for snorkeling, etc. would be expected to provide long-term benefits to tourism and recreational use. Some Alternative 2 projects may restrict some recreational</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>uses such as boating or hiking in certain areas (e.g. SAV restoration sites or dune revegetation project areas). These restrictions would not be expected to substantially contribute to adverse effects to recreational uses because of the small geographic area likely to be restricted and the availability of other areas for those types of recreation. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in the same geographic or localized area. This may lead to effects that are more readily apparent at the smaller spatial scale, which could provide a greater incremental beneficial contribution to the localized area, especially in places where other environmental stewardship and restoration efforts are occurring or have occurred.</p> <p>Over the long-term, Alternative 2 would not substantially contribute to cumulative adverse impact to tourism and recreational use and could provide an incremental benefit to some tourism and recreational uses (e.g. beach going, snorkeling, wildlife viewing). Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in construction-related, short-term adverse impacts to recreation and tourism from temporary recreational site closures and adverse impacts on recreational experiences associated with noise, wildlife disturbances, visual impacts and other adverse impacts on recreational experiences.</p> <p>However, Alternative 3 would not be expected to contribute incrementally to cumulative adverse impacts as project types are intended to provide benefits to tourism and recreational use. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts associated with the implementation of Alternative 4 would reflect those impacts described above for alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and type of use within project areas.</p> <p>Projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not substantially contribute to a cumulative adverse impact to tourism and recreational use. As discussed above, some Alternative 2 projects would benefit recreational uses and tourism and those that resulted in restrictions on some recreational uses are not likely to result in substantial adverse effects. Alternative 3 projects are intended to benefit recreation and tourism. Multiple projects implemented</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>in the same geographic area could result in a larger beneficial contribution to tourism and recreational use in the localized area. These regional scale benefits may be more prevalent if other environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have short-term adverse impacts related to construction, but overall would provide long-term benefits to Gulf Coast tourism and recreational use.</p> <p>Alternative 4 would not be expected to substantially contribute to cumulative adverse impacts as project types are intended to provide benefits to tourism and recreational use and restrictions placed on some recreational uses from ecological projects are likely to be minimal. Alternative 4 would also have an incremental benefit to tourism and recreational use depending on spatial scale.</p>

6.9.4.3.6 Fisheries and Aquaculture

Commercial fisheries represent a multi-billion dollar industry to the northern Gulf Coast region and have traditionally included finfish, shrimp, oysters, and crabs. State, federal, and international agencies regulate fishery resources within their jurisdictions. NMFS (2011) defines aquaculture as “...the propagation and rearing of aquatic organisms in controlled or selected aquatic environments for any commercial, recreational, or public purpose.” The Census of Aquaculture targets, “all commercial or noncommercial places from which \$1,000 or more of aquaculture products were produced and either sold or distributed during the census year” (USDA National Agricultural Statistics Service 2005). Noncommercial operations include Federal, State, and tribal hatcheries (USDA National Agricultural Statistics Service 2005).

Ongoing activities (Appendix 6-B) have resulted in varying degrees of impacts to commercial fisheries and aquaculture. Table 6-15 summarizes cumulative impacts of the Phase III ERP/PEIS Alternatives on fisheries and aquaculture.

Table 6-15. Cumulative Impacts to Fisheries and Aquaculture

ALTERNATIVES	CUMULATIVE IMPACTS
Alternative 1 - No Action	Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast commercial fisheries and aquaculture. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These activities include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to fisheries, in terms of water quality and habitat improvements. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast commercial fisheries or aquaculture.
Alternative 2 - Contribute to Restoring Habitats and Living Coastal and	Under Alternative 2, Phase III Early Restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats or protecting species. These actions could cause short-term adverse impacts to commercial fishing by limiting allowable catch. However, overall long-term benefits to commercial

ALTERNATIVES	CUMULATIVE IMPACTS
Marine Resources	<p>fisheries would be anticipated because of improved habitats that are important to a number of fish and shellfish species and potential for increased populations and species stability. These projects are unlikely to impact aquaculture. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted within the same geographic or localized area. This may result in effects that are more readily apparent at the smaller spatial scale, which could provide a greater incremental beneficial contribution the localized area.</p> <p>Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to synergistic effects and a greater incremental beneficial contribution to Gulf Coast fish resources and related commercial fisheries.</p> <p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impact to commercial fisheries or aquaculture. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse impacts during construction as a result of in-water disturbances such as pile driving, dredging, etc.</p> <p>Alternative 3 would not be expected to contribute incrementally to cumulative adverse impacts and some project types under Alternative 3 are intended to provide benefits to commercial fishing and aquaculture. Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale. If multiple projects are proposed in close proximity to one another (The relative contribution or additive adverse effects may be greater in the localized area and may result in a greater relative contribution to cumulative adverse impacts.</p> <p>Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of habitats within project areas.</p> <p>Projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to commercial fisheries or aquaculture.</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast including aquaculture/stock enhancement and artificial reefs. In cases where multiple projects under Alternative 4 are proposed within geographic area, the incremental contribution to a cumulative adverse effect in the short-term may be greater, especially in areas where ongoing non-restoration activities are concentrated.</p> <p>Alternative 4 would not be expected to result in an incremental contribution to cumulative adverse impacts to commercial fisheries or aquaculture. Alternative 4 could result in incremental benefits to commercial fisheries and aquaculture.</p>

6.9.4.3.7 Marine Transportation

Marine transportation is an important component of the northern Gulf of Mexico regional economy, and the Gulf Coast is a major shipping center. The U.S. economy relies heavily on the ports in the northern Gulf of Mexico region for the import and export of both foreign and domestic goods.

Ongoing activities (Appendix 6-B) have resulted in varying degrees of impacts to marine transportation. Table 6-16 summarizes cumulative impacts of the Phase III ERP/PEIS Alternatives on marine transportation.

Table 6-16. Cumulative Impacts to Marine Transportation

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, ongoing activities would continue to affect Gulf Coast marine transportation. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may result in adverse impacts if marine transportation is restricted from certain restoration areas. Alternative 1 would not incrementally contribute to cumulative adverse effects to Gulf Coast marine transportation.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term impacts to marine transportation if marine transportation is restricted in those areas during construction. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in a single water body. This may lead to additive effects such as limiting marine traffic in certain areas during construction that may be more readily apparent at the smaller spatial scale. .</p> <p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impact to marine transportation based on the scale of projects and limited areas likely to be</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>affected. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse impacts to marine transportation during construction if travel in certain areas is restricted, but these would not be expected to persist beyond construction. Therefore, Alternative 3 would not be expected to contribute incrementally to cumulative adverse impacts in the long-term.</p> <p>Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for Alternatives 2 and 3 and would be primarily short-term. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence of marine transportation within project areas.</p> <p>Projects proposed under Alternative 4 would primarily result in adverse impacts if areas were closed to marine transportation during construction. As discussed in Alternative 2 above, multiple projects implemented within the water body may result in additive effects that would be more readily apparent. These regional scale short-term impacts would be more prevalent if other environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have similar impacts as Alternatives 2 and 3 if areas are restricted to marine transportation during construction. Alternative 4 is not anticipated to contribute to adverse effects to marine transportation.</p>

6.9.4.3.8 Aesthetics and Visual Resources

The current Gulf of Mexico coastal region is characterized by thousands of miles of shoreline, which is bordered by a variety of landscapes, including natural and maintained beaches, mangroves and other wetlands, developed areas such as towns and urban centers, as well as heavily industrialized areas including ports and infrastructure related to energy production.

Ongoing activities (Appendix 6-B) have resulted in varying changes and associated impacts to aesthetics and visual resources. Table 6-17 summarizes cumulative impacts of the Phase III ERP/PEIS Alternatives on aesthetics and visual resources.

Table 6-17. Cumulative Impacts to Aesthetics and Visual Resources

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast aesthetics and visual resources. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts include those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to aesthetics and visual resources, though short-term impact would likely occur during construction depending on the nature of the site. Alternative 1 would not contribute to cumulative adverse effects to Gulf Coast geology or substrates.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term and long-term adverse impacts due to construction related visual effects (placement of equipment, staging, fencing etc.) However, Alternative 2 projects are expected to result in long-term benefits to aesthetics and visual resources due to improved habitat areas that reflect a more natural setting. Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in the same geographic or localized area. This may lead to additive effects to visual resources during construction that would be more readily apparent. Over the long-term, beneficial effects may be more readily apparent at the smaller spatial scale, and could provide a greater incremental beneficial contribution to local or visual resources. Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts may lead to synergistic effects and a greater incremental beneficial contribution to Gulf Coast aesthetic and visual resources.</p> <p>Over the long-term, Alternative 2 would not contribute incrementally to cumulative adverse impact to aesthetics and visual resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse impacts to aesthetics and visual resources during construction. In some cases, these effects may persist beyond the construction period. For example, if new facilities are introduced that contrast with the existing viewshed.</p> <p>However, Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts because of the size and scale of projects that would typically occur under Alternative 3. The contribution of individual Alternative 3 projects to cumulative</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>adverse effects may vary based on geographic locations, existing visual character and spatial scale. If multiple projects are proposed in close proximity to one another, there may be additive effects and (the relative contribution to adverse effects may be greater).</p> <p>As stated above, Alternative 3 would not be expected to result in a substantial contribution to cumulative adverse impacts to aesthetics and visual resources. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts with the implementation of Alternative 4 would reflect those impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and quality of aesthetics and visual resources within project areas.</p> <p>Ecological projects proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to aesthetics and visual resources. As discussed in Alternative 2 above, multiple projects implemented within or on a single regional resource could result in a larger beneficial contribution for that particular viewshed.</p> <p>Alternative 4 also includes activities intended to promote recreational activities and public access to the Gulf Coast; these may have adverse impacts to Gulf Coast aesthetics and visual resources associated with them during construction. Adverse effects may persist beyond construction if new facilities do not fit in with the existing visual character of a particular viewshed.</p> <p>Alternative 4 would not be expected to result in a substantial contribution to cumulative adverse impacts to aesthetics and visual resources. Alternative 4 may also have an incremental benefit to aesthetics and visual resources depending on spatial scale and existing character of the viewshed.</p>

6.9.4.3.9 Public Health and Safety, Including Flood and Shoreline Protection

Provision of public health and safety can be complicated by large storm events such as tropical storms and hurricanes (and associated storm surges, winds, and battering waves) that have historically caused extensive damage to the shoreline as well as infrastructure such as roadways, bridges and buildings. The Gulf’s coastal communities are at increased risk for severe shoreline damage and storm surges. In addition, construction activities and increased human uses of resources can also pose risks to public health and safety.

Ongoing activities (Appendix 6-B) have resulted in varying degrees of impacts to public health and safety. Table 6-18 summarizes cumulative impacts of the Phase III ERP/PEIS Alternatives on public health and safety, including flood and shoreline protection.

Table 6-18. Cumulative Impacts to Public Health and Safety, Including Flood and Shoreline Protection

ALTERNATIVES	CUMULATIVE IMPACTS
<p>Alternative 1 - No Action</p>	<p>Under Alternative 1, ongoing activities would continue to adversely affect Gulf Coast public health and safety, however most activities would have plans in place to reduce risks to the public. Restoration, conservation and recovery efforts associated with other environmental stewardship and restoration activities in the Gulf of Mexico would continue. These efforts are in addition to those being conducted under Phase I and Phase II Early Restoration. Some of these actions may provide benefits to public health and safety, in terms of helping reduce effects from storms and wave action on shorelines. Alternative 1 would not contribute to cumulative adverse effects to public health and safety.</p>
<p>Alternative 2 - Contribute to Restoring Habitats and Living Coastal and Marine Resources</p>	<p>Under Alternative 2, early restoration projects may include creating wetlands, restoring SAV, restoring barrier islands and beaches, and conserving habitats. These actions could cause short-term impacts to public health and safety particularly during construction when roads may be closed or heavy equipment may be operating. However, long-term benefits to public health and safety would be anticipated in areas where coastal and flood protection was achieved (e.g. placement of living shorelines, nearshore wetland creation, etc.) Other ongoing activities described in Appendix 6-B would be expected to continue.</p> <p>The effects of Alternative 2 would vary depending on geographic location, proximity of restoration projects to one another, and spatial scale. Potential exists for multiple Alternative 2 projects to be conducted in the same geographic area. Because of the geographic boundary, effects may be more readily apparent at the smaller spatial scale, which could provide a greater incremental beneficial contribution to a localized area or specific shoreline or coastal area (e.g. living shoreline and wetland creation along the same coastal area). Alternative 2 projects carried out in conjunction with other environmental stewardship and restoration efforts in the same geographic area may lead to synergistic effects and a greater incremental beneficial contribution to Gulf Coast public health and safety.</p> <p>Over the long-term, Alternative 2 would not contribute to cumulative adverse impact to public health and safety. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 2 are discussed in Chapters 8 through 12.</p>
<p>Alternative 3 - Contribute to Providing and Enhancing Recreational Opportunities</p>	<p>Alternative 3 actions vary widely from construction of recreation and public access facilities (boat ramps, promenades, dune walkovers, parking facilities, artificial reef, etc.) to educational and cultural facilities specifically intended to provide educational awareness of Gulf Coast habitats (and associated species and cultural values). Cumulative effects associated with Alternative 3 would vary widely in both scope and severity depending on the location of specific actions. Alternative 3 projects may result in adverse impacts to public health and safety during construction. In some cases, these effects may persist beyond the construction period. For example, potential of hazardous waste and materials released during construction or use contaminating soils, groundwater, and surface waters could persist beyond construction and affect public health and safety. However, steps would be implemented to reduce the likelihood of this risk</p>

ALTERNATIVES	CUMULATIVE IMPACTS
	<p>Alternative 3 would not be expected to contribute substantially to cumulative adverse impacts. Similar to the scenario described in Alternative 2, the contribution of individual Alternative 3 projects to cumulative adverse effects may vary based on geographic locations and spatial scale and would be limited mainly to short-term construction effects.</p> <p>As stated above, Alternative 3 would not be expected to result in an incremental contribution to cumulative adverse impacts to public health and safety. Cumulative impacts to regional resources related to currently proposed Phase III Early Restoration projects proposed as part of this ERP/PEIS under Alternative 3 are discussed in Chapters 8 through 12.</p>
<p>Alternative 4 - Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities</p>	<p>Cumulative impacts to public health and safety with the implementation of Alternative 4 would be similar to impacts described above for Alternatives 2 and 3. Cumulative adverse impacts associated with ongoing activities would likely continue, but would vary based on location and presence in project areas.</p> <p>Project types proposed under Alternative 4 would primarily result in short-term construction-related adverse impacts and would not contribute to a cumulative adverse impact to public health and safety. As discussed in Alternative 2 above, multiple projects implemented in the same coastal area could result in a larger beneficial contribution for that particular shoreline, improving shoreline integrity and storm surge buffers. These regional scale benefits would be more prevalent if other synergistic environmental stewardship and restoration activities (NRDA and non-NRDA) also occurred in the same area.</p> <p>Alternative 4 includes activities intended to promote recreational activities and public access to the Gulf Coast. These projects may result in adverse to public health and safety during construction. In cases where multiple projects falling under Alternative 3 are proposed within or on the same regional resource, the incremental contribution to a cumulative adverse effect may be greater, especially in areas where ongoing non-restoration activities are concentrated.</p> <p>Alternative 4 would not be expected to result in an incremental contribution to cumulative adverse impacts on public health and safety. Alternative 4 may also have an incremental benefit to public health and safety and shoreline protection, depending on spatial scale.</p>

6.9.5 Cumulative Impact Analysis of Proposed Phase III Projects

Chapters 8 -12 provide more specific analyses based on the Phase III ERP projects being proposed by the Trustees. Overall, the proposed Phase III projects represent relatively small areas of potential disturbance distributed across the very large geographic area of the northern Gulf of Mexico. The Trustees considered whether a cumulative impact analysis of the more specific issues associated with project level impacts would be best organized by project type or by geography. Given the very large distance between similar projects (e.g., living shoreline projects in Florida, Alabama and Mississippi), the Trustees determined that analysis of potential project-level cumulative impacts based on their spatial proximity is a rational approach, such that different types of projects occurring in proximity to each

other would be evaluated together. The initial spatial sorting of Phase III projects for cumulative impact analysis is therefore organized by each of the 5 Gulf States. Additional rational assemblages of projects within each state are described in Chapters 8 through 12 to group projects with a potential for cumulative impacts together for purposes of cumulative impact analysis.

6.10 Other NEPA Considerations

6.10.1 Unavoidable Adverse Impacts

Section 102(2)(c)(ii) of NEPA requires that an EIS include information on any adverse environmental effects that cannot be avoided, should the proposed action be implemented. Unavoidable adverse impacts are the effects on human environment that would remain after mitigation measures have been applied. Unavoidable adverse impacts do not include temporary or permanent impacts that would be mitigated. While these impacts do not have to be avoided by the planning agency, they must be disclosed, considered and mitigated where possible (40 C.F.R. 1500.2(e)). For some restoration techniques, mitigation measures are identified as options that can be used to avoid, reduce, minimize or mitigate these impacts. However these mitigation options are provided for consideration in future project development and selection, vary based on site-specific conditions, and are not required mitigations as part of the action alternatives. Therefore, future tiered restoration III projects are considering appropriate mitigation measures. Unavoidable adverse impacts associated with conversion of habitat and built infrastructure are disclosed for relevant project types and Phase III projects where reasonably foreseeable. In addition, future Early Restoration planning phases and associated NEPA analyses would consider the extent to which adverse impacts can be avoided, including consideration of appropriate mitigation, and would describe those adverse impacts that are unavoidable. Many examples of mitigation measures are identified in Appendix 6-A.

6.10.2 Relationship Between Short-Term Uses Of The Human Environment And The Maintenance And Enhancement Of Long-Term Productivity

Section 102(2)(c)(iv) of NEPA requires that an EIS “discuss ... the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity...” This section describes how the action alternatives would affect the short-term uses of the human environment and how that would affect the maintenance or enhancement of long-term productivity.

As described in Chapter 1, the purpose of this Draft Phase III ERP/PEIS is to accelerate meaningful restoration of injured natural resources and their services resulting from the Spill. This Plan would complement previous investments in Early Restoration in accordance with the Oil Pollution Act (OPA) and funds made available in the Framework Agreement. In order to meet this purpose, the Trustees have proposed alternatives intended to improve certain aspects of the human environment which would result in the maintenance and enhancement of the long-term productivity of a number of natural resources. Chapters 8 through 12 describe in detail the types of short- and long-term adverse impacts and/or benefits that would be expected for the different resource categories.

For a number of project types under Alternatives 2 and 4, such as creating and improving wetlands, protecting shorelines and reducing erosion, and restoring barrier islands and beaches, short-term adverse impacts generally include those associated with construction or implementation of restoration

activities. Many of these impacts would be temporary and would not be expected to reduce long-term productivity. However, these project types are intended to enhance long-term productivity.

Some project types, particularly those in Alternatives 3 and 4, intend to provide and enhance recreational opportunities that would increase access to, and the recreational use of, resources. Dependent on how those uses are managed, these project types could result in both short-term and long-term impacts to habitats and resources. However, those impacts are not expected to degrade long-term productivity. Overall, the alternatives considered here are expected to enhance long-term productivity.

6.10.3 Irreversible and Irretrievable Commitment of Resources

Section 102(2)(c)(v) of NEPA requires that an EIS “discuss ... any irreversible and irretrievable commitment of resources which would be involved in the proposed action should it be implemented” (40 C.F.R. §1502.16). However, NEPA and the CEQ regulations do not define “irreversible and irretrievable.” For purposes of this analysis, a commitment of a resource is considered *irreversible* when the use or destruction of a specific resource (*e.g.*, energy) cannot be replaced within a reasonable time frame. An *irretrievable* commitment refers to the loss in value of an affected resource that cannot be restored as a result of the action (*e.g.*, the disturbance of a cultural site).

Implementation of any of the action alternatives would require an irreversible commitment of energy through the combustion of fossil fuels and material resources for construction. However, the level of commitment would vary based on project type. For example the construction of a fish hatchery or aquaculture facility would require more resources than an action that replants vegetation on beaches as part of the “Restore Barrier Island and Beaches” project type.

An irretrievable commitment of resources could result from the implementation of alternatives that displace or destroy common ecological communities (*e.g.*, local benthic communities) to provide sites for habitat restoration or creation. Species displacement and habitat alteration or loss resulting from restoration construction may be irretrievable if the alterations are permanent. However, the degree of displacement and amount of irretrievable habitat loss should represent a transitory and small effect on the overall populations of most species. Further, there is an assumption that the lost resources would be replaced by systems of higher quality—that is, higher species diversity and higher productivity—or by systems that specifically enhance survival of native or protected species. For example, the restoration of a barrier island would eliminate or displace species that could be present; however, the restored island would provide a higher quality habitat and increased species diversity.

No irretrievable commitment of cultural resources or endangered or threatened species would be expected to occur with the implementation of the proposed alternatives. Any approvals of the proposed actions would be conditioned on compliance with the ESA and NHPA. Under the ESA, the project proponent would make an effects determination and, as appropriate, consult with the US Fish and Wildlife Service or the National Marine Fisheries Service to ensure threatened and endangered species are protected and any irretrievable commitment of resources would be avoided. Although the potential for an irretrievable commitment of resources under the scenario in the paragraph above could occur if one or more individuals of a species listed under the ESA is injured or killed, or important habitats such as nesting sites are disturbed. Coordination prior to initiation of any project would identify mitigation

measures to reduce or eliminate potential impacts to listed species, and implementation of such measures would act to reduce the potential for irretrievable commitment of these biological resources. Similarly, under the NHPA, an effects determination would occur and consultation would be initiated with the State Historic Preservation Officer, as appropriate. Unintended impacts to cultural resources would also be considered an irretrievable commitment of resources. However, consultation in adherence to cultural resource protection laws would reduce the potential for this type of impact.

6.10.4 Climate Change and NEPA

In 2010, the Council on Environmental Quality (CEQ) issued draft guidance on considering the effects of climate change and greenhouse gas emissions in their analysis of proposed action under NEPA (CEQ 2010) above. The draft climate change guidance also suggests ways that federal agencies should consider effects of climate change in developing projects that are resilient in nature and able to adapt to changes in the existing environmental conditions over time.

6.10.4.1 Current Climate Change Projections

Climate change is projected to lead to a number of impacts in the southeastern United States, including increases in air and water temperatures, decreased water availability, an increase in the frequency of severe weather events, and ecosystem change. Coastal environments are expected to be at increasing risk due to sea-level rise and increases in hurricane intensity and storm surge. The Intergovernmental Panel on Climate Change (IPCC) projects a rise of the world's oceans from 0.26 to 0.82 m by the end of the century, depending on the level of greenhouse gas emissions (IPCC 2013).

Climate change will likely have a number of impacts on the aquatic ecosystems of the northern Gulf. Higher ocean temperatures are expected to increase coral bleaching (Scavia et al. 2002). Sea-level rise and increasingly frequent coastal storms and hurricanes will impact shorelines, altering coastal wetland hydrology, geomorphology, biotic structure, and nutrient cycling (Michener et al. 1997). Furthermore, an increase in atmospheric CO₂ concentrations is projected to increase freshwater discharge from the Mississippi River to the coastal ocean, decrease aquatic oxygen content, and expand the hypoxic zone in the northern Gulf of Mexico (Justic et al. 1997).

6.10.4.2 Climate Change Considerations in Planning

The Council on Environmental Quality (CEQ. 2011) provides the following general definition of Climate Change Adaptation:

Climate change adaptation means adjusting to a changing climate to reduce the negative impacts already occurring and taking advantage of new opportunities. In general, planning in advance for climate change impacts will help avoid disruptions to Federal agency operations and allow the Government to design and implement programs that are capable of achieving their missions across a range of future climate conditions.

CEQ encourages preemptive planning to the extent practicable, and consideration of climate change adaptations designed to reduce the vulnerability of a system to the effects of climate change. An example would be designing projects that are resilient across a range of future climate scenarios. In their recent draft guidance, the CEQ relies on 40 C.F.R. §1502.24 when it states that “[w]ith regard to the effects of climate change on the design of a proposed action and alternatives, Federal agencies must

ensure the scientific and professional integrity of their assessment of the ways in which climate change is affecting or could affect environmental effects of the proposed action” (CEQ 2010).

A recent executive order reinforces the direction to undergo planning efforts to develop projects that are more resilient to changes in the environment over time as a result of climate change effects. It states that:

The Federal Government must build on recent progress and pursue new strategies to improve the Nation's preparedness and resilience. In doing so, agencies should promote: (1) engaged and strong partnerships and information sharing at all levels of government; (2) risk-informed decision-making and the tools to facilitate it; (3) adaptive learning, in which experiences serve as opportunities to inform and adjust future actions; and (4) preparedness planning. (Executive Order -- Preparing the United States for the Impacts of Climate Change, November 1, 2013)

Projects associated with the project types evaluated in this Draft Phase III ERP/PEIS are not inconsistent with the Executive Order and CEQ Guidance on climate change. Consideration of factors such as sea level rise, changes to shorelines and altered hydrology at the project design stage allows for the anticipation of a range of environmental changes and the development of Early Restoration projects that would be more resilient over time.

6.11 References

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Chapter 6 Appendix 6-A: Potential Mitigation Measures and Best Management Practices

Site-specific mitigation measures and BMPs are numerous and varied. For this reason, specific mitigation measures and BMPs would need to be evaluated and implemented on a project-by-project basis. The Trustees would implement appropriate mitigation measures and BMPs for specific projects, including any measures that are included in permit requirements or identified during consultation processes, such as consultations for endangered species or essential fish habitat. The Trustees would expect to minimize potential risk from early restoration actions by implementing BMPs, as appropriate. In some cases, activities may occur in sensitive habitat areas, with the intent of providing restoration benefits to specific resources (e.g. beach re-nourishment to enhance sea turtle nesting on a known turtle nesting beach). In these cases, potential impacts may be further reduced with additional mitigation.

Best practices for restoration could include, but are not limited to, appropriate engineering design; conducting surveys for sensitive wildlife and protected plants; management of construction to minimize impacts to existing resources, including impacts from noise, vibration, and turbidity; post-construction inspections; management of any water intake and effluent discharge; use of protective buffers around sensitive resources; utilization of suitable borrow sites, fill materials and reef materials; and use of appropriate native vegetation. Mitigation measures to avoid risk could include measures that reduce the risk of spreading invasive species, spilling oil or hazardous materials, or disturbing contaminated soil or sediment; measures to protect fish health, genetics, and populations for aquaculture projects; as well as measures that reduce human impacts to sensitive resources.

Table 6A-1 and Table 6A-2 provide examples of mitigation measures and BMPs that may be implemented on a project-specific basis. Not all BMPs or mitigation measures are necessary or will be done for every project. Additional resource-specific mitigation measures may be developed and selected on a project-by-project basis, as appropriate. Examples include, but are not limited to, Sea Turtle and Smalltooth Sawfish [and Gulf Sturgeon] Construction Conditions (NOAA 2006); Standard Manatee Conditions for In-Water Work (USFWS 2011); Conservation Measures for Dune Walkover Construction (USFWS 2013).

Table 6A-1. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to Natural Resources

Potential Mitigation Measures	Geology and Substrates		Hydrology and Water Quality				Habitats					Living Coastal and Marine Resources										
	Upland Geology and Substrates	Nearshore Geology and Substrates	Freshwater Environments		Saltwater Environment Fish Resources		Wetlands	Barrier Islands	Beaches	Submerged Aquatic Vegetation (SAV)	Terrestrial, Coastal, and Riparian Habitat	Nearshore Benthic Communities	Oysters	Pelagic Microfaunal Communities	Sargassum	Finfish			Sea Turtles	Marine Mammals	Birds	Terrestrial Wildlife
			Groundwater	Surface Water	Nearshore Coastal Environment	Offshore Marine Environment										Demersal Fish	Pelagic Fish	Diadromous and Freshwater Fish				
<ul style="list-style-type: none"> Tilling of compacted soil areas to reduce hardening. 	X	X					X	X		X								X			X	
<ul style="list-style-type: none"> Use of existing access ways whenever possible. Temporary access roads would not be built in locations that would suggest a likelihood of excessive erosion (e.g., large slopes, erosive soils, proximity to water body). All temporary access roads would be restored when the action is completed, the soil would be stabilized, and the site would be re-vegetated. Temporary roads in wet or flooded areas would be restored shortly after the work period was complete. 	X	X		X	X		X	X	X	X		X	X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Selection and operation of heavy equipment to minimize adverse effects to the environment (e.g., minimally-sized, low-pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils). 	X	X		X	X		X	X	X	X						X	X	X	X	X	X	X
<ul style="list-style-type: none"> To the extent feasible, heavy equipment would work from the top of the bank, unless work from another location would result in less habitat disturbance. 	X	X		X	X		X	X	X	X			X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Temporary stabilization of areas of upland soil disturbance by sediment and erosion control practices during construction, and re-vegetation with appropriate native species following construction. 	X			X			X	X	X	X		X	X			X	X	X	X		X	X
<ul style="list-style-type: none"> When local conditions indicate the presence of contaminated soils/sediments is likely, soil samples would be tested for contaminant levels, and precautions would be taken to avoid disturbance of or provide for proper disposal of contaminated soils/sediments. 	X	X	X	X	X		X	X	X	X	X	X	X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Prior to dredging, methods will be evaluated to reduce the potential for impacts from turbidity. 				X	X		X	X	X	X	X	X	X			X	X	X	X			
<ul style="list-style-type: none"> Seasonal rainfall will be factored into the construction timeline to reduce ground disturbance during raining or flood seasons. 	X	X		X	X		X	X	X	X		X	X			X	X	X	X	X	X	X

Table 6A-1. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to Natural Resources

Potential Mitigation Measures	Geology and Substrates		Hydrology and Water Quality				Habitats					Living Coastal and Marine Resources										
	Upland Geology and Substrates	Nearshore Geology and Substrates	Freshwater Environments		Saltwater Environment Fish Resources		Wetlands	Barrier Islands	Beaches	Submerged Aquatic Vegetation (SAV)	Terrestrial, Coastal, and Riparian Habitat	Nearshore Benthic Communities	Oysters	Pelagic Microfaunal Communities	Sargassum	Finfish			Sea Turtles	Marine Mammals	Birds	Terrestrial Wildlife
			Groundwater	Surface Water	Nearshore Coastal Environment	Offshore Marine Environment										Demersal Fish	Pelagic Fish	Diadromous and Freshwater Fish				
<ul style="list-style-type: none"> Employment of standard BMPs for construction to reduce erosion, stormwater runoff, transport of soil into receiving waters, or disturbance of sediment. 	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Employment of temporary erosion controls prior to any land clearing or land disturbance on the project site, which would be monitored during construction to ensure proper function. Turbidity curtains, hay bales, and erosion mats would be used where appropriate. 	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Confinement of vegetation removal and soil disturbance would be to the minimum area and the minimum length of time necessary to complete the action. 	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Site work stoppage under high flows or seasonal conditions that threaten to damage erosion and sediment control measures, except where efforts are aimed at avoiding or minimizing resource damage. 	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Maintenance of generators, cranes, and any other stationary equipment operated within 150 feet of any natural or wetland area as necessary to prevent leaks and spills from entering the water. 			X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Development and implementation of spill prevention and control plans to minimize the risk of releasing petroleum and oil products to receiving waters. 			X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Management of hazardous material generated, used, or stored onsite in accordance with Federal and State regulations, including notification of proper authorities. 	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Application of herbicide during land-based activities would be in accordance with the direction and guidance provided on the appropriate Environmental Protection Agency (EPA) labels. 			X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Cleaning of construction equipment before moving between sites to prevent spread of invasive species 							X	X	X	X	X	X	X					X	X	X	X	X

Table 6A-1. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to Natural Resources

Potential Mitigation Measures	Geology and Substrates		Hydrology and Water Quality				Habitats					Living Coastal and Marine Resources										
	Upland Geology and Substrates	Nearshore Geology and Substrates	Freshwater Environments		Saltwater Environment Fish Resources		Wetlands	Barrier Islands	Beaches	Submerged Aquatic Vegetation (SAV)	Terrestrial, Coastal, and Riparian Habitat	Nearshore Benthic Communities	Oysters	Pelagic Microfaunal Communities	Sargassum	Finfish			Sea Turtles	Marine Mammals	Birds	Terrestrial Wildlife
			Groundwater	Surface Water	Nearshore Coastal Environment	Offshore Marine Environment										Demersal Fish	Pelagic Fish	Diadromous and Freshwater Fish				
<ul style="list-style-type: none"> Identification of mooring locations for restoration-related barges and other boats to best avoid EFH and minimize damage to existing healthy reefs or adjacent SAV beds. 							X	X	X	X	X		X	X		X	X	X	X	X		
<ul style="list-style-type: none"> Creation, as feasible, of a stockpile of topsoil; native channel material; and large, mature native trees and shrubs for reuse in the restoration process. 	X	X						X	X		X							X		X	X	
<ul style="list-style-type: none"> Upon completion of construction activities, all disturbed areas would be restored as necessary to allow habitat functions to return. 	X	X	X	X	X		X	X	X	X	X		X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Temporal (e.g., time-of-year, seasonal) restrictions for construction activities applicable to protection of Federally listed threatened and endangered species, EFH, diadromous fish species, SAV, or other natural resources could be employed to avoid impacts. 							X	X	X	X	X		X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Fueling, maintenance, and storage of construction vehicles and equipment within a designated vehicle staging area removed from any natural surface water resource or wetland. Vehicles and equipment would be inspected daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking. 			X	X	X		X	X	X	X	X	X	X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> Conducting preconstruction surveys for the presence of sensitive natural and cultural resources. 							X	X	X	X	X			X		X	X	X	X	X	X	X
<ul style="list-style-type: none"> Installation of protective buffers around sensitive wetlands, surface waters, and wildlife habitat. At a minimum, flagging or fencing sensitive resource areas adjacent to the action area would be employed to avoid accidental impacts. 				X	X		X	X	X	X			X			X	X	X	X	X	X	X
<ul style="list-style-type: none"> The use of an appropriate assemblage of species native to the action area or region, including trees, shrubs, and herbaceous species, would be used in the re-vegetation and restoration processes. 							X	X	X	X	X					X	X	X	X	X	X	X
<ul style="list-style-type: none"> Performing exploratory trenching 																						

Table 6A-1. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to Natural Resources

Potential Mitigation Measures	Geology and Substrates		Hydrology and Water Quality				Habitats					Living Coastal and Marine Resources										
	Upland Geology and Substrates	Nearshore Geology and Substrates	Freshwater Environments		Saltwater Environment Fish Resources		Wetlands	Barrier Islands	Beaches	Submerged Aquatic Vegetation (SAV)	Terrestrial, Coastal, and Riparian Habitat	Nearshore Benthic Communities	Oysters	Pelagic Microfaunal Communities	Sargassum	Finfish			Sea Turtles	Marine Mammals	Birds	Terrestrial Wildlife
			Groundwater	Surface Water	Nearshore Coastal Environment	Offshore Marine Environment										Demersal Fish	Pelagic Fish	Diadromous and Freshwater Fish				
<ul style="list-style-type: none"> During all phases of the project, keeping equipment and vehicles within the limits of the initially disturbed areas. In addition, use existing roads to the maximum extent feasible to avoid additional surface disturbance. 							X			X						X	X	X				
<ul style="list-style-type: none"> Restoration activities could utilize the Secretary of the Interior’s Standards for the Treatment of Historic Properties. Archeological deposits should be avoided or excavated, analyzed, and curated with the proper State or Federal repository. 																						
<ul style="list-style-type: none"> Construction workers and volunteers employed in the projects associated with restoration techniques would be adequately trained to ensure that impacts are minimized. Training may include but may not be limited to: understanding impacts to transportation and energy infrastructure. 																						
<ul style="list-style-type: none"> Local companies should try to work with project leads to establish construction work times that overlap with off season tourism schedules. 																						

Table 6A-2. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to the Human Environment.

Potential Mitigation Measures	Socio-economics		Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreation Use						Fisheries		Marine Transportation	Aesthetics and Visual	Public Health and Safety	Noise	Air Quality and Greenhouse Gases
	Demographics	Regional Economy				Wildlife Observation	Hunting	Beach and Waterfront	Boating	Recreational Fishing and Stock Enhancement	Tourism	Commercial Fisheries, Processing, and Sales	Aquaculture, Processing, and Sales (and Shellfish Leases)					
<ul style="list-style-type: none"> Tilling of compacted soil areas to reduce hardening. 																		
<ul style="list-style-type: none"> Use of existing access ways whenever possible. Temporary access roads would not be built in locations that would suggest a likelihood of excessive erosion (e.g., large slopes, erosive soils, proximity to water body). All temporary access roads would be restored when the action is completed, the soil would be stabilized, and the site would be re-vegetated. Temporary roads in wet or flooded areas would be restored shortly after the work period was complete. 			X											X	X			X
<ul style="list-style-type: none"> Selection and operation of heavy equipment to minimize adverse effects to the environment (e.g., minimally-sized, low-pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils). 														X				X
<ul style="list-style-type: none"> To the extent feasible, heavy equipment would work from the top of the bank, unless work from another location would result in less habitat disturbance. 						X	X	X										
<ul style="list-style-type: none"> Temporary stabilization of areas of upland soil disturbance by sediment and erosion control practices during construction, and re-vegetation with appropriate native species following construction. 						X	X	X						X	X			X
<ul style="list-style-type: none"> When local conditions indicate the presence of contaminated soils/sediments is likely, soil samples would be tested for contaminant levels, and precautions would be taken to avoid disturbance of or provide for proper disposal of contaminated soils/sediments. 	•														X			
<ul style="list-style-type: none"> Prior to dredging, methods will be evaluated to reduce the potential for impacts from turbidity. 	•								X		X	X						
<ul style="list-style-type: none"> Seasonal rainfall will be factored into the construction timeline to reduce ground disturbance during raining or flood seasons. 	•								X		X	X			X			
<ul style="list-style-type: none"> Employment of standard BMPs for construction to reduce erosion, stormwater 	•		X			X	X	X	X		X	X		X	X			

Table 6A-2. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to the Human Environment.

Potential Mitigation Measures	Socio-economics		Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreation Use						Fisheries		Marine Transportation	Aesthetics and Visual	Public Health and Safety	Noise	Air Quality and Greenhouse Gases
	Demographics	Regional Economy				Wildlife Observation	Hunting	Beach and Waterfront	Boating	Recreational Fishing and Stock Enhancement	Tourism	Commercial Fisheries, Processing, and Sales	Aquaculture, Processing, and Sales (and Shellfish Leases)					
runoff, transport of soil into receiving waters, or disturbance of sediment.																		
<ul style="list-style-type: none"> • Employment of temporary erosion controls prior to any land clearing or land disturbance on the project site, which would be monitored during construction to ensure proper function. Turbidity curtains, hay bales, and erosion mats would be used where appropriate. 	•		X			X	X	X		X		X	X		X	X		
<ul style="list-style-type: none"> • Confinement of vegetation removal and soil disturbance would be to the minimum area and the minimum length of time necessary to complete the action. 			X	X		X	X	X							X	X		
<ul style="list-style-type: none"> • Site work stoppage under high flows or seasonal conditions that threaten to damage erosion and sediment control measures, except where efforts are aimed at avoiding or minimizing resource damage. 				X		X	X	X							X	X		
<ul style="list-style-type: none"> • Maintenance of generators, cranes, and any other stationary equipment operated within 150 feet of any natural or wetland area as necessary to prevent leaks and spills from entering the water. 						X	X	X			X	X		X	X			X
<ul style="list-style-type: none"> • Development and implementation of spill prevention and control plans to minimize the risk of releasing petroleum and oil products to receiving waters. 						X	X	X		X		X		X	X			
<ul style="list-style-type: none"> • Management of hazardous material generated, used, or stored onsite in accordance with Federal and State regulations, including notification of proper authorities. 															X			X
<ul style="list-style-type: none"> • Application of herbicide during land-based activities would be in accordance with the direction and guidance provided on the appropriate Environmental Protection Agency (EPA) labels. 															X			
<ul style="list-style-type: none"> • Cleaning of construction equipment before moving between sites to prevent spread of invasive species 						X	X	X						X				
<ul style="list-style-type: none"> • Identification of mooring locations for restoration-related barges and other boats to best avoid EFH and minimize damage to existing healthy reefs or adjacent SAV 						X	X	X		X		X	X					

Table 6A-2. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to the Human Environment.

Potential Mitigation Measures	Socio-economics		Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreation Use						Fisheries		Marine Transportation	Aesthetics and Visual	Public Health and Safety	Noise	Air Quality and Greenhouse Gases
	Demographics	Regional Economy				Wildlife Observation	Hunting	Beach and Waterfront	Boating	Recreational Fishing and Stock Enhancement	Tourism	Commercial Fisheries, Processing, and Sales	Aquaculture, Processing, and Sales (and Shellfish Leases)					
beds.																		
<ul style="list-style-type: none"> Creation, as feasible, of a stockpile of topsoil; native channel material; and large, mature native trees and shrubs for reuse in the restoration process. 																		
<ul style="list-style-type: none"> Upon completion of construction activities, all disturbed areas would be restored as necessary to allow habitat functions to return. 						X	X	X						X	X			
<ul style="list-style-type: none"> Temporal (e.g., time-of-year, seasonal) restrictions for construction activities applicable to protection of Federally listed threatened and endangered species, EFH, diadromous fish species, SAV, or other natural resources could be employed to avoid impacts. 						X	X	X		X	X							
<ul style="list-style-type: none"> Fueling, maintenance, and storage of construction vehicles and equipment within a designated vehicle staging area removed from any natural surface water resource or wetland. Vehicles and equipment would be inspected daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking. 															X			
<ul style="list-style-type: none"> Conducting preconstruction surveys for the presence of sensitive natural and cultural resources. 			X			X								X				
<ul style="list-style-type: none"> Installation of protective buffers around sensitive wetlands, surface waters, and wildlife habitat. At a minimum, flagging or fencing sensitive resource areas adjacent to the action area would be employed to avoid accidental impacts. 						X	X	X		X	X				X			
<ul style="list-style-type: none"> The use of an appropriate assemblage of species native to the action area or region, including trees, shrubs, and herbaceous species, would be used in the re-vegetation and restoration processes. 						X	X							X				
<ul style="list-style-type: none"> Cultural resource monitoring of construction in the vicinity of the development 			X													X	X	X
<ul style="list-style-type: none"> Conducting records searches to determine the presence of known archaeological sites and historic structures within the area of potential effect. Identify the need for an archaeological and/or architectural survey. Conduct a survey, if needed. 			X	X														

Table 6A-2. Potential Site-Specific and Construction Mitigation Measures and BMPs: Benefits to the Human Environment.

Potential Mitigation Measures	Socio-economics		Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreation Use						Fisheries		Marine Transportation	Aesthetics and Visual	Public Health and Safety	Noise	Air Quality and Greenhouse Gases
	Demographics	Regional Economy				Wildlife Observation	Hunting	Beach and Waterfront	Boating	Recreational Fishing and Stock Enhancement	Tourism	Commercial Fisheries, Processing, and Sales	Aquaculture, Processing, and Sales (and Shellfish Leases)					
<ul style="list-style-type: none"> During all phases of the project, keeping equipment and vehicles within the limits of the initially disturbed areas. In addition, use existing roads to the maximum extent feasible to avoid additional surface disturbance. 			X			X	X	X						X	X			
<ul style="list-style-type: none"> Restoration activities could utilize the Secretary of the Interior’s Standards for the Treatment of Historic Properties. Archeological deposits should be avoided or excavated, analyzed, and curated with the proper State or Federal repository. 			X															
<ul style="list-style-type: none"> Construction workers and volunteers employed in the projects associated with restoration techniques would be adequately trained to ensure that impacts are minimized. Training may include but may not be limited to: understanding impacts to transportation and energy infrastructure. 			X	X	X	X	X	X	X		X	X	X		X	X	X	
<ul style="list-style-type: none"> Local companies should try to work with project leads to establish construction work times that overlap with off season tourism schedules. 		X								X								
<ul style="list-style-type: none"> Local companies and workforces should be used for construction or implementation the project if possible to support local economic benefits. 		X																
<ul style="list-style-type: none"> Vocational training for out-of-work fisheries workers 		X									X	X						

Chapter 6 Appendix 6-B: Additional Past, Present, and Reasonably Foreseeable Future Actions

The following tables describe additional actions or programs considered as part of the ERP-PEIS cumulative impact analysis. The tables are organized by the category of actions being evaluated.

Table 6B-1. Example Habitat Conservation and Protection Programs in the Gulf Coast Region

FEDERAL OR FEDERAL/STATE/LOCAL PARTNERSHIP ACTIVITIES	
The National Marine Sanctuaries	<ul style="list-style-type: none"> Two sanctuaries are located in the Gulf of Mexico: Flower Garden Banks, which includes 36,000 acres of waters offshore of Texas and Louisiana, and the 2900 square mile area in the Florida Keys.
The National Wildlife Refuge System	<ul style="list-style-type: none"> 36 National Wildlife Refuges are located within the coastal areas of the Gulf of Mexico. No new National Wildlife Refuges have been proposed in the Gulf of Mexico proposed planning area.
National Estuarine Research Reserves	<ul style="list-style-type: none"> Federal and State partnerships. Past actions have included the establishment of four estuarine research reserves in the Gulf of Mexico area from Texas to Tampa Bay. There are no known future nominated estuaries planned for the National Estuarine Research Reserves in the Gulf of Mexico.
Gulf of Mexico Marine Protected Areas (MPAs) (State and Federal)	<ul style="list-style-type: none"> There are approximately 295 MPAs located within the Gulf of Mexico region, covering nearly 40 percent of the Gulf of Mexico U.S. marine waters. MPAs by jurisdiction include 19 in Texas, 17 in Louisiana, 21 in Mississippi, 7 in Alabama, 217 in Florida, and 33 in Federal Waters.
USDA NRCS Wetlands Reserve Program (WRP)	<ul style="list-style-type: none"> The WRP is one of the largest private lands wetland restoration and easement programs in the U.S.
USDA Conservation Reserve Program (CRP)	<ul style="list-style-type: none"> The CRP is the largest private lands buffer and conservation cover rental contract program in the U.S. Annual enrolled acreage for 2012 (USDA 2012): <ul style="list-style-type: none"> o Texas: 3.3 million acres o Louisiana: 325,174 acres o Mississippi: 829,056 acres o Alabama: 360,489 acres o Florida: 51,966 acres
USDA Grassland Reserve Program (GRP)	The GRP is jointly administered by the Farm Service Agency and the Natural Resources Conservation Service to protect and enhance working grazing lands, grasslands and rangelands through rental contracts and conservation easements.
USDA NRCS Farm and Ranch Land Protection Program (FRPP)	The FRPP provides funding to eligible States, Indian tribes, and non-governmental organizations for purchase of conservation easements to protect agricultural use and related conservation values of eligible land by limiting nonagricultural uses of that land.
USDA NRCS Environmental Quality Incentives Program (EQIP)	<ul style="list-style-type: none"> EQIP provides financial and technical assistance to farmers and ranchers in order to improve water and air quality, conserve ground and surface water resources, reduce soil erosion and sedimentation, and improve or create wildlife habitat.
USDA NRCS Wildlife Habitat Incentives Program (WHIP)	<ul style="list-style-type: none"> WHIP provides financial and technical assistance to wildlife-minded landowners and producers who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.

FEDERAL OR FEDERAL/STATE/LOCAL PARTNERSHIP ACTIVITIES	
The National Park System	<ul style="list-style-type: none"> National Park Service lands along the coast or in coastal areas of the Gulf of Mexico include the Everglades National Park, Big Cypress National Preserve, Dry Tortugas National Park, Padre Island National Seashore, Gulf Islands National Seashore, Palo Alto Battlefield National Historical Park, Jean Lafitte National Historic Park, New Orleans Jazz National Historical Park, and DeSoto National Memorial.
NOAA Coastal and Estuarine Land Conservation Program	<ul style="list-style-type: none"> The Coastal and Estuarine Land Conservation Program grants to Gulf of Mexico State agencies and local governments to acquire property or conservation easements in the coastal zone or coastal watershed.
USFWS ESA Recovery/Habitat Plans	<ul style="list-style-type: none"> As part of the recovery plans for some ESA listed species Critical Habitat has been designated as described in chapter 3. FWS Habitat Conservation programs including : Endangered Species Grants, Partners for Fish and Wildlife, the Coastal Program; the National Coastal Wetlands Conservation Grant Program; North American Wetlands Conservation Grants, Fish Passage Program; and National Fish Habitat Partnerships.
MSFCA EFH Fishery Management Plans	<ul style="list-style-type: none"> EFH has been designated for 55 fish and shellfish species in the Gulf of Mexico. Habitat Areas of Particular Concern (HAPCs) have been defined for some of these designations.
North American Bird Conservation Initiative - Bird Conservation Regions	<ul style="list-style-type: none"> The North American Bird Conservation Initiative strategy is to foster coordination and collaboration on key issues of concern, including bird monitoring, conservation design, private lands, international collaboration, and State and Federal agency support for integrated bird conservation. Five NABCI BCRs overlap the area of the northern Gulf of Mexico as described in chapter 3 of this Draft PEIS.

STATE ACTIVITIES	
Texas	<ul style="list-style-type: none"> • Texas Coastal Management Program; Texas Land and Water Resources Conservation and Recreation Plan; Texas Prairie Wetlands Project; Texas Wetland Conservation Plan; Water for Texas (2012 State Water Plan); Texas 2011 Regional Water Plans; Texas Parks and Wildlife Conservation Programs; Seagrass Conservation Plan for Texas; and the Coastal Erosion Protection Planning and Response Act Program are active coastal and land protection programs.
Louisiana	<ul style="list-style-type: none"> • Louisiana’s 2012 Comprehensive Master Plan for a Sustainable Coast guides all coastal restoration and hurricane protection efforts.
Mississippi	<ul style="list-style-type: none"> • Coastal Preserves Program works to protect sensitive coastal habitats using Tidelands Trust Funds to acquire coastal areas. The Mississippi Coastal Improvement Program provides resources to address storm damage, saltwater intrusion, erosion, fish and wildlife, and other purposes. Other efforts include: Mississippi Comprehensive Resource Management Plan and Mississippi’s Vision for Gulf Coast Recovery, Restoration, and Protection.
Alabama	<ul style="list-style-type: none"> • Through the Forever Wild Program, and other programs, the Alabama has invested in land protection around the Mobile-Tensaw River delta. Other projects that are likely to be implemented are identified in the Coastal Recovery Commission of Alabama’s Roadmap to Resilience
Florida	<ul style="list-style-type: none"> • Florida Forever program has protected 294,930 acres of functional wetlands, as part of its 9.9 million acres of conservation lands protected.
Private and Non-governmental Conservation Easements—Past to 2010 (Conservation Registry 2012)	
Texas	<ul style="list-style-type: none"> • Total of 260,000 acres including Ducks Unlimited holdings of 211,052 acres.
Louisiana	<ul style="list-style-type: none"> • Total of 363,000 acres including holdings of The Nature Conservancy which is one of the largest landowners.
Mississippi	<ul style="list-style-type: none"> • Total of 294,000 acres including Ducks Unlimited holdings of 289,000 acres.
Alabama	<ul style="list-style-type: none"> • Total of 71,000 acres including Alabama Land Trust holdings of 23,000 acres.
Florida	<ul style="list-style-type: none"> • Total of 483,000 acres including Southwest Florida Water Management District holdings of 53,187 acres.

Table 6B-2 below describes many of the Federal, State, and local projects and programs related to habitat restoration that have occurred in the past and present, and are expected to continue into the future. Because of the number of individual restoration projects that are implemented through these programs, major agency or non-governmental programs have been described generically. These many and various types of restoration programs and thousands of projects they compose are implemented at many different scales and in accordance with the various programs, authorities, and bodies that enable restoration activities.

Table 6B-2. Example Restoration Programs in the Gulf Coast Region

FEDERAL ACTIVITIES	
Coastal Impact Assistance Program (CIAP)	<ul style="list-style-type: none"> The CIAP provides funding to the six OCS oil- and gas-producing states – Alabama, Alaska, California, Louisiana, Mississippi and Texas – for the conservation, protection and preservation of coastal areas, including wetlands. Each State has an approved plan for implementing appropriations.
The National Estuary Program	<ul style="list-style-type: none"> The National Estuary Program provides focused management to benefits habitats, water quality, and other desired resource management objectives for: Coastal Bend Bays and Estuaries, Corpus Christi Bay, Galveston Bay, Barataria-Terrebonne Estuarine Complex, Mobile Bay, Tampa Bay, Sarasota Bay, and Charlotte Harbor.
USDA NRCS Gulf of Mexico Initiative (GOMI)	<ul style="list-style-type: none"> NRCS delivers voluntary financial and easement assistance through existing conservation programs in 16 priority watersheds in the Gulf of Mexico watershed. GOMI objectives are to improve water quality, increase water conservation and enhance wildlife habitat within watersheds draining into the Gulf of Mexico through long-term contracts with private landowners would result in implementation of a wide range of conservation practices and land protection easements.
USDA NRCS Migratory Bird Habitat Initiative	<ul style="list-style-type: none"> The Migratory Bird Habitat Initiative was established in response to the Deepwater Horizon disaster to provide immediate food and critical habitat for bird populations potentially impacted by the spill.
USDA Farm Bill Conservation Programs (non-easement)	<ul style="list-style-type: none"> A number of USDA programs and projects have been implemented in the Gulf of Mexico region to address resource concerns, including wildlife habitat, water quality and quantity, soil quality, and other resource concerns.
USFWS State Wildlife Grants	<ul style="list-style-type: none"> USFWS administers several grant programs to support wildlife restoration benefiting Gulf of Mexico ecosystems. USFWS has provided funding to all Gulf states.
Gulf of Mexico Community-Based Restoration Program	<ul style="list-style-type: none"> The Gulf of Mexico Community-Based Restoration Program is a multi-year, regional partnership between the Gulf of Mexico Foundation, the NOAA CRP, the EPA Gulf of Mexico Program, and the Gulf States and Caribbean Territories. The purpose of this partnership is to strengthen the conservation efforts of the NOAA CRP and EPA Gulf of Mexico Program by supporting on-the-ground restoration activities and fostering local stewardship of ecologically significant areas.
USACE Programs	<ul style="list-style-type: none"> The Water Resource Development Act authorizes USACE to plan and establish wetland areas as part of an authorized water resources development project. The Mississippi Coastal Improvement Program was established by USACE after Hurricane Katrina. The program is comprehensive, consisting of structural, non-structural, and environmental improvement projects for coastal Mississippi. The Northern Gulf of Mexico Regional Sediment Management Plan and Projects addresses restoration and sediment management at a regional scale.
State And Regional Activities	
State and Regional Invasive Species Management Activities	<ul style="list-style-type: none"> Invasive species have been the focus of a number of efforts, including: Southeast Aquatic Resource Partnership, Gulf and South Atlantic Regional Panel on Aquatic Invasive Species, Aquatic Nuisance Species Task Force, and National Invasive Species Council.
Texas	<ul style="list-style-type: none"> Oyster restoration efforts in Galveston Bay are underway to address siltation and destruction of oyster beds due to hurricane impacts. Seagrass Conservation Plan for Texas and the Coastal Erosion Protection Planning and Response Act Program are also active coastal restoration/conservation programs. Other restoration priorities and projects being implemented in Texas include—40 miles of breakwaters along Bolivar Peninsula, freshwater inflow and saltwater intrusion initiatives, water quality initiatives in priority watersheds associated with bay ecosystems (e.g., Galveston, San Antonio, Nueces, and Laguna Madre and Aransas Bays.

FEDERAL ACTIVITIES	
Louisiana	<ul style="list-style-type: none"> • Louisiana’s 2012 Comprehensive Master Plan for a Sustainable Coast (“Master Plan”) represents fundamental state policy with regards to coastal planning and restoration. It was drafted following extensive technical and public input and consultation and includes a suite of restoration and protection measures designed to achieve a sustainable and resilient coastal landscape and to protect Louisiana’s coastal resources from inundation. • The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) and the Louisiana Coastal Wetlands Conservation and Restoration Task Force—a State and Federal partnership—has authorized over 185 projects since its inception representing over 133,000 acres of coastal wetland restoration. A total of 93 projects have been completed, representing 80,000 acres. CWPPRA will implement 91 projects, representing 53,000 acres in the foreseeable future. • LDWF cultch planting ongoing since 1917. Since the initiation of the program, LDWF has placed over 1.5 million cubic yards of cultch material on nearly 30,000 acres. • Other Federal statewide efforts include the Louisiana Coastal Area Near-Term Plan and CPRA’s Annual Plans. CPRA’s Mississippi River Hydrodynamic and Delta Management Studies authorized through USACE Water Resources Development will address water and sediment management on the Mississippi River. Other restoration actions may be funded through CIAP and/or state surplus dollars.
Mississippi	<ul style="list-style-type: none"> • Mississippi Coastal Improvement Program provides resources to address storm damage, saltwater intrusion, erosion, fish and wildlife, and other purposes. Fifteen “interim” projects were funded following Hurricane Katrina. Mississippi Coastal Improvement Program has developed a comprehensive program for coastal restoration and protection, especially focused on barrier islands. • In 2009, USACE funded barrier island and other restoration activities. A regional Sediment Management Master Plan is in development to address Gulf barrier island restoration.
Alabama	<ul style="list-style-type: none"> • State of Alabama is focused on barrier island restoration. Restore Coastal Alabama Project will restore 100 miles of oyster reefs and over 1000 acres of coastal marsh and seagrass beds. Community-based oyster and marsh restoration projects with non-governmental organizations are also underway. Future efforts include the implementation of an Alabama Coastal Resiliency Plan.
Florida	<ul style="list-style-type: none"> • Florida’s Comprehensive Everglades Restoration Plan contributes to Gulf of Mexico restoration efforts. Other programs include Coastal Wildlife Conservation Initiative to address native wildlife and coastal ecosystems and the Statewide Beaches Habitat Conservation Plan led by the Florida Department of Environmental Protection.

FEDERAL ACTIVITIES	
Example Regional Restoration Planning Efforts	
Gulf of Mexico Foundation: Community Based Restoration Partnership	<ul style="list-style-type: none"> ● Gulf of Mexico Foundation has administered the program, managing over 75 restoration projects throughout the Gulf and Caribbean. Example projects include: <ul style="list-style-type: none"> <u>2012 Community Based Restoration Partnership Projects</u> <ul style="list-style-type: none"> ○ Bon Secour Shoreline and Habitat Restoration ○ Galt Preserve Restoration ○ Restoring Coral Reefs with in-situ Nursery Techniques <u>2011 Community Based Restoration Partnership Projects</u> <ul style="list-style-type: none"> ○ Oyster Reef Restoration in the Texas Coastal Bend ○ Elmer’s Island Community-led Restoration ○ Habitat Restoration in Mobile Bay ○ Enhancement of mangrove shorelines in Clam Bayou ○ Newman Branch Creek Phase II Restoration
NFWF	<ul style="list-style-type: none"> ● NFWF has supported over 450 projects in the Gulf of Mexico with a total value of more than \$128 million (NFWF 2012)
The Gulf Coast Joint Venture	<ul style="list-style-type: none"> ● The Gulf Coast Joint Venture is a partnership among Federal and State Agencies, non-profit organizations, and private landowners dedicated to the conservation of priority bird habitat along the U.S. Gulf of Mexico coast. Habitat projects are developed and implemented by 5 regional Initiative Teams of biologists and managers of public and private lands. The Gulf Coast Joint Venture partners include numerous other organizations and hundreds of individuals that are involved in specific collaborative habitat, planning or evaluation projects.

Water Quality Improvement Programs

Table 6B-3 describes many of the Federal, State, and local projects and programs that protect and restore Gulf of Mexico water quality. The programs listed are only representative of efforts being undertaken throughout the MSR and other tributaries to the Gulf of Mexico. In particular, the states outside of the study area but contributing to these waters are implementing programs similar in scope and magnitude to those described below.

Table 6B-3. Example Regulatory and Voluntary Programs to Improve Water Quality in the Gulf Coast Region

USEPA	<ul style="list-style-type: none"> • Vessel emission control in the Gulf of Mexico - emission standards to reduce the environmental impact from marine spark-ignition engines and vessels by requiring manufacturers to control exhaust emissions from fuel tanks and fuel lines. • Mercury Reduction to Gulf of Mexico - Mercury and Air Toxics Standards for power plants to limit mercury, acid gas, and other pollution from power plants. • Targeting Clean Water section 319 programs in 2015 to regional landscape initiatives, such as the MSR and the Gulf of Mexico, as States develop comprehensive strategies for reducing nitrogen and phosphorus pollution. • Proposed targeted reductions of atmospheric deposition for mercury, sulfur, nitrogen, and other pollutants to U.S. waters, including the Gulf of Mexico.
Hypoxia Task Force Action Plan	<ul style="list-style-type: none"> • Implementation of comprehensive nutrient and phosphorus reduction strategies for States in the Mississippi and Atchafalaya River Basin.
National Ocean Policy Implementation Plan	<ul style="list-style-type: none"> • National Ocean Council with NOAA, USDA, USGS, and Hypoxia Task Force members propose identification of collaborative measures with regional partnerships to improve water quality in the Gulf of Mexico in 2012; • MSR interagency monitoring, modeling, and assessment partnership to be established in 2013; • With interested States, MSR proposed the collaborative development and implementation of state-wide nitrogen and phosphorus reduction strategies in the MSR and Gulf region in 2014.
USDA NRCS	<ul style="list-style-type: none"> • The Migratory Bird Habitat Initiative was established in response to the Deepwater Horizon disaster to provide immediate food and critical habitat for bird populations potentially impacted by the spill. • Nutrient Management Implementation--28 million acres of land have come under nutrient management systems within the MSR since 2000, including 4 million acres added in Fiscal Year 2009 and 2010. • Soil Erosion Control--Conservation practices were applied to 34 million acres of land for erosion control from Fiscal 2005 to Fiscal 2010, including 10 million acres in Fiscal 2009 and 2010.
USACE	<ul style="list-style-type: none"> • Steele Bayou Project-Mississippi - flood control/sediment reduction project in the MSR watershed in which sediment control and water management practices were installed including eight low-head weirs to maintain minimum water depths in the channels and 67 sediment control structures to prevent sediment from filling the channels.
Louisiana-Nutrient Discharge Reductions	<ul style="list-style-type: none"> • Louisiana Department of Environmental Quality works with industries and municipalities along the Mississippi River to reduce nutrient discharges
Mississippi State Nutrient Reduction Strategy and Delta Farmers	<ul style="list-style-type: none"> • The Mississippi Department of Environmental Quality participates with the State Nutrient Reduction Strategy Work Group, to develop a consistent approach among MSR States to reduce nutrient loadings to the Gulf. The Mississippi Department of Environmental Quality is co-leading an effort with Delta Farmers Advocating Resource Management to develop a nutrient reduction strategy for the Delta region of Mississippi. • Mississippi/Gulf of Mexico Watershed Nutrient Task Force is working to address statewide nutrient reduction and upper-basin information and technology exchange.
Florida Numerical Nutrient Limits	<ul style="list-style-type: none"> • Authorized by the Watershed Restoration Act 1999, Florida is implementing nutrient reduction strategies through its total maximum daily load program and setting numerical nutrient limits on the amount of allowable nutrients that can be discharged into State waters.

GOMA, Alabama, Florida, Louisiana, Mississippi, and Texas Nutrient Reduction Strategies	<ul style="list-style-type: none"> • States and the GOMA to develop and implement State nutrient reduction frameworks to restore local water quality conditions.
Non-Governmental Organizations	<ul style="list-style-type: none"> • Mississippi River Water Quality Collaborative sponsored by the McKnight Foundation brings together representatives from more than 20 non-governmental organizations from states along the Mississippi River corridor to explore strategies for comprehensive, river-wide water quality improvements. • Lower Mississippi River Conservation Committee, Lower Mississippi River Aquatic Resource Management Plan, a 10-year operational plan to address the primary factors adversely affecting aquatic resources in the river's active floodplain and backwater areas • Ducks Unlimited, • The Conservation Fund, • The Nature Conservancy; • Louisiana Environmental Action Network, • Tennessee Clean Water Network, • Iowa Environmental Council, • Minnesota Center for Environmental Advocacy; • Mississippi River Basin Alliance
International Water Quality Projects	<ul style="list-style-type: none"> • North American Emissions Control Area-2010 to control marine vessel pollution in international waters.

Other Cumulative Actions

Table 6B-4. Example Military Activities and Projects in the Gulf Coast Region

INSTALLATION	ACTIVITY
Eglin Air Force Base, Pensacola, Florida	<ul style="list-style-type: none"> • Installation of a fiber optic cable between Eglin and Santa Rosa Island • Three new missions resulting from BRAC 2005 realignment; 59 F-35 Primary Assigned Aircraft and associated cantonment construction and limited flight training operations added under the Record of Decision in 2008 (United States Air Force 2009) • More than 50 planned Military Construction projects beyond FY 2010 with approximately 2 million square feet (Eglin Air Force Base Development Plan)
Hurlburt Field, Eglin Complex, Florida	<ul style="list-style-type: none"> • Selected as preferred location for future receipt of a 140-person Air Force Reserve MQ-1 Predator squadron that would provide intelligence, surveillance, reconnaissance and precision-strike capability for joint force commanders • More than 50 transportation and capital improvement projects at Hurlburt Field over 2011-2016; \$24 million in construction and maintenance projects in FY 2012 (Hurlburt Field 2012)
Naval Air Station Pensacola, Florida	<ul style="list-style-type: none"> • Potential decrease in Pensacola area jobs of about 3,784 through BRAC 2005 recommendations that realign and consolidate commands; • New training aircraft arrivals through 2020 may require operational and facility changes, including longer runways, new overlays, taxiways, parking aprons and updated operational training space. • Addition of fleet aircraft and missions would intensify the number of flight operations (Escambia County 2003)
BRAC 2005 Recommendations Naval Air Station Corpus Christi, Texas	<ul style="list-style-type: none"> • Reduction of jobs through realignment and consolidation of commands; general and supporting new construction and facility upgrades required (BRAC 2012)
Naval Air Station Ingleside, Texas	<ul style="list-style-type: none"> • Base closure under BRAC 2005; main property will revert to Port of Corpus Christi Authority; • Electromagnetic Reduction Facility available for re-use – potential for construction of a marine business park and marina (U.S. Department of the Navy 2010)
Naval Support Area, Panama City, Florida	<ul style="list-style-type: none"> • The Naval Support Area is expected to continue to expand in the future as the number of classes and students increases with increasing modernization of naval forces, advances in technology and as modern warfare increases research, design, testing and evaluation activities projects. Naval Support Area Panama City uses nine federally designated U.S. Navy Restricted Areas in St. Andrew Bay for near-shore, open water operations along with additional training areas in the Gulf of Mexico. (Bay County 2009).
Operating Training Area	<ul style="list-style-type: none"> • Military activities that occur within the Gulf of Mexico waters can result in impacts to marine mammals, sea turtles and other marine fauna although the areas restricted to military use may also function as MPAs when not in use. The U.S. Navy has developed range-complex monitoring plans to provide marine mammal and sea turtle monitoring in compliance with the MMPA and the EPA.

Table 6B-5. Example Shipping and Maritime Port Projects the Gulf Coast Region

Texas	
Brownsville	<ul style="list-style-type: none"> • Lease negotiations with a company based in China to develop a 35-acre site (Port of Brownsville 2012) • Feasibility study on widening and deepening ship channel (USACE 2012; Federal Register 2011)
Galveston	<ul style="list-style-type: none"> • Cruise ship terminal improvements; proposed lease for 185-acre rail access and bulk cargo terminal on Pelican Island (National Council for Public-Private Partnerships 2012; Seaport Press Review 2012) • Galveston – Upper Galveston Bay – dredged material placement Atkinson Island; beach nourishment Galveston (Brown 2011)
Houston	<ul style="list-style-type: none"> • Bayport Container and Cruise Terminal full build out expected in 2030; (Port of Houston Authority 2011) • Pelican Island and Houston Ship Channel Disposal Area Management Practices (Brown 2011) • Beneficial Uses Group Project over 50 years would create 4,250 acres of inter-tidal salt marsh in Galveston Bay; create Evia Island for bird nesting habitat and restore Redfish and Goat Islands (Better Bay 2012)
Port Arthur, Beaumont	<ul style="list-style-type: none"> • Rail yard rehabilitation and construction of a rail spur for intermodal connections (South East Texas Regional Planning Commission 2010)
Port Lavaca-Point Comfort	<ul style="list-style-type: none"> • Expansion of the turning basin, development of a dry bulk unloading dock and the Calhoun Terminal for liquefied natural gas (LNG) (World PortSource 2012).
Freeport	<ul style="list-style-type: none"> • \$400+ million capital investment plan including phased build out of Velasco Terminal and a future multimodal facility (Port of Freeport Texas 2011)
Texas City	<ul style="list-style-type: none"> • Phased development of international terminal on 1000 acres to include six berths and 400 acres of container yard. (City of Texas City n.d.)
Corpus Christi	<ul style="list-style-type: none"> • The Corpus Christi channel improvement project would create nearly 200 acres of shallow-water habitat using dredged material (Port of Corpus Christi 2012).
Maintenance dredging	<ul style="list-style-type: none"> • Corpus Christi Ship Channel, Freeport Harbor, Houston Ship Channel, Galveston and the Gulf Intracoastal Waterway (USACE 2012; Brown 2011)
Louisiana	
New Orleans	<ul style="list-style-type: none"> • Expansion and improvements to cruise ship facilities; proposed mixed use redevelopment including maritime and commercial uses; phased expansion of terminal (Port of New Orleans 2012a; Port of New Orleans 2012b; Port of New Orleans 2011; Port of New Orleans 2007) • Relocation of the France Road and Jourdan Road terminals (Port of New Orleans 2012a)
Plaquemines	<ul style="list-style-type: none"> • Dredged material project to build six bird islands of marsh, shrub/scrub, bare land, and beach habitats that form a chain about 2.5 mi long parallel to the seaward end of the Baptiste Collette Bayou channel. Unconfined dredged material was placed at sub-tidal elevations and was used for restoration of subsided and eroded inter-tidal marsh on the western side of Southwest Pass (Gagliano et al. 2008) • Maintenance dredging Mississippi River outlets at Baptiste Collette Bar • West Pointe a la Hache wetlands project will recreate marsh habitat by harvesting sediment from the Mississippi River (USFWS 2009).
Baton Rouge	<ul style="list-style-type: none"> • Annual harbor dredging at Mississippi River (USACE 2012)

Lake Charles	<ul style="list-style-type: none"> • Biennial maintenance dredging of ship channel (USACE 2012)
Port of South Louisiana	<ul style="list-style-type: none"> • Globalplex Intermodal Terminal redevelopment including 150 acres for expansion (Port of South Louisiana 2011)
Gulf Intracoastal Waterway, Louisiana	<ul style="list-style-type: none"> • Maintenance dredging (USACE 2012)
Mississippi	
Pascagoula	<ul style="list-style-type: none"> • New \$1.1 billion terminal opened in October 2011; upgrading existing facilities (Port of Pascagoula 2012) • Harbor dredged material management plan is in the final approval stage (Port of Pascagoula 2012); widening of the Pascagoula Bar Channel; Bayou Cassotte Channel widening improvements; Pascagoula and Gulfport harbors dredging (USACE 2012)
Biloxi Harbor	<ul style="list-style-type: none"> • Dredged material from maintenance of Biloxi Harbor was used to create approximately 30 acres of tidal marsh on the north shore of the east end of the Deer Island (USACE 2011b; Great Lakes Commission 2010)
Alabama	
Perdido Pass	<ul style="list-style-type: none"> • Maintenance dredging (USACE 2012)
Florida	
Port Manatee	<ul style="list-style-type: none"> • Incentives for development of 5,000 acres adjacent to the port; planning for intermodal container yard development [Florida Seaport and Transportation and Economic Development Council (FSTEDC) 2011] • Dredging and extension of Berth 12 and extension by 584 ft (USACE 2012)
Port Everglades	<ul style="list-style-type: none"> • New cruise terminal constructed. Renovation of 4 other cruise terminals part of a 15-yr agreement with Carnival Cruise lines; new 41-acre container terminal; 30-year lease and operating agreement to develop an intermodal container transfer facility (FSTEDC 2011)
Port of Pensacola	<ul style="list-style-type: none"> • Land available for permanent dredged materials disposal (9 acres) and for future development (8.5 acres)
Port of Tampa	<ul style="list-style-type: none"> • \$100 million improvements including phased expansion of container facilities (two new terminals, expansion of container yard); plans for new product distribution center capacity; upgrading and expanding bulk cargo facilities; expanded cruise service (FSTEDC 2011).
Port of Panama City	<ul style="list-style-type: none"> • Bulkhead maintenance and rehabilitation; general and bulk cargo area expansions; intermodal distribution center (Port of Panama City 2012) • Deepening of channel and berthing areas (Port of Panama City 2012)
Port of Freeport	<ul style="list-style-type: none"> • Deepening and widening (USACE 2012).
Maintenance dredging	<ul style="list-style-type: none"> • Pensacola Harbor Entrance Channel, Port Everglades and Tampa harbors (USACE 2012)
Tampa Bay	<ul style="list-style-type: none"> • Beneficial use placement in the planning stages for USACE projects, including the creation of wetlands and additional bird nesting habitat just south of Bird Island.

Table 6B-6. Example Tourism and Recreation Programs and Initiatives Within the Gulf Coast Region

INCENTIVE PROGRAMS	
Texas	
Texas Nature Tourism Council	<ul style="list-style-type: none"> A council of the Texas Travel Industry Association whose mission is to promote the value of nature tourism in Texas and to educate Texans and visitors about the State's nature tourism resources. The Council also assists and educates businesses, individuals and other entities that provide nature-based tourism services and facilities to the public (Texas Tourism Council 2012).
The Nature Tourism Program of Texas A&M Agrilife Extension	<ul style="list-style-type: none"> Provides educational and training programs, materials and consultations for professionals, landowners and the general public to assist people who are interested in nature tourism as a business enterprise, conservation or community development program (Texas A&M University 2012).
Texas Heritage Trail	<ul style="list-style-type: none"> The Texas Heritage Trail Program an award-winning heritage tourism initiative that encourages communities, heritage regions, and the State to partner and promote historic and cultural resources. Local preservation efforts, combined with statewide marketing of heritage regions as tourism destinations, increase visitation to cultural and historic sites and is based on 10 scenic driving trails including the Gulf Coast Byway, a portion of the Texas Tropical Trail (Texas Historical Commission 2012).
Louisiana	
Louisiana Office of Tourism	<ul style="list-style-type: none"> Louisiana provides grants and opportunities for partnering for tourism promotion within Louisiana to strengthen marketing opportunities (Louisiana Office of Tourism 2012).
Mississippi	
Mississippi Tourism Rebate Program	<ul style="list-style-type: none"> Program for qualifying new tourism projects that allows a portion of the sales tax paid by visitors to the eligible tourism-oriented enterprise project to reimburse eligible costs incurred during the construction of the project. Qualifying projects include tourism attractions, hotels, public golf courses and marinas and resort developments (Visit Mississippi 2011).
Mississippi-Alabama	
Nature Tourism Initiative	<ul style="list-style-type: none"> Tourism initiative for coastal Alabama and Mississippi to evaluate nature-oriented businesses and to provide resources to meet their needs to in order to provide a “quality nature experience for the guests while also encouraging good stewardship and sustainability of the area’s natural resources”. The Mississippi-Alabama Sea Grant Consortium has developed goals and objects for sustainable development including a goal for developing “healthy coastal economies that include working waterfronts, an abundance of recreation and tourism opportunities, and coastal access for all citizens.” (Mississippi-Alabama Sea Grant Consortium 2012)
Florida	
Partnership for Florida’s Tourism	<ul style="list-style-type: none"> A grassroots coalition designed to raise awareness of the importance of tourism and to increase public funding of tourism marketing. The Partnership is comprised of the Florida Restaurant and Lodging Association, Florida Attractions Association, Florida Association of RV Parks and Campgrounds, Florida Association of Destination Marketing Organizations and VISIT FLORIDA (Partnership for Florida’s Tourism 2012).

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CHAPTER 7: INTRODUCTION TO PROPOSED PHASE III EARLY RESTORATION PROJECTS

This chapter provides introductory, overview information about the Phase III Early Restoration projects that are proposed for implementation by the Trustees. The Trustees anticipate that additional projects will be proposed and approved as the Early Restoration process continues. As noted throughout this document, Early Restoration actions are not intended to provide the full extent of restoration needed to make the environment and the public whole for the injuries to natural resources caused by the Spill. Furthermore, after injury assessment activities are complete, there will be additional opportunities for consideration of restoration projects as the NRDA claim development and restoration planning processes move forward. Throughout the restoration process public input and comment will be considered.

To facilitate the public's review and evaluation of the proposed Phase III projects, the remainder of this chapter provides:

- A summary of proposed Phase III projects;
- A general description of the methodologies used to estimate Offsets for the projects;
- A general description of the Trustees' approach to environmental compliance; and
- A brief overview of each proposed project.

Detailed information about each project, as well as project-specific information on affected environments and evaluations of environmental consequences, is provided in Chapters 8-12. Each chapter covers the projects proposed for implementation within each individual Gulf Coast state, including those on federally managed lands within those states.

7.1 Overview of Proposed Phase III Early Restoration Projects

Table 7-1 lists the 44 proposed Phase III projects, identifies the state in which each is located or proximate, and relates each project back to the project type(s) and programmatic alternatives described in Chapter 5.

The Trustees are proposing a set of Phase III Early Restoration projects totaling approximately \$627 million in estimated projects' costs (including contingencies). These projects are being evaluated in this document to permit the Trustees to expeditiously implement any selected projects, and to avoid the delay in implementing any selected projects that would be incurred by evaluating these projects under individual NRDA restoration plans and their supporting individual NEPA analyses. Ecological projects comprise \$396.9 million (63%) of this total, and recreational projects comprise the remaining \$230 million (37%). Within the ecological project category, barrier island restoration accounts for \$318.4 million of estimated project costs, followed by restoration of living shorelines (\$66.6 million), oysters (\$8.6 million), Seagrasses (\$2.7 million) and dune projects (\$0.6 million). Overview information concerning all of the proposed projects is presented in Chapter 7. More detailed project information and environmental analyses for proposed Phase III Early Restoration projects are included in Chapters 8-12 of this document.

In both tables, the proposed projects are organized by state, from west to east within the Gulf. Note that the ultimate decision to select (or not) each individual project for implementation is subject to a consensus decision by all Trustees. Except as otherwise noted in Chapters 8-12, State Trustees will be the lead for project implementation and management of projects located in their states. For example, two of the proposed projects would be implemented on federally managed lands within the boundaries of Florida, and for organizational purposes are included with the Florida projects.

Table 7-1. Proposed Phase III Early Restoration Projects: Relationship to Programmatic Alternatives.

	PROPOSED PROJECT	LOCATION	ALTERNATIVE 4											
			ALTERNATIVE 2									ALTERNATIVE 3		
			CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH
1	Freeport Artificial Reef Project	TX											X	
2	Matagorda Artificial Reef Project	TX											X	
3	Mid/upper Texas Coast Artificial Reef Ship Reef Project ¹	TX											X	
4	Sea Rim State Park Improvements	TX										X	X	
5	Galveston Island State Park Beach Redevelopment	TX										X	X	
6	Louisiana Outer Coast Restoration	LA ²			X									
7	Louisiana Marine Fisheries Enhancement, Research, and Science Center	LA											X	X
8	Mississippi Hancock County Marsh Living Shoreline Project	MS	X	X										
9	Restoration Initiatives at the INFINITY Science Center	MS										X	X	X
10	Popp's Ferry Causeway Park	MS										X	X	X
11	Pascagoula Beach Front Promenade	MS										X	X	
12	Alabama Swift Tract Living Shoreline	AL		X										
13	Gulf State Park Enhancement Project	AL										X	X	X
14	Alabama Oyster Cultch Restoration	AL						X						
15	Beach Enhancement	FL ³											X	

	PROPOSED PROJECT	LOCATION	ALTERNATIVE 4												
			ALTERNATIVE 2									ALTERNATIVE 3			
			CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH	
	Project at Gulf Islands National Seashore														
16	Gulf Islands National Seashore Ferry Project	FL ³											X		
17	Florida Cat Point Living Shoreline Project	FL	X	X											
18	Florida Pensacola Bay Living Shoreline Project	FL	X	X											
19	Florida Seagrass Recovery Project	FL				X									
20	Perdido Key State Park Beach Boardwalk Improvements	FL											X	X	
21	Big Lagoon State Park Boat Ramp Improvement	FL											X	X	
22	Bob Sikes Pier Parking and Trail Restoration	FL											X	X	
23	Florida Artificial Reefs	FL											X	X	
24	Florida Fish Hatchery	FL											X	X	
25	Scallop Enhancement for Increased Recreational Fishing Opportunity in the Florida Panhandle	FL											X	X	
26	Shell Point Beach Nourishment	FL												X	
27	Perdido Key Dune Restoration Project	FL			X										
28	Florida Oyster Cultch Placement Project	FL							X						
29	Strategically Provided Boat Access Along Florida's Gulf Coast	FL											X	X	
30	Walton County Boardwalks and Dune Crossovers	FL											X	X	
31	Gulf County Recreation Projects	FL											X	X	
32	Bald Point State Park Recreation Areas	FL											X	X	
33	Enhancements of Franklin County Parks and Boat Ramps	FL											X	X	X
34	Apalachicola River Wildlife and Environmental Area Fishing and Wildlife Viewing Access Improvements	FL											X	X	

	PROPOSED PROJECT	LOCATION	ALTERNATIVE 4											
			ALTERNATIVE 2								ALTERNATIVE 3			
			CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH
35	Navarre Beach Park Gulfside Walkover Complex	FL										X	X	
36	Navarre Beach Park Coastal Access	FL										X	X	
37	Gulf Breeze Wayside Park Boat Ramp	FL										X	X	
38	Developing Enhanced Recreational Opportunities at the Escribano Point Portion of the Yellow River Wildlife Management Area	FL										X	X	X
39	Norriego Point Restoration and Recreation Project	FL										X	X	X
40	Deer Lake State Park Development	FL										X	X	
41	City of Parker – Oak Shore Drive Pier	FL										X	X	
42	Panama City Marina Fishing Pier, Boat Ramp and Staging Docks	FL										X	X	
43	Wakulla Marshes Sands Park Improvements	FL										X	X	
44	Northwest Florida Estuarine Habitat Restoration, Protection and Education – Fort Walton Beach	FL										X	X	X

¹ As described in more detail in Chapter 8, the Trustees include an alternative (the Corpus Artificial Reef Project) to the Mid/upper Texas Coast Artificial Reef Ship Reef Project, to be implemented in the event the Ship Reef Project becomes technically infeasible (e.g., an appropriate ship cannot be acquired with available funding). The Corpus Artificial Reef Project 'Alternative' has its own project description, description of Affected Environment and analysis of environmental consequences in Chapter 8; is categorized within the same Programmatic Alternative as the Ship Reef Project; and would provide similar Offsets.

² One component of this proposed project would be implemented on federally-managed lands and managed by DOI.

³ These proposed projects would be implemented on federally-managed lands and managed by DOI.

7.2 Offsets Estimation Methodologies

The Trustees used three primary methods to estimate Offsets for Early Restoration projects: Habitat Equivalency Analysis (“HEA”), Resource Equivalency Analysis (“REA”), and monetized estimates of project benefits. A general overview of each of these methods is provided below. Table 7-2 provides the estimated cost (including contingencies) of each project and information about the type(s) of Offsets negotiated with BP for each project. More detailed information about estimated Offsets for each proposed project can be found in Chapters 8-12 of this document.

The methods used to estimate Offsets for Early Restoration projects were implemented pursuant to the Framework Agreement and are based on the expected benefits for each project. In the context of Early Restoration under the Framework Agreement, the Trustees used the best information and methodologies available to judge the adequacy of proposed Early Restoration actions relative to OPA regulatory evaluation standards (see 15 C.F.R. § 990.54(a)) while determining that the agreements reached with BP under the Framework Agreement were also fair, reasonable, and in the public interest. It is important to note that, under the Framework Agreement, neither the amount of the Offsets nor the methods of estimation used in analyzing any project may be used as precedent for assessing the gains provided by any other projects either during the Early Restoration process or in the assessment of total injury.

When the Trustees’ NRD claim is resolved, the NRD Offsets will be credited against BP’s NRD liability as provided in the project stipulations and the Framework Agreement.

7.2.1 HEA and REA

HEA and REA are methods commonly used in natural resource damage assessments. HEA is used to quantify changes in ecological services on a habitat basis (e.g., acres of marsh habitat) whereas REA is used to quantify changes in ecological services¹ in resource specific units (e.g., birds, oysters, etc.). When HEA or REA is used to estimate restoration credits, anticipated ecological benefits resulting from the proposed activity often are expressed in units that reflect the present (current) value over a project’s lifespan. For purposes of the proposed Early Restoration projects included in this document, the Trustees expressed HEA-estimated habitat benefits as “discounted service acre years” (“DSAYs”) of the specific habitat types to be restored.² For example, the Trustees estimated the present value of Offsets associated with a proposed Early Restoration project focused on primary dune restoration in terms of “primary dune DSAYs”.

¹ As stated in Chapter 1, examples of ecological services include biological diversity, nutrient cycling, food production for other species, habitat provision, and other services that natural resources provide for each other.

² ¹ “DSAY” = the discounted (to a specified base year) services provided by one acre of habitat for one year.

Table 7-2. Proposed Phase III Early Restoration Projects: Estimated Costs and Offsets.

	PROJECT	LOCATION	COST	OFFSET ¹								
				BACK BARRIER MARSH HABITAT	SALT MARSH HABITAT	BEACH/DUNE HABITAT	SUBMERGED AQUATIC VEGETATION HABITAT	OYSTER SECONDARY PRODUCTIVITY	BENTHIC SECONDARY PRODUCTIVITY	PELICAN, TERN/SKIMMER AND GULL FLEDGLINGS	RECREATIONAL USE	
1	Freeport Artificial Reef Project	TX	\$2,155,365									X
2	Matagorda Artificial Reef Project	TX	\$3,486,398									X
3	Mid/upper Texas Coast Artificial Reef Ship Reef Project ²	TX	\$1,785,765									X
4	Sea Rim State Park Improvements	TX	\$210,100									X
5	Galveston Island State Park Beach Redevelopment	TX	\$10,745,060									X
6	Louisiana Outer Coast Restoration	LA ³	\$318,363,000	X		X					X	
7	Louisiana Marine Fisheries Enhancement, Research, and Science Center	LA	\$22,000,000									X
8	Mississippi Hancock County Marsh Living Shoreline Project	MS	\$50,000,000		X					X		
9	Restoration Initiatives at the INFINITY Science Center	MS	\$10,400,000									X
10	Popp's Ferry Causeway Park	MS	\$4,757,000									X
11	Pascagoula Beach Front Promenade	MS	\$3,800,000									X
12	Alabama Swift Tract Living Shoreline	AL	\$5,000,080		X					X		
13	Gulf State Park Enhancement Project	AL	\$85,505,305									X
14	Alabama Oyster Cultch Restoration	AL	\$3,239,485					X				
15	Beach Enhancement Project at Gulf Island National Seashore	FL ⁴	\$10,836,055									X
16	Gulf Islands National Seashore Ferry Project	FL ⁴	\$4,020,000									X
17	Florida Cat Point Living Shoreline Project	FL	\$775,605		X					X		
18	Florida Pensacola Bay Living Shoreline Project	FL	\$10,828,063		X					X		
19	Florida Seagrass Recovery Project	FL	\$2,691,867				X					
20	Perdido Key State Park Beach Boardwalk Improvements	FL	\$588,500									X
21	Big Lagoon State Park Boat Ramp Improvement	FL	\$1,483,020									X
22	Bob Sikes Pier Parking and Trail Restoration	FL	\$1,023,990									X
23	Florida Artificial Reefs	FL	\$11,463,587									X
24	Florida Fish Hatchery	FL	\$18,793,500									X
25	Scallop Enhancement for Increased Recreational Fishing Opportunity in the Florida Panhandle	FL	\$2,890,250									X

	PROJECT	LOCATION	COST	OFFSET ¹								
				BACK BARRIER MARSH HABITAT	SALT MARSH HABITAT	BEACH/DUNE HABITAT	SUBMERGED AQUATIC VEGETATION HABITAT	OYSTER SECONDARY PRODUCTIVITY	BENTHIC SECONDARY PRODUCTIVITY	PELICAN, TERN/SKIMMER AND GULL FLEDGLINGS	RECREATIONAL USE	
26	Shell Point Beach Nourishment	FL	\$882,750									X
27	Perdido Key Dune Restoration Project	FL	\$611,234			X						
28	Florida Oyster Cultch Placement Project	FL	\$5,370,596					X				
29	Strategically Provided Boat Access Along Florida's Gulf Coast	FL	\$3,248,340									X
30	Walton County Boardwalks and Dune Crossovers	FL	\$743,276									X
31	Gulf County Recreation Projects	FL	\$2,118,600									X
32	Bald Point State Park Recreation Areas	FL	\$470,800									X
33	Enhancement of Franklin County Parks and Boat Ramps	FL	\$1,771,385									X
34	Apalachicola River Wildlife and Environmental Area Fishing and Wildlife Viewing Access Improvements	FL	\$262,989									X
35	Navarre Beach Park Gulfside Walkover Complex	FL	\$1,221,847									X
36	Navarre Beach Park Coastal Access	FL	\$614,630									X
37	Gulf Breeze Wayside Park Boat Ramp	FL	\$309,669									X
38	Developing Enhanced Recreational Opportunities on the Escribano Point Portion of the Yellow River Wildlife Management Area	FL	\$2,576,365									X
39	Norriego Point Restoration and Recreation Project	FL	\$10,228,130									X
40	Deer Lake State Park Development	FL	\$588,500									X
41	City of Parker- Oak Shore Drive Pier	FL	\$993,649									X
42	Panama City Marina Fishing Pier, Boat Ramp, and Staging Docks	FL	\$2,000,000									X
43	Wakulla Mashas Sands Park Improvements	FL	\$1,500,000									X
44	Northwest Florida Estuarine Habitat Restoration, Protection, and Education- Fort Walton Beach	FL	\$4,643,547									X
		Total	\$626,998,302									

	PROJECT	LOCATION	COST	OFFSET ¹							
				BACK BARRIER MARSH HABITAT	SALT MARSH HABITAT	BEACH/DUNE HABITAT	SUBMERGED AQUATIC VEGETATION HABITAT	OYSTER SECONDARY PRODUCTIVITY	BENTHIC SECONDARY PRODUCTIVITY	PELICAN, TERN/SKIMMER AND GULL FLEDGLINGS	RECREATIONAL USE
<p>¹ Offset Types indicated in this table provide general information about Offsets, for overview purposes only. Important, detailed information about Offsets is provided in project-specific write-ups included in Chapters 8-12.</p> <p>² As described in more detail in Chapter 8, the Trustees include an alternative (the Corpus Artificial Reef Project) to the Mid/upper Texas Coast Artificial Reef Ship Reef Project, to be implemented in the event the Ship Reef Project becomes technically infeasible (e.g., an appropriate ship cannot be acquired with available funding). The Corpus Artificial Reef Project 'Alternative' has its own project description, description of Affected Environment and analysis of environmental consequences in Chapter 8; is categorized within the same Programmatic Alternative as the Ship Reef Project; and would provide similar Offsets.</p> <p>³ One component of this proposed project would be implemented on federally-managed lands and managed by DOI.</p> <p>⁴ These proposed projects would be implemented on federally-managed lands and managed by DOI.</p>											

REA-estimated benefits are expressed in resource-specific units, rather than on a habitat basis. For example, the Trustees estimated the present value of Offsets associated with Early Restoration projects focused on construction of living shorelines in terms of discounted kilogram years (DKg-Y) of benthic secondary productivity (in addition to a habitat credit for living shorelines, estimated as DSAYS of salt marsh habitat).³

The Trustees considered a variety of project-specific factors when applying HEA and REA methods to estimate the ecological benefits of restoration projects, including, but not limited to:

- The date at which ecological services from a restoration project are expected to begin to accrue;
- The rate of ecological service accrual over time;
- The time period over which ecological services will be provided;
- The quantity and quality of ecological services provided by the restored habitat or resource relative to those not affected by the Spill; and
- The size of the restoration action.

HEA- and REA-based Offsets negotiated by the Trustees and BP use 2010 (the year of the Spill) as the base year and a 3.0 percent annual discount rate for calculation of present values.⁴ For each of the proposed Phase III ecological Early Restoration projects, the Trustees and BP either agreed to:

³ 1 "DKG-Y" = the discounted (to a specified base year) kilograms of biomass generated by the project in one year, reflecting the expected survival and growth of that biomass during that year.

⁴ It is standard practice to use a 3.0 percent annual discount rate for this type of analysis; please see (NOAA 1999) for a detailed discussion of the basis for its use.

- A primary Offset;
- A primary Offset, plus specified agreements on methods for “converting” Offset units if needed to better match units ultimately used in the Trustees’ final assessment of injury;
- A “primary” Offset to be applied against a specified injury, and a “secondary” Offset to be applied only if the “primary” Offsets are at the time of final case resolution determined to be in excess of the injury ultimately determined and quantified in the Trustees’ final assessment of injury; or
- More than one Offset, reflecting project-specific evaluation of the types of benefits expected to be generated by a particular project.

Detailed information about Offsets negotiated for each proposed Phase III Early Restoration project is provided in subsequent chapters of this document.

7.2.2 Monetized Offsets

The expected benefits of some restoration projects can be monetized, or expressed in terms of the dollar value of expected benefits to the public, rather than in terms of ecological gains. As with HEA and REA, monetization approaches are used to estimate Offsets over a restoration project’s expected lifespan. For this Draft Phase III ERP/PEIS, the Trustees used a monetizing approach to estimate Offsets for proposed recreational use projects designed to achieve a range of goals, including:

- Enhancing public access to natural resources for recreational use;
- Enhancing recreational experiences; and/or
- Promoting environmental and cultural stewardship, education and outreach.

More specifically, the Trustees relied on a benefit-to-cost ratio (“BCR”) approach to estimate Offsets for the proposed Phase III Early Restoration recreational use projects. This approach uses existing economic literature and preliminary estimates of project inputs (see below for additional detail) to develop BCRs representing average benefit-to-cost ratios. For example, a project with an estimated cost of \$10 and a BCR of 1.5 would be assigned a monetized Offset of \$15.⁵ This monetized Offset would later be applied to monetized estimates of recreational use losses attributable to the Spill.

Estimated project inputs considered by Trustees as part of the process for developing BCRs for recreational use losses include, but are not limited to:

- The number of participants expected to benefit from each project;
- The benefit these individuals are expected to derive from a new experience or enhanced experience;
- The time frame over which the benefits will be provided, in terms of both start date as well as expected duration of benefits; and
- The discount rate used to calculate the present value of future benefits (3.0 percent, expressed in 2010 dollars).

⁵ \$15 = \$10 * 1.5

The BCR is applied to the amount of Early Restoration funds that are provided by BP for a project, but not to funds provided from other sources.

Based on review and analysis of relevant economics literature and project-specific information, the Trustees developed BCRs applicable to two groupings of the proposed projects, based on their expected levels of benefits relative to their costs. Specifically, one BCR was established for projects expected to yield lower levels of benefits relative to costs (to represent the lower end of the range of project-specific BCR), and a second BCR was established for projects expected to have higher levels of benefits relative to costs (to represent the higher end of the BCR range).

The Trustees and BP agreed to apply a BCR of 1.5 to the proposed recreational use projects expected to have lower benefit-to-cost ratios and a BCR 2.0 to the remaining proposed recreational use projects. Thus proposed projects in the lower BCR category would provide BP with a monetized Offset equal to 1.5 times the project funding provided by BP, to be applied against monetized injuries to recreational use arising from the Spill. For the remaining proposed projects, BP would receive a monetized Offset equal to 2.0 times the project funding provided by BP.

7.3 Performance Monitoring

NRDA regulations call on Trustees, when developing a draft restoration plan under OPA, to establish restoration objectives that are specific to the injuries (15 C.F.R. § 990.55(b)(2)). These objectives should clearly specify the desired project outcome, and the performance criteria by which successful restoration under OPA will be determined (15 C.F.R. § 990.55(b)(2)). The monitoring component of a draft restoration plan is further described in 15 C.F.R. § 990.55(b)(3).

Performance monitoring for proposed Early Restoration projects will be designed to evaluate the effectiveness of the restoration actions in meeting the restoration objectives and to assist in determining the need for corrective actions. While the Trustees intend to strive for consistency in performance monitoring parameters, frequency, and duration for similar project types, flexibility in monitoring design is necessary to account for inherent differences between restoration projects.

7.4 Consistency with Project Evaluation Criteria

Chapters 8-12 of this document provide project-specific information addressing each project's consistency with project evaluation criteria identified in Chapter 2. These criteria are summarized again below for reference.

The following evaluation criteria are from the OPA regulations (15 C.F.R. § 990.54):

- The cost to carry out the alternative;
- The extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses (the ability of the restoration project to provide comparable resources and services; that is, the nexus between the project and the injury is an important consideration in the project selection process);
- The likelihood of success of each alternative;
- The extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;

- The extent to which each alternative benefits more than one natural resource and/or service; and
- The effect of each alternative on public health and safety.

If the Trustees conclude that two or more alternatives are equally preferable, the most cost-effective alternative must be chosen (15 C.F.R. § 990.54(b)).

The Framework Agreement states Early Restoration projects are to meet all of the following criteria:

- Contribute to making the environment and the public whole by restoring, rehabilitating, replacing, or acquiring the equivalent of natural resources or services injured as a result of the Spill, or compensating for interim losses resulting from the incident;
- Address one or more specific injuries to natural resources or services associated with the incident;
- Seek to restore natural resources, habitats, or natural resource services of the same type, quality, and of comparable ecological and/or recreational use value to compensate for identified resource and service losses resulting from the incident;
- Are not inconsistent with the anticipated long-term restoration needs and anticipated final restoration plan; and
- Are feasible and cost-effective.

In addition, the introductions to chapters 8-12 include additional, Trustee-specific information about their Early Restoration project screening process, beyond the general project screening information provided in Chapter 2. Finally, to limit repetition in the discussion of OPA criteria in the proposed Phase III project information portions of Chapters 8-12, the Trustees note that:

- The potential of each proposed project to cause collateral injury (15 C.F.R. §990.54(a)(4)) is addressed via each proposed project’s environmental consequence analysis; and
- The potential impact of each proposed project on public health and safety (15 C.F.R. §990.54(a)(6)), is addressed in each proposed project’s environmental consequence analysis where applicable for individual projects.

7.5 Environmental Compliance

Chapters 8-12 of this document provide detailed information and OPA and NEPA analyses for each proposed Phase III Early Restoration project, its expected environmental consequences and its consistency with the programmatic alternative(s). In addition, the Trustees have started coordination and reviews to ensure compliance with a variety of other legal authorities potentially applicable to proposed Phase III Early Restoration projects. While these efforts are still in process, progress to date suggests that all proposed projects will be able to meet permitting and other environmental compliance requirements; all projects will be implemented in accordance with all applicable laws and regulations.

Examples of applicable laws or executive orders include, but are not necessarily limited to, the following:

7.5.1 Endangered Species Act (16 U.S.C. §§ 1531 et seq.)

Numerous species throughout the Gulf of Mexico are listed as threatened or endangered and protected by the Endangered Species Act of 1973 (ESA). Section 7(a)(2) of the ESA requires every Federal agency, in consultation with and with the assistance of the Secretaries of the Interior and Commerce, to ensure

that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat

To comply with the ESA, the Trustees have started coordination and reviews with the U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) to evaluate the effects the proposed Phase III Early Restoration projects may have on listed, proposed, and candidate species and their designated or proposed critical habitats.

7.5.2 Migratory Bird Treaty Act (16 U.S.C. §§ 703-712)

There are more than 400 species of migratory birds and millions of individual resident birds that reside along the Gulf Coast for all or part of the year. The Migratory Bird Treaty Act of 1918 (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under MBTA, unless permitted by regulations, it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg or product, manufactured or not. USFWS regulations broadly define “take” under MBTA to mean “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect” (50 C.F.R. §10.12).

Each proposed Phase III Early Restoration project has been reviewed by the USFWS to ensure “take,” pursuant to the MBTA, does not occur. If migratory birds may be present in a project area, avoidance measures would be implemented to ensure these birds (parts, nests, eggs, or products) are not wounded or killed during construction or use of the project area. Avoidance measures, where applicable, are described within each specific project description.

7.5.3 Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.)

The 1996 Magnuson-Stevens Fishery and Conservation and Management Act (MSA) requires cooperation among NMFS, anglers, and federal and state agencies to protect, conserve, and enhance essential fish habitat (EFH). EFH encompasses waterbodies, habitats, and substrates necessary for fish that are managed by federal or regional fishery management councils to complete various life history stages such as breeding, spawning, feeding or growth, and survival to maturity. EFH for multiple fish species is present throughout the Gulf Coast. To comply with requirements of the MSA, the Trustees obtained information on areas that are designated as EFH from NMFS at <http://www.habitat.noaa.gov/protection/efh/newInv/index.html>, and from text descriptions in Fishery Management Plans also available at that website. An assessment of potential effects to EFH from each proposed project is ongoing, and any required consultations regarding potential impacts to EFH will be completed with NMFS concurrent with the development of the Final Phase III ERP/PEIS.

7.5.4 Marine Mammal Protection Act (16 U.S.C. §§ 1361-1421h)

There are more than 22 species of marine mammals in the Gulf of Mexico, including dolphins, whales, and the West Indian manatee. The Marine Mammal Protection Act, as amended, prohibits the taking of marine mammals, where “take” is defined as “the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such” 16 U.S.C. § 1362(13). The Marine Mammal Protection Act

does provide a mechanism (section 101(a)(5) (A-D)) for allowing, upon request, the "incidental", but not intentional, taking of small numbers of marine mammals by U.S citizens who engage in a specified activity (other than commercial fishing) within a specified geographic region. Proposed projects were analyzed to evaluate the potential for any such non-fishery interactions with marine mammals. Based on that analysis, either: 1) no incidental take of marine mammals is anticipated, and a Marine Mammal Protection Act authorization will not be required or sought for the proposed project; or 2) if there is potential that marine mammals may be incidentally harassed or otherwise "taken" during the construction or implementation phases of a project, discussions of whether any best management practices can be implemented to avoid or reduce the potential for take are underway. Should incidental take be anticipated, the appropriate authorization would be sought and obtained for the relevant aspects of the project.

7.5.5 Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668c)

Bald eagles are present along the Gulf Coast. The Bald and Golden Eagle Protection Act of 1940 prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Bald and Golden Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" 16 U.S.C. § 668c. Under the regulations implementing the Bald and Golden Eagle Act, "disturb" means: to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior 50 C.F.R. § 22.3. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment. Each proposed project has been reviewed to evaluate bald eagle status in the action area and determine if best management practices need to be put into place to avoid unintentional "taking" or "disturbing" of bald eagles. Although very rare, golden eagles are occasionally observed along the Gulf coast during migration, and it is likely that any measures taken to protect bald eagles will also protect golden eagles.

7.5.6 Coastal Zone Management Act (16 U.S.C. §§ 1451-1456)

The goal of the Coastal Zone Management Act (CZMA) is to encourage states to preserve, protect, develop, and where possible, to restore and enhance the resources of the nation's coastal zone. The CZMA encourages coastal states to develop and implement comprehensive management programs that balance the need for coastal resource protection with the need for economic growth and development in the coastal zone. Coastal management plans developed by a coastal state must be approved by the Secretary of the U.S. Department of Commerce. Once a coastal management plan is approved, the CZMA requires federal agency activities affecting the land or water uses or natural resources of a state's coastal zone to be consistent, to the maximum extent practicable, with the applicable, enforceable policies of that state's federally approved coastal management program. This requirement is addressed through processes that provide for state review of a federal agency's determination of consistency with the relevant state's approved program. Restoration activities proposed to be undertaken or authorized by federal agencies are subject to review for "federal consistency" under the CZMA.

The Federal Trustees involved in development of this Draft Phase III ERP have reviewed the specific restoration projects proposed herein, have made appropriate determinations as to consistency and are submitting those determinations to the appropriate state agencies for review and concurrence. The Federal Trustees expect that review process to be complete before projects are selected for inclusion in the Final Phase III ERP.

7.5.7 Clean Air Act (42 U.S.C. §7401 et seq.)

The Clean Air Act (CAA) requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS have been set for six common air pollutants (also known as criteria pollutants), consisting of particle pollution or particulate matter, ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. Particulate matter is defined as fine particulates with a diameter of 10 micrometers or less (PM₁₀), and fine particulates with a diameter of 2.5 micrometers or less (PM_{2.5}). When a designated air quality area or airshed in a state exceeds an NAAQS, that area may be designated as a “nonattainment” area. Areas with levels of pollutants below the health-based standard are designated as “attainment” areas. To determine whether an area meets the NAAQS, air monitoring networks have been established and are used to measure ambient air quality. The EPA also regulates 187 hazardous air pollutants (HAPs) that are known or suspected to cause cancer or other serious health effects. The Trustees are ensuring that all projects are in compliance with the CAA, and no violations of NAAQS are expected to occur.

7.5.8 Federal Water Pollution Control Act (Clean Water Act, 33 U.S.C. §§ 1251 et seq.) and/or Rivers and Harbors Act (33 U.S.C. §§ 401 et seq.)

Waters of the United States, as defined by the Clean Water Act and implementing regulations, and navigable waterways, regulated by the Rivers and Harbors Act, are present throughout the Gulf Coast and could potentially be affected by proposed projects. Section 404 of the Clean Water Act requires U.S. Army Corps of Engineers (USACE) authorization prior to discharging dredged or fill material into waters of the United States. Section 10 of the Rivers and Harbors Act requires Corps authorization prior to any work in, under or over navigable waters of the United States, or which affects the course, location, condition or capacity of such waters. There may be other provisions of the Clean Water Act or Rivers and Harbors Act within the Corps’ responsibility that are also applicable to proposed Early Restoration projects depending on site-specific circumstances. For proposed projects with activities which might be subject to either Clean Water Act Section 404 or Rivers and Harbors Act provisions, project sponsors are coordinating with the appropriate Corps of Engineers District office responsible for authorizing such activities to help identify whether a Corps permit is needed and, if so, what type. Early coordination helps facilitate information-sharing and communication, thus maximizing available efficiencies in the permitting process. Early coordination also allows for advance discussion of measures to avoid and minimize potential project impacts and helps inform sponsors on additional factors the Corps considers in its decision-making process. Corps authorization under Clean Water Act Section 404 or Rivers and Harbors Act Section 10 has already been completed for some of the proposed projects considered in this document. For those proposed Early Restoration projects still requiring Corps authorization, coordination between project sponsors and the Corps is ongoing and authorization will ultimately be completed prior to project implementation.

7.5.9 National Historic Preservation Act (16 U.S.C. §§ 470 et seq.)

People have lived in the coastal region of the Gulf of Mexico for more than ten thousand years. Today many unique and diverse cultures call the Gulf Coast home. These cultures, past and present, are often closely linked to the environmental and natural resources which comprise the Gulf Coast ecosystem and which these projects seek to help restore. The National Historic Preservation Act of 1966 (NHPA) charges the Federal Government with protecting the cultural heritage and resources of the nation. A complete review of proposed projects under Section 106 of the NHPA would be completed as environmental review continues. Projects will be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

In addition to potentially applicable laws and regulations

7.5.10 Executive Order 13112: Invasive Species

The potential introduction of terrestrial and aquatic non-native invasive species of plants, animals, and microbes is a constant concern. Non-native invasive species could alter existing terrestrial or aquatic ecosystems, may cause economic damages and losses (Pimentel et al. 2005), and are frequently the second most common reason for protecting species under the Endangered Species Act. To address these concerns, the prevention, management, and control of non-native invasive species, as it pertains to federal agencies, was formally addressed in Executive Order 13112. The executive order directs federal agencies to work together to “prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.” Therefore, all projects would provide an evaluation of the possible transport and spread of non-native invasive species due to planned activities and provide measures to avoid and minimize habitat and trust resource impacts. The amount of measures taken will vary for each project based on the potential risk of invasive species introduction, the presence of transport vectors, and the sensitivity of receiving areas.

Additional, project-specific information and analyses regarding the environmental compliance status of proposed Phase III Early Restoration projects are provided below and in subsequent chapters of this document.

7.6 Overview of Proposed Phase III Early Restoration Projects

The following subsections list and briefly describe each proposed project. The list is organized by the state in which the proposed project will take place.

7.6.1 Texas

7.6.1.1 Freeport Artificial Reef Project

The proposed Freeport Artificial Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico and approximately 6 miles from Freeport, Texas. The current reef site is permitted for 160 acres, but only has materials in 40 acres. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet. These improvements would enhance recreational fishing and diving opportunities. The estimated cost for this Project is \$2,155,365.

7.6.1.2 Matagorda Artificial Reef Project

The proposed Matagorda Artificial Reef Project will create a new artificial reef site (BA-439) within Texas state waters in the Gulf of Mexico, approximately 10 miles offshore of Matagorda County, Texas. The proposed Project will create 160 acres of artificial reef, through deployment of predesigned concrete pyramids onto sandy substrate at a water depth of 60 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$3,486,398.

7.6.1.3 Mid/upper Texas Coast Artificial Reef Ship Reef Project⁶

The proposed Ship Reef Project will enhance fishing and diving opportunities for Texas by sinking a ship to create an artificial reef about 67 miles offshore of Galveston, Texas in the Gulf of Mexico. Texas will acquire and sink a ship that is at least 200 feet long in waters that are approximately 135 feet deep. The ship will be cleaned of hazardous substances to meet EPA criteria, as well as pass all required federal and state inspections, including EPA, TPWD, and USCG. The Project area (HI-A-424) is 80 acres of sandy substrate in the Gulf of Mexico. This Early Restoration project proposal would fund a portion of the costs to implement this project. The estimated cost for the portion of this Project funded by Early Restoration is \$1,785,765.

7.6.1.4 Sea Rim State Park Improvements

Sea Rim State Park is located along the upper Texas Coast in Jefferson County, Texas, southwest of Port Arthur, Texas. The proposed Sea Rim State Park Improvements Project would construct two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station, and one fish cleaning shelter in the Park. These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this Project is \$210,100.

7.6.1.5 Galveston Island State Park Beach Redevelopment

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, southwest of the City of Galveston in Galveston County, Texas. The proposed Galveston Island State Park Beach Development Project includes the building of multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of the Park. These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this Project is \$10,745,060.

7.6.2 Louisiana

7.6.2.1 Louisiana Outer Coast Restoration

The Trustees propose to restore habitat at four barrier island locations in Louisiana. From west to east, the four locations are Caillou Lake Headlands (also known as Whiskey Island), Cheniere Ronquille, Shell

⁶ Should the proposed project become technically infeasible, the Trustees will implement the “Texas Artificial Reef (mid/upper Coast)- Corpus Reef ” Project: The proposed Corpus Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (MU-775) located within Texas state waters in the Gulf of Mexico and approximately 11 miles from Packery Channel (near Corpus Christi Bay, Texas). Previous deployments at the reef site placed artificial reef materials into the northwest quadrant and in the center of the 160-acre reef site. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre project area onto sandy substrate at a water depth of 73 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$1,785,765.

Island (West Lobe and portion of East Lobe), and North Breton Island (Breton National Wildlife Refuge). Each of these locations has experienced land loss and shoreline retreat. The goal of the proposed project is to restore more than 2000 acres of beach, dune, and back-barrier marsh habitats, as well as brown pelicans, terns, skimmers, and gulls. The total estimated Early Restoration contribution toward implementation of Louisiana Outer Coast Restoration is \$318,363,000.

7.6.2.2 Louisiana Marine Fisheries Enhancement, Research, and Science Center

The Louisiana Marine Fisheries Enhancement, Research, and Science Center (“the Center”) would establish state of the art facilities to responsibly develop aquaculture-based techniques for marine fishery management. The proposed project would include two sites (Calcasieu Parish and Plaquemines Parish) with the shared goals of fostering collaborative multi-dimensional research on marine sport fish and bait fish species; enhancing stakeholder involvement; and providing fisheries extension, outreach, and education to the public. The estimated cost for this project is \$22,000,000.

7.6.3 Mississippi

7.6.3.1 Mississippi Hancock County Marsh Living Shoreline Project

The proposed Hancock County Marsh Living Shoreline project is intended to employ living shoreline techniques that utilize natural and artificial breakwater material to reduce shoreline erosion by dampening wave energy while encouraging reestablishment of habitat that was once present in the region. The project would provide for construction of up to 5.9 miles of living shoreline (breakwater). An additional component includes, approximately 46 acres of marsh would be constructed to protect and enhance the existing shoreline and 46 acres of sub-tidal oyster reef would be created in Heron Bay to increase secondary productivity in the area. The project, to be managed by both the state of Mississippi and NOAA, would include shoreline erosion reduction, creation of habitat for secondary productivity, and protection and creation of marsh habitat. The estimated cost for this project is \$50,000,000.

7.6.3.2 Restoration Initiatives at the INFINITY Science Center

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

7.6.3.3 Popp's Ferry Causeway Park

The proposed Popp's Ferry Causeway Park Project would improve a portion of a site in Back Bay, Mississippi that is owned by the City of Biloxi by providing a park environment where local residents and

visitors can experience the coastal estuarine ecosystem. The project is intended to restore lost recreational use resulting from the Spill. The project would provide for construction of an interpretive center, nature trails, boardwalks, and other recreational enhancements and would enhance visitor access to the adjacent coastal estuarine environment while updating and constructing amenities allowing visitors to fish, crab and observe nature. The estimated cost for this project is \$4,757,000.

7.6.3.4 Pascagoula Beachfront Promenade

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

7.6.4 Alabama

7.6.4.1 Alabama Swift Tract Living Shoreline

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. This project would create breakwaters to dampen wave energy and reduce shoreline erosion while also providing habitat that was once regionally present. The project would provide for construction of up to 1.6 miles of breakwaters. 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. NOAA would be the lead implementing Trustee for this project. The estimated cost for this project is \$5,000,080.

7.6.4.2 Gulf State Park Enhancement Project

The proposed Visitor Enhancements at Gulf State Park would implement ecologically-sensitive improvements to Gulf State Park (GSP) to: (1) rebuild the Gulf State Park Lodge and Conference Center; (2) build an Interpretive Center; (3) build a Research and Education Center; (4) add 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) conduct ecological restoration and enhancement of degraded dune habitat. Early Restoration funds would contribute \$85.5 million, a portion of the total project funding.

7.6.4.3 Alabama Oyster Cultch Restoration

The proposed Alabama Oyster Cultch project would increase the productivity of oyster reefs in Alabama coastal waters. 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, Alabama, 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 \$3.2 million.

7.6.5 Florida

7.6.5.1 Beach Enhancement Project at Gulf Island National Seashore

This project involves removing fragments of asphalt and road-base material (limestone aggregate and some chunks of clay) that have been scattered widely over the Fort Pickens, Santa Rosa, and Perdido Key areas of the Florida District of Gulf Islands National Seashore. These materials originated from roads damaged during several storms and hurricanes. The asphalt- and road-base-covered conditions are clearly unnatural and impact the visitor experience both aesthetically and physically in these National Seashore lands. This project would enhance visitor experience in the cleaned-up areas. The National Park Service, as a bureau of DOI, would serve as the lead implementing Trustee for this project. The estimated cost for this project is \$10,837,000.

7.6.5.2 Gulf Islands National Seashore Ferry Project

The proposed National Park Service Ferry Purchase project involves the purchase of 2-3 ferries to be used to ferry visitors (no automobiles) between the City of Pensacola, Pensacola Beach, and the Fort Pickens area of Gulf Islands National Seashore in Florida. The need for an alternative means to access the Fort Pickens area of the park was made especially apparent when hurricanes and storms in 2004 and 2005 destroyed large segments of the road, eliminating vehicle access through this eight-mile-long area. A viable ferry service to this area of the park would allow visitors to enjoy the park not only if the road were to be destroyed again, but also while the road is still there by allowing additional visitors access to the park that they otherwise would not have. The National Park Service, as a bureau of DOI, would serve as the lead implementing Trustee for this project. The estimated cost for this project is \$4,020,000.

7.6.5.3 Florida Cat Point Living Shoreline Project

The proposed Cat Point (Franklin County) Living Shoreline project is intended to employ living shoreline techniques that utilize natural and/or artificial breakwater material to reduce shoreline erosion and provide habitat off Eastpoint, Florida. Combining these objectives, this project would create breakwaters to reduce wave energy, increase benthic secondary productivity, and create salt marsh habitat. Proposed activities include expanding an existing breakwater creating up to 0.3 miles of new breakwater and creating 1 acre of salt marsh habitat. The total estimated cost for this project is \$775,605.

7.6.5.4 Florida Pensacola Bay Living Shoreline Project

The proposed Pensacola Bay Living Shorelines project is intended to employ living shoreline techniques that utilize natural and/or artificial breakwater material to reduce shoreline erosion and provide habitat at two sites within a portion of Pensacola Bay. Combining these objectives, this project would create breakwaters to reduce wave energy, increase benthic secondary productivity, and create salt marsh habitat. Proposed activities include completing and expanding an existing breakwater at the Project GreenShores Site II, constructing approximately 2,400 feet of breakwater at the Sanders Beach site, and creating salt marsh habitat at both sites. In total, approximately 18.8 acres of salt marsh habitat and 4 acres of breakwaters would be constructed. Florida and NOAA would be the implementing Trustees for this project. The estimated cost for this project is \$10,828,063.

7.6.5.5 Florida Seagrass Recovery Project

The proposed St. Joseph Bay Seagrass Recovery project will address boat damage to shallow seagrass beds in the Florida panhandle by restoring scars located primarily in turtle grass (*Thalassia testudinum*) habitats located in St. Joseph Bay Aquatic Preserve in Gulf County, with additional potential sites in Alligator Harbor Aquatic Preserve in Franklin County, and St. Andrews Aquatic Preserve, in Bay County. A boater outreach and education component of the project will install non-regulatory Shallow Seagrass Area signage, update existing signage and buoys where applicable, and install educational signage and provide educational brochures about best practices for protecting seagrass habitats at popular boat ramps in St. Joseph Bay, Alligator Harbor, and St. Andrews Bay. The project would restore approximately 2 acres of seagrass habitat. The total estimated cost for this project is \$2,691,867.

7.6.5.6 Perdido Key State Park Beach Boardwalk Improvements

The proposed Perdido Key project would improve a number of existing boardwalks along Perdido Key in Escambia County. The proposed improvements include removing and replacing six existing boardwalks leading to the beach from two public access areas. The total estimated cost for this project is \$588,500.

7.6.5.7 Big Lagoon State Park Boat Ramp Improvement

The proposed Big Lagoon State Park project would involve enhancing an existing boat ramp and surrounding facilities in the Big Lagoon State Park in Escambia County. These improvements would include adding an additional lane to the boat ramp, expanding boat trailer parking, improving traffic circulation at the boat ramp, and providing a new restroom facility to connect the park to the Emerald Coast Utility Authority (ECUA) regional sanitary sewer collection system. The total estimated cost for this project is \$1,483,020.

7.6.5.8 Bob Sikes Pier Parking and Trail Restoration

The proposed Bob Sikes Pier project would improve access to a fishing pier in the Pensacola area in Escambia County as well as enhancing the quality of the experience for its recreational users. The proposed improvements include renovating parking areas, enhancing bicycle/pedestrian access, and aesthetic improvements to the surrounding area. The estimated cost for this project is \$1,023,990.

7.6.5.9 Florida Artificial Reefs

The proposed Florida Artificial Reef Creation and Restoration project involves creating artificial reefs in the Escambia, Santa Rosa, Okaloosa, Walton, and Bay counties. These proposed improvements include emplacing artificial reefs in already permitted areas. The total estimated cost for this project is \$11,463,587.

7.6.5.10 Florida Fish Hatchery

The proposed Florida Gulf Coast Marine Fisheries Hatchery/Enhancement Center project would involve constructing and operating a saltwater sportfish hatchery in Pensacola, Florida. This project would enhance recreational fishing opportunities. The total estimated cost for this project is \$18,793,500.

7.6.5.11 Scallop Enhancement for Increased Recreational Fishing Opportunity in the Florida Panhandle

The proposed Scallop Enhancement project would involve enhancing local scallop populations in targeted areas in the Florida Panhandle. The proposed improvements include the harvesting and

redistribution of naturally-occurring juvenile scallops supplemented with stocking from a commercial scallop hatchery. The total estimated cost for this project is \$2,890,250.

7.6.5.12 Shell Point Beach Nourishment

The proposed Shell Point Beach Nourishment project would involve the renourishment of Shell Point Beach in Wakulla County. The proposed improvements include the placement of approximately 15,000 cubic yards of sand on the beach from an approved upland borrow area to restore the width and historic slope/profile of this beach. The total estimated cost for this project is \$882,750.

7.6.5.13 Perdido Key Dune Restoration Project

The proposed Perdido Key Dune Restoration project will restore appropriate dune vegetation to approximately 20 acres of degraded beach dune habitat in Perdido Key, Florida, including habitat used by the federally endangered Perdido Key Beach Mouse. The project will consist of planting appropriate dune vegetation (e.g., sea oats, panic grasses, cord grasses, sea purslane, beach elder) approximately 20 – 60' seaward of the existing primary dune to provide a buffer to the primary dune and enhance dune habitats. In addition, gaps in existing dunes within the project area will be re-vegetated to provide a continuous dune structure. The total estimated cost for this project is \$611,234.

7.6.5.14 Florida Oyster Cultch Placement Project

The proposed Florida Oyster Cultch project would enhance and improve the oyster populations in Pensacola Bay, St. Andrew Bay and Apalachicola Bay. The proposed improvements include the placement of a total of 42,000 cubic yards of suitable cultch material over 210 acres of previously constructed oyster bars for the settling of native oyster larvae and oyster colonization in three Florida Bays. The total estimated cost for this project is \$5,370,596.

7.6.5.15 Strategically Provided Boat Access along Florida's Gulf Coast Project Components

7.6.5.15.1 City of Mexico Beach Marina Project

The proposed FWC City of Mexico Beach Marina project would improve the existing Mexico Beach Canal Park boat ramp in the City of Mexico Beach. The proposed improvements include replacing the boardwalk dock with a concrete surface and increasing the width, removing and replacing eighteen existing finger piers, and replacement of the existing retaining wall. The total estimated cost of the project is \$1,622,912.

7.6.5.15.2 Panama City St. Andrews Marina Docking Facility Expansions

The proposed FWC Panama City St. Andrews Marina Docking Facility Expansions project would improve the existing St. Andrews Marina docking facility in Panama City. The proposed improvements include adding three boat slips, replacing the boat ramp, and replacing a fixed wooden dock with a concrete floating dock. The total estimated cost of the project is \$250,029.

7.6.5.15.3 Strategically Provided Boat Access - City of Parker, Donaldson Point Boat Ramp Improvements

The proposed FWC City of Parker Donaldson Point Boat Ramp Improvements project would improve the existing Donaldson Point boat ramp in the City of Parker. The proposed improvements include adding a dock at the boat ramp. The total estimated cost of the project is \$60,569.

7.6.5.15.4 City of Parker, Earl Gilbert Dock and Boat Ramp Improvements

The proposed FWC City of Parker Earl Gilbert Dock and Boat Ramp Improvements project would improve the existing Earl Gilbert dock and boat ramp in the City of Parker. The proposed work includes improving the existing dock and expanding the existing parking. The total estimated cost of the project is \$109,360.

7.6.5.15.5 City of Port St. Joe, Frank Pate Boat Ramp Improvements

The proposed FWC City of Port St. Joe Frank Pate Boat Ramp Improvements project would improve the existing Frank Pate boat ramp in the City of Port St. Joe. The proposed improvements include constructing an additional boarding dock, boat trailer parking, access drive, staging area, and a fish cleaning station. The total estimated cost of the project is \$806,972.

7.6.5.15.6 City of St. Marks Boat Ramp Improvements

The proposed FWC City of St. Marks Boat Ramp Improvements project would improve the existing City of St. Marks boat ramp. The proposed improvements include adding a boarding dock to the one-lane boat ramp. The total estimated cost of the project is \$50,006.

7.6.5.15.7 Walton County, Choctaw Beach Boat Ramp Improvements

The proposed FWC Walton County Choctaw Beach Boat Ramp Improvements project would improve the existing Choctaw Beach boat ramp in Walton County. The proposed improvements include replacing the boat ramp, installing two boarding docks, removing existing inadequate restrooms and constructing new ones, and constructing a new paved and marked parking lot. The total estimated cost of the project is \$140,642.

7.6.5.15.8 Walton County, Lafayette Creek Boat Dock Improvements

The proposed FWC Walton County Lafayette Creek Boat Dock Improvements project would improve the existing Lafayette Creek boat dock in Walton County. The proposed improvements include expanding the dock by 400 feet at the boat ramp to accommodate larger vessels and additional vessels. The total estimated cost of the project is \$207,850.

7.6.5.16 Walton County Boardwalks and Dune Crossovers

7.6.5.16.1 Ed Walline Beach Access Improvements

The proposed Walton County Ed Walline Beach Access Improvements project would improve the Ed Walline regional beach access facility in Walton County. The proposed improvements include replacing pavilions and restroom fixtures and upgrading all interior plumbing. The total estimated cost of the project is \$117,700.

7.6.5.16.2 Gulfview Heights Beach Access Improvements

The proposed Walton County Gulfview Heights Beach Access Improvements project would improve the Gulfview Heights beach access facility in Walton County. The proposed improvements include replacing restroom fixtures, updating all interior plumbing, and repairing all soffits on pavilions. The total estimated cost of the project is \$87,981.

7.6.5.16.3 Grayton Dunes Beach Access Boardwalk Improvements

The proposed Walton County Grayton Dunes Beach Access Boardwalk Improvements project would improve the Grayton Dunes beach access and boardwalk facility in Walton County. The proposed improvements include replacing the dune walkover allowing beach visitors to access the beach. The total estimated cost of the project is \$168,076.

7.6.5.16.4 Dothan Beach Access Boardwalk Improvements

The proposed Walton County Dothan Beach Access Boardwalk Improvements project would improve the Dothan Beach Access Boardwalk in Walton County. The proposed improvements include replacing the dune walkover allowing beach visitors to access the beach. The total estimated cost of the project is \$188,909.

7.6.5.16.5 Palms of Dune Allen West Beach Access Improvements

The proposed Walton County Palms of Dune Allen West Beach Access Improvements project would improve the Palms of Dune Allen West beach access facility in Walton County. The proposed improvements include constructing a dune walkover, allowing beach visitors to access the beach. The total estimated cost of the project is \$112,109.

7.6.5.16.6 Bayside Ranchettes Park Improvements

The proposed Walton County Bayside Ranchettes Park Improvements project would improve the Bayside Ranchettes Park in Walton County. The proposed improvements include constructing a parking area, a picnic table, a dock, and steps into the water allowing access to the bay. The total estimated cost of the project is \$68,501.

7.6.5.17 Gulf County Restoration Projects

7.6.5.17.1 Highland View Boat Ramp

The proposed Gulf County Highland View Boat Ramp project would improve the existing Highland View boat ramp in Gulf County. The proposed improvements include repairing and enhancing the existing boat ramp, replacing existing access and termination piers, and improving the parking to provide better facilities. The total estimated cost of the project is \$176,550.

7.6.5.17.2 Indian Pass Boat Ramp

The proposed Gulf County Indian Pass Boat Ramp would improve the existing Indian Pass boat ramp in Gulf County. The proposed improvements include repairing and enhancing the existing boat ramp and replacing existing access and termination piers to provide better facilities for the public. The total estimated cost of the project is \$176,550.

7.6.5.17.3 Improvements at Beacon Hill Veterans' Memorial Park

The proposed Gulf County Beacon Hill Veterans' Memorial Park Improvements project would improve and enhance the existing facilities at the Beacon Hill Veterans' Memorial Park Gulf County. The proposed improvements include building, pavilions, restrooms, a nature trail, a parking area, and a small amphitheater. The total estimated cost of the project is \$588,500.

7.6.5.17.4 Windmark Beach Fishing Pier Improvements

The proposed Gulf County Windmark Beach Fishing Pier Improvements project would construct a fishing pier at Windmark Beach in Gulf County. The proposed improvements include constructing a fishing pier into the Gulf of Mexico. The total estimated cost of the project is \$1,177,000.

7.6.5.18 Bald Point State Park Recreation Areas

The proposed Bald Point State Park Recreation Areas project would improve the existing visitor areas at Bald Point State Park in Franklin County. The proposed improvements would include construction of picnic pavilions, boardwalks, restroom and aerobic treatment system and drainfield, and a boardwalk and floating dock for use as a canoe/kayak launch. The total estimated cost of the project is \$470,800.

7.6.5.19 Enhancement of Franklin County Parks and Boat Ramps

7.6.5.19.1 Abercrombie Boat Ramp Project

The proposed Franklin County Abercrombie Boat Ramp project would improve the existing Abercrombie boat launch facility in Franklin County. The proposed improvements include constructing additional docks to enhance water access. The total estimated cost of the project is \$176,550.

7.6.5.19.2 Waterfront Park

The proposed Franklin County Waterfront Park project would improve the existing Waterfront Park in Apalachicola. The proposed improvements include enhancing existing parking and adjacent tie-up docks to enhance water access. In addition an existing onsite building would be enhanced to serve as an information center and dockmaster office. The total estimated cost of the project is \$294,250.

7.6.5.19.3 Indian Creek Park

The proposed Franklin County Indian Creek Park project would improve the existing Indian Creek Park boat launch facility in Franklin County. The proposed improvements include constructing restroom facilities, connecting them to an existing central wastewater facility nearby, and renovating the existing boat ramp, bulkhead, and parking area to enhance water access. The total estimated cost of the project is \$353,100.

7.6.5.19.4 Eastpoint Fishing Pier Improvements

The proposed Franklin County Eastpoint Fishing Pier Improvement project would add restroom facilities to the base of the existing public East Point Fishing Pier in Franklin County. The proposed improvements include not only constructing new restrooms, but a holding tank that would be pumped out regularly. The total estimated cost of the project is \$294,250.

7.6.5.19.5 St. George Island Fishing Pier Improvements

The proposed Franklin County St. George Island Fishing Pier Improvements project would enhance the existing public St. George Island Fishing Pier in Franklin County. The proposed improvements include constructing new restrooms and a holding tank that would be pumped out regularly since there is no central wastewater facility on the island. The proposed improvements also include renovating the existing bulkhead that leads up to the pier, and protects the road to the pier. The total estimated cost of the project is \$653,235.

7.6.5.20 Apalachicola River Wildlife and Environmental Area Fishing and Wildlife Viewing Access Improvements

7.6.5.20.1 Cash Bayou

The proposed Apalachicola Cash Bayou project would improve public access at Cash Bayou in the Apalachicola River Wildlife and Environmental Area. The proposed improvements include constructing a fishing and wildlife observation structure and parking area. The total estimated cost of the project is \$209,171.

7.6.5.20.2 Sand Beach

The proposed Apalachicola Sand Beach project would improve public access at Sand Beach in the Apalachicola River Wildlife and Environmental Area. The proposed improvements include constructing a boardwalk. The total estimated cost of the project is \$53,818.

7.6.5.21 Navarre Beach Park Gulfside Walkover Complex

The proposed Navarre Beach Park Gulfside Walkover Complex project would enhance access to the shoreline at Navarre Beach Park to enhance recreational use of the natural resources. The proposed improvements include constructing an entrance, driveway, and parking area; constructing a restroom facility; constructing pavilions with boardwalk connections; and constructing a dune walkover that will provide access to the beach. The total estimated cost of the project is \$1,221,847.

7.6.5.22 Florida Navarre Beach Park Coastal Access

The proposed Navarre Beach Park Coastal Access project would improve access for the public seeking to access the beach and water of Santa Rosa Sound from the existing pavilion/parking lot areas. In addition, construction of a new canoe/kayak launch would increase access opportunities to the waters of the sound for recreational boaters. The enhancement of the recreational experience from these infrastructure improvements would also be complemented by the restoration of a roughly 1 acre parcel of degraded dune habitat in the project area. The estimated cost for this project is \$614,630.

7.6.5.23 Gulf Breeze Wayside Park Boat Ramp

The proposed Gulf Breeze Wayside Park Boat Ramp Improvements project would improve the existing boat ramp at Wayside Park in the City of Gulf Breeze, Santa Rosa County, FL. The proposed improvements include repairing the existing boat ramp and seawall cap, constructing a public restroom facility, and repairing and enhancing the parking area to improve access. The total estimated cost of the project is \$309,669.

7.6.5.24 Developing Enhanced Recreational Opportunities on the Escribano Point Portion of the Yellow River Wildlife Management Area

The proposed Escribano Point project would improve public access and enjoyment of natural resources at the Escribano Point portion of the Yellow River Wildlife Management Area. The proposed improvements include a one-time assessment and mapping activities necessary for developing the site for outdoor recreation purposes, hurricane debris removal and road repair, constructing an entrance kiosk, information facilities, parking facilities, a parking area, interpretive fishing facility, interpretive picnicking facilities, primitive camping sites, wildlife viewing areas, and bear-proof containers for trash and food storage. The total estimated cost of the project is \$2,576,365.

7.6.5.25 Norriego Point Restoration and Recreation Project

The proposed Norriego Point Restoration and Recreation project would involve stabilizing and re-establishing recreational activities available at Norriego Point. Improvements would include constructing erosion control structures and new park amenities including a picnic pavilion with restrooms, showers, and drinking fountains; educational signage; a multi-use trail; bike racks; and vehicle parking along the access road adjacent to the park land. The total estimated cost of the project is \$10,228,130.

7.6.5.26 Deer Lake State Park Development

The proposed Deer Lake State Park Recreation Areas project would improve the existing visitor areas at Deer Lake State Park in Walton County. The proposed improvements would include adding a paved access road, parking, picnic shelters, and a restroom. The total estimated cost of the project is \$588,500.

7.6.5.27 City of Parker – Oak Shore Drive Pier

The proposed City of Parker Oak Shore Drive Pier project would construct a fishing pier at Oak Shore Drive in the City of Parker, Bay County Florida. The proposed work includes construction of a 500 foot long fishing pier. The total estimated cost of the project is \$993,649.

7.6.5.28 Panama City Marina Fishing Pier, Boat Ramp, and Staging Docks

The proposed Panama City Marina Fishing Pier, Boat Ramp, and Staging Docks project would provide additional recreational fishing opportunities for the public in Panama City in Bay County. The proposed improvements include constructing a 400-foot long pier, replacing a poorly functioning boat ramp, and constructing new docks at the Panama City Marina. The total estimated cost of the project is \$2,000,000.

7.6.5.29 Wakulla County Mashes Sands Park Improvements

The proposed Wakulla County Mashes Sands Park Improvements project would improve recreation areas at the Wakulla County Mashes Sands Park. The proposed improvements include constructing observation platforms, boardwalks, and walking paths, improving the boat ramp area, and picnic areas, renovating the parking area, and the restroom facility, and constructing a canoe/kayak launch site. The total estimated cost of the project is \$1,500,000.

7.6.5.30 Northwest Florida Estuarine Habitat Restoration, Protection, and Education- Fort Walton Beach

The proposed Northwest Florida Fort Walton Beach Educational Boardwalk project would expand existing boardwalks as well as conducting several small natural resource and habitat enhancement projects in Fort Walton Beach. The proposed improvements include constructing a new educational and interactive boardwalk, expansion of an existing intertidal oyster reef, and restoration of a degraded salt marsh. The total estimated cost of the project is \$4,643,547.

7.7 Organization and Content of Proposed Phase III Project Chapters

Chapters 8-12 provide information and analysis related to the specific projects listed above located in Texas, Louisiana, Mississippi, Alabama, and Florida respectively.

Within each chapter, there is a subsection for each proposed Phase III project. Each project-specific subsection begins with a general description of the project and relevant background information,

followed by: 1) a discussion of the project’s consistency with project evaluation criteria; 2) 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 specific to each project’s affected environment and analysis about anticipated environmental consequences for individual, proposed projects.⁷ Each of the proposed projects is consistent with proposed project types identified and evaluated in the Trustees’ programmatic alternatives (see Chapters 5 and 6). The Trustees have also undertaken project-specific environmental reviews in the following Chapters to analyze proposed project locations, methods, timing and other factors, project benefits, potential adverse consequences, and otherwise address environmental compliance needs.

7.8 Intent to Adopt Existing NEPA Analyses

Four of the proposed projects or project components are the subject of existing NEPA analyses prepared by other federal agencies. These projects or components are analyzed in whole or in part in these NEPA documents. The DOI (or any of its bureaus) is not a cooperating agency on the NEPA analyses DOI intends to adopt. They are:

7.8.1 Louisiana

- Louisiana Outer Coast Restoration Project components:
 - Chenier Ronquille Barrier Island – Environmental Assessment for the Chenier Ronquille Barrier Island Restoration Project (NOAA 2013).
 - Caillou Lake Headlands - Louisiana Coastal Area Integrated Feasibility Study and Final Environmental Impact Statement for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010).
 - Shell Island - Louisiana Coastal Area Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement (USACE 2012).

7.8.2 Mississippi

- Pascagoula Beachfront Promenade Project - Environmental Assessment for the Department of Housing and Urban Development for the Beachfront Promenade Project (HUD 2011)

Federal agencies are encouraged to coordinate and take appropriate advantage of existing NEPA documents and studies, including adoption and incorporation by reference. Under CEQ NEPA Regulations (40 C.F.R. § 1506.3), DOI NEPA Regulations (43 C.F.R. § 46.120), and individual DOI bureau NEPA procedures, DOI may adopt another federal agency’s NEPA analysis to streamline the NEPA compliance process.

⁷ This format is not precisely followed for all Florida projects because some are grouped together for environmental review purposes.

DOI may adopt another federal agency's NEPA analysis or portion thereof if it meets the standards for an adequate analysis under the CEQ NEPA regulations, and if it adequately assesses the environmental effects of the proposed action and reasonable alternatives (40 C.F.R. 1506.3(a); 43 C.F.R. 46.120(c)). If DOI adopts another agency's NEPA analysis, the supporting record must include an evaluation of whether new circumstances, new information or changes in the action or its impacts not previously analyzed may result in significantly different environmental effects (43 C.F.R. 46.120(c)). The Spill was not previously considered in the Caillou Lake Headlands – Louisiana Coastal Area Integrated Feasibility Study and Final Environmental Impact Statement (Caillou Lake Headlands FIES) for the Terrebonne Basin Barrier Shoreline Restoration. The Spill was not considered as part of the affected environment in the Caillou Lake Headlands FEIS, and therefore the environmental consequences of the Caillou Lake Headlands alternatives were not considered in light of the Spill. However, the environmental consequences of the Caillou Lake Headlands alternatives would occur regardless of the Spill and the relative impacts of the alternatives considered would not materially change because of the Spill.

In addition to the requirements listed above, DOI may adopt another federal agency's NEPA analysis if DOI independently reviews the analysis and finds that the analysis complies with the DOI NEPA regulations, relevant provisions of the CEQ NEPA regulations and with other program requirements (43 C.F.R. 46.320(a)). DOI must also ensure that DOI's public involvement requirements are met before adopting another federal agency's NEPA analysis (43 C.F.R. 46.320(d)). When appropriate, the Responsible Official may augment the analysis to be consistent with the DOI's proposed action (43 C.F.R. 46.320(b)).

DOI has independently evaluated the existing NEPA analyses pertinent to the four proposed projects or project components listed above. DOI believes these existing NEPA analyses meet the standards for adequate NEPA analyses under the CEQ NEPA regulations, and that they adequately assess the environmental effects of the proposed restoration projects and reasonable alternatives.

Summaries of the adopted NEPA analyses for the Caillou Lake Headlands, Chenier Ronquille Barrier Island and Shell Island components of the proposed Louisiana Outer Coast Restoration project are found in Chapter 9, Proposed Phase III Early Restoration Projects: Louisiana, Sections 9.2, 9.3 and 9.4, respectively.

Chapter 10, Proposed Phase III Early Restoration Projects: Mississippi, includes the proposed Mississippi Pascagoula Beachfront Promenade restoration project (Section 10.7), and contains a summary of the NEPA analysis DOI intends to adopt. The Pascagoula Beachfront Promenade adopted EA required augmentation due to changes in the proposed action. The proposed action contained elements not analyzed in the 2011 HUD EA, requiring additional analysis (43 C.F.R. 46.320(b)). Elements that were added to the proposed action in the 2011 HUD EA (additional promenade and visitor amenities) are the subject of additional analysis in Section 10.7 to determine if they would "result in significantly different environmental effects" (43 C.F.R. 46.120(c)). These additional elements are not anticipated to result in significantly different environmental effects.

Accordingly, DOI intends to adopt these NEPA analyses and incorporate them in this PEIS.

7.9 References

- HUD (U.S. Department of Housing and Urban Development). 2011. Environmental Assessment for HUD-funded Proposals, Pascagoula Beach Promenade Project. Prepared by BMI Environmental Services, LLC., for the City of Pascagoula.
- National Oceanic and Atmospheric Administration (NOAA). 1999. Discounting and the Treatment of Uncertainty in Natural Resource Damage Assessment: Technical Paper 99-1. Silver Spring, MD. Available at: <http://www.whitehouse.gov/omb/circulars/a094/a094.pdf>.
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- United States Army Corps of Engineers (USACE). 2010. Louisiana Coastal Area Integrated Feasibility Study and Final Environmental Impact Statement for the Terrebonne Basin Barrier Shoreline Restoration Terrebonne Parish, Louisiana. Available at: http://www.lca.gov/Projects/3/final_reports.aspx.
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CHAPTER 8: PROPOSED PHASE III EARLY RESTORATION PROJECTS: TEXAS

Introduction

Following the *Deepwater Horizon* oil spill (Spill), Texas Trustees engaged coastal governments, stakeholders, non-governmental organizations, state and regional agencies, and the public through a variety of public outreach and coordination efforts to discuss NRDA, the restoration planning process, and potential restoration projects related to the Spill. In addition to the meetings discussed in Section 2.1.5 of this document, State Trustees met with stakeholders to provide information and solicit suggestions. Numerous conference calls were also held to coordinate with these stakeholders. Texas also solicited restoration project ideas from the public through outreach at coastal events, including the Freeport Fishin' Fiesta, the Groundwater to the Gulf Summer Teacher Institute, Galveston Bay Days, and the Texas General Land Office (TGLO) Coastal Expo.

Over 250 project ideas in or pertinent to Texas have been received through the Gulf Spill Restoration Site, and have been considered for Early Restoration¹. Based on outreach efforts, Texas Trustees compiled a list of potential projects for restoration of injured natural resources and services, including recreational use services, and evaluated them based on their alignment with the project evaluation criteria introduced in Chapter 2 of this document. From there, the projects were refined in a group to address multiple categories of injured resources, as well multiple methodologies for implementation. A final consideration was also the likelihood that specific projects could be negotiated successfully with BP. The Texas Trustees will continue to accept restoration project ideas. To submit a project idea online, or to view project ideas that have already been submitted, please go to the Gulf Spill Restoration Site (<http://www.gulfspillrestoration.noaa.gov/>). Projects proposed but not selected for this phase of Early Restoration planning will be considered for future stages of both early and long-term restoration.

Based on the process outlined above, analysis of the evaluation criteria set forth in the OPA regulations and the Framework Agreement, the Trustees are proposing the following Phase III Early Restoration projects in Texas:

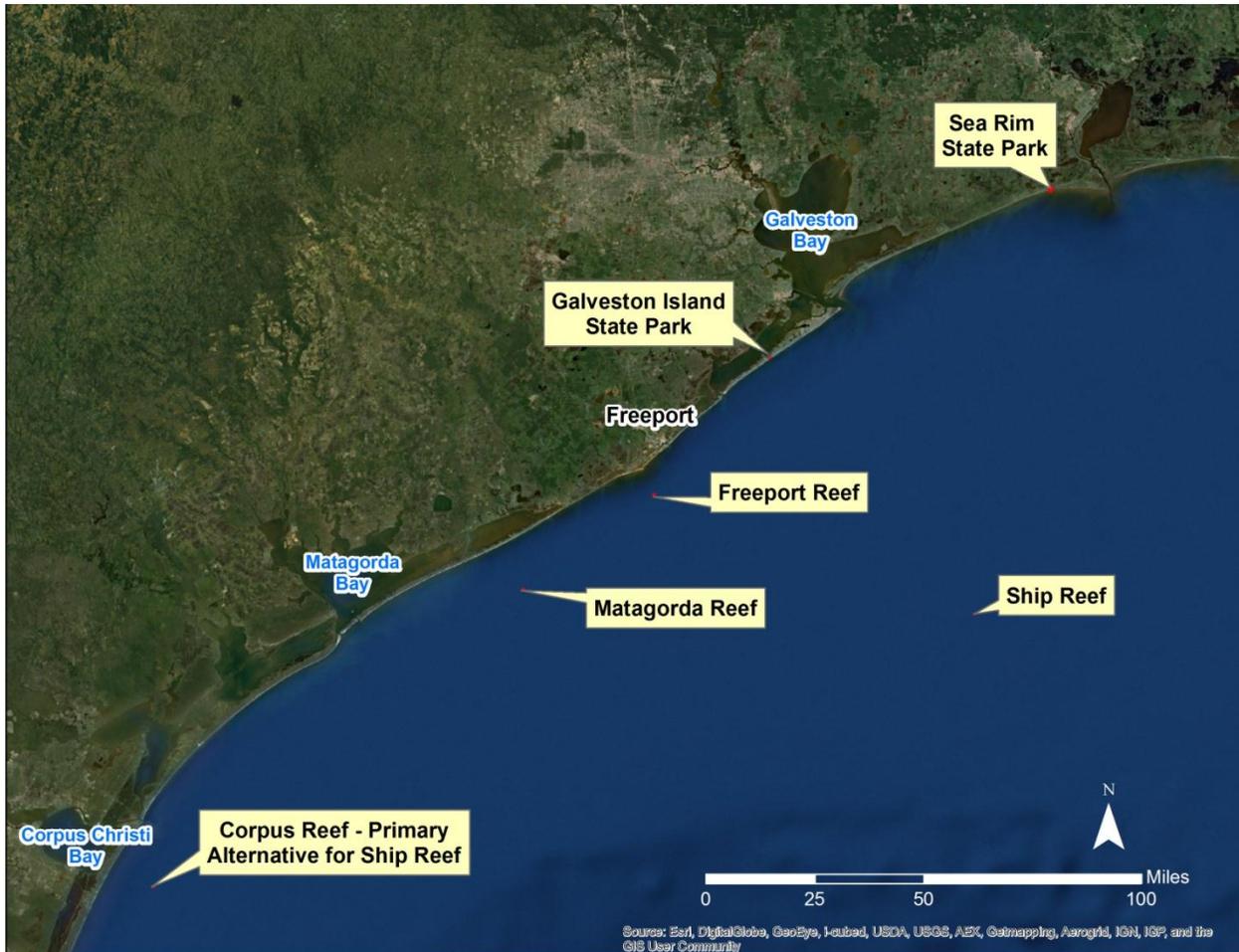
1. Expansion of the George Vancouver (Liberty Ship) Artificial Reef in Texas State Waters of the Gulf of Mexico (Freeport Artificial Reef Project);
2. Creation of the Matagorda Artificial Reef in Texas State Waters of the Gulf of Mexico (Matagorda Artificial Reef Project);
3. Creation of an artificial reef on the Mid/upper Texas Coast (Ship Reef Project)²;

¹ As of September 16, 2013.

² If the Ship Reef Project becomes technically infeasible (if, e.g. an appropriate ship cannot be obtained), an alternative project, the Expansion of the Corpus Christi Artificial Reef in Texas State Waters of the Gulf of Mexico (Corpus Artificial Reef Project) will be implemented instead. Project information and analysis of the Corpus Artificial Reef Project also is provided in this chapter.

4. Sea Rim State Park Improvements Project (Sea Rim State Park Project); and
5. Galveston Island State Park Beach Redevelopment Project (Galveston Island State Park Project).

The figure below provides a map of the locations of all of the proposed projects in Texas. These projects are consistent with the goal of compensating the public for natural resource injuries resulting from the Spill. The Early Restoration projects proposed in this Draft Phase III ERP/PEIS are not intended to fully compensate the public for injuries caused by the Spill. Additional restoration actions will be required.



Location of all Phase III Early Restoration projects proposed in Texas.

Within the remainder of this chapter, there is a subsection for each proposed Phase III Early Restoration project. Each project-specific subsection begins with a general description of the project and relevant background information, followed by: (1) a discussion of the project's consistency with project evaluation criteria; (2) a description of planned performance criteria, monitoring and maintenance; (3) a description of the type and quantity of Offsets BP would receive upon project implementation; and (4) information about estimated project costs.

Following project information is a project-specific environmental review, which provides information regarding the individual project's affected environment and analysis about anticipated environmental consequences of each proposed project. Although each of the proposed projects falls within the Trustees' preferred Programmatic Alternative (Alternative 4) identified and evaluated in Chapters 5 and 6, the Trustees have prepared individual environmental reviews to help ensure that project-specific environmental compliance concerns are addressed.

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

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8.1 Freeport Artificial Reef Project: Project Description

8.1.1 Project Summary

The proposed Freeport Artificial Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico, approximately 6 miles from Freeport, Texas. The current reef site is permitted for 160 acres, but only has materials in 40 acres. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet. These improvements would enhance recreational fishing and diving opportunities. The estimated cost for this Project is \$2,155,365.

8.1.2 Background and Project Description

The purpose of the Freeport Artificial Reef Project is to enhance recreational fishing (and limited diving due to water clarity) opportunities for Texas. Texas Parks and Wildlife Department (TPWD) created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989 (Title 5, Texas Parks and Wildlife Code Chapter 89). The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide a significant fiscal boost to local economies.

The proposed Project will increase the amount of reef materials in a currently permitted artificial reef site, the George Vancouver (Liberty Ship) Artificial Reef (BA-336), located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Brazos (BA-336) (Figure 8-1). The current reef site is permitted for 160 acres, but only has materials in 40 acres of the site. The 40 acres contain the Vancouver Liberty Ship, an obsolete 441-foot WWII ship (placed in 1976), as well as additional reef material including 1-ton+ quarry rock and concrete culverts, and 100 pyramid structures similar to those proposed for this Project. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet, about 6 miles from Freeport, Texas.

The project site is a legacy reef that was originally permitted and created in 1976 with the sinking of the George Vancouver Liberty Ship. The reef permit was later transferred from the Texas Coastal and Marine Council to TPWD in the 1980s before the TPWD's Artificial Reef Program was formally established. The TPWD Coastal Resources Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) provided input into the expansion of the reef. The reef is utilized by numerous fishermen and the George Vancouver Liberty Ship has attracted divers over the years. Commercial trawl fishermen avoid the reef site as it is a well-known "wreck" marked with a navigational buoy and on NOAA charts.



Figure 8-1. Location of the proposed Freeport Artificial Reef Project.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD’s Artificial Reef Program adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. Previous deployments at the permitted reef site placed artificial reef materials (the Vancouver Liberty Ship, quarry rock, concrete culverts, and pyramid structures) in a portion of the 160-acre reef site. The Freeport Artificial Reef Project will randomly space 800 to 950 additional predesigned pyramids in the remaining portions of the permitted area.

Texas’ artificial reefs are generally created by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to

withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high (Figure 8-2). This Project will use similarly structured pyramids. Each pyramid should penetrate the substrate by no more than 2 feet, and the pyramids will be randomly spaced over the designated portion of the 160-acre permitted reef.



Figure 8-2. An example of the predesigned pyramid structures.

8.1.3 Evaluation Criteria

This proposed Freeport Artificial Reef Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Freeport Artificial Reef Project is intended to enhance recreational fishing (and limited diving due to water clarity) opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas, which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The Project would enhance opportunities for the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. 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 Framework Agreement).

The Project is technically feasible, utilizes proven techniques with established methods and documented results, and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The site selection of this reef occurred through the work of the Texas Coastal and Marine Council in the early 1970s. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are

consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The TPWD Coastal Resource Advisory Committee provided input into the expansion of the reef site. As a result, the proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>) and suggested to the State of Texas through other venues.

8.1.4 Performance Criteria, Monitoring and Maintenance

The Freeport Artificial Reef Project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to increase the amount of reef materials in a currently permitted artificial reef site (BA-336) through the random placement of 800 to 950 predesigned concrete pyramids within the open portions of the permitted reef site.

Performance criteria for this Project will include a determination of successful construction of the Project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

Recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the reflective TPWD decal as needed, and replacing or repairing the buoy as needed. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

8.1.5 Offsets

The Early Restoration benefits provided by the Project, also known as Natural Resource Damage (NRD) Offsets, are \$4,310,730 expressed in present value 2013 dollars to be applied against the monetized

value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.³

8.1.6 Cost

The total estimated cost to implement this Project is \$2,155,365. This cost reflects 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.

8.2 Freeport Artificial Reef Project: Environmental Review

The proposed Freeport Artificial Reef Project would increase the amount of reef materials in a currently permitted artificial reef site (BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico, approximately 6 miles from Freeport, Brazoria County, Texas (Figure 8-3). The current reef site is permitted for 160 acres, but only has materials in 40 acres. The 40 acres contain the Vancouver Liberty Ship, an obsolete 441-foot WWII ship (sunk in 1976), as well as additional reef material including 1-ton+ quarry rock, concrete culverts, and 100 pyramid structures similar to the proposed pyramids for this Project (Figure 8-2). The proposed Project would place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet. These improvements would enhance recreational opportunities. The estimated cost for this Project is \$2,155,365.

8.2.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Freeport Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas, which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. This Project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues.

Compliance with state requirements, including the Texas Coastal Management Program, would be fulfilled prior to implementation. All federal, state, and local required permits would be secured prior to project implementation. In addition, compliance with federal requirements including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation.

TPWD obtained a U.S. Army Corps of Engineers (USACE) permit (SWG-2010-00264) for the Freeport Artificial Reef Project under Section 10 of the Rivers and Harbors Act in May 2012. During the permitting process, the Freeport Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program. The USACE permit requires that a 50-meter avoidance zone surrounding the wreck of the George Vancouver be established.

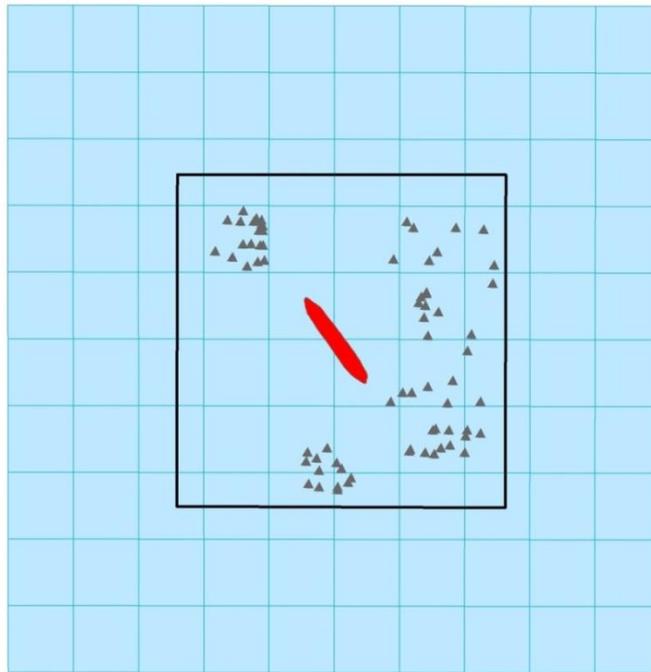


Figure 8-3. Diagram of the 160-acre Freeport Artificial Reef Project area. The gray triangles indicate the area where concrete pyramids are currently located. The red oval depicts the location and orientation of the Liberty Ship. Other artificial reef materials are currently in the Project area within the area designated by the black square.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and avoid impacts to coastal waters. Additionally, the lease requires that the project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements by the TPWD's Artificial Reef Program.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

8.2.2 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 Freeport Artificial Reef Project as part of Phase III Early Restoration.

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

8.2.3 Project Location

The Freeport Artificial Reef Project is located in Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block, Brazos (BA-336) (Figure 8-3). It is located about 6 miles offshore from Brazoria County, Texas at a center point of 28.793009 N, 95.347796 W (North American Datum 1983). The permitted area is 160 acres of sandy substrate at a water depth of 55 feet. The reef site has been permitted for a 33-foot clearance (33 feet of clear water between the surface and any reef material), which allows for a 22-foot profile of material off the ocean bottom.

The location for the Freeport Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.

8.2.4 Construction and Installation

This Project would involve deploying approximately 800-950 three-sided predesigned concrete pyramids (Figure 8-2) in the Project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high. This Project would use similarly structured pyramids. Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the designated portion of the 160-acre permitted reef (areas without reef materials).

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed.

It is expected that the pyramids would be transported directly from the manufacturer, therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Freeport Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for Project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the Project area is expected to take 4 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the Project area.

8.2.5 Operations and Maintenance

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the reflective TPWD decal as needed, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

8.2.6 Affected Environment and Environmental Consequences

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the Freeport Artificial Reef Project area (USACE 2012).⁴ The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The following factors were determined to be particularly relevant to this application and were evaluated appropriately, as they relate to the least environmentally damaging practicable alternative described in the alternative analysis section: historical and cultural resources, water quality, endangered species, fish and wildlife values, Essential Fish Habitat (EFH), wetland/special aquatic species, navigation, federal projects, safety, economics, and air pollution. The USACE considered the

⁴ For purposes of the proposed action under NRDA, the EA and SOF does not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF is discussed in this document for informational purposes only.

following factors during the evaluation process and determined that they were not particularly relevant to the permit application: shoreline erosion and accretion, recreation, aesthetics, land use, conservation, floodplain values, energy needs, food and fiber production, and mineral needs. The EA and SOF found that this Project would benefit the Texas state fisheries by providing an augmented natural habitat for juvenile fish, which in turn would increase recreational fisheries.

When considering the overall impacts that would result from this Project, in context with the overall impacts from similar past, present, and reasonably foreseeable future projects, the USACE concluded that their cumulative impacts are not considered to be significantly adverse since the Project involves the creation of artificial reefs to create habitat for juvenile fish. Overall, the Project would result in minimal environmental impacts and minimal impacts on fish and wildlife values.

The USACE added the following Special Conditions to the permit authorization: the applicant shall establish a 50-meter avoidance zone surrounding the wreck of the George Vancouver and no reef building material shall be placed within this avoidance zone.

The USACE determined that there would be no significant environmental effects identified from the proposed work. The impact of this proposed activity on aspects affecting the quality of the human environment was evaluated and the USACE determined that this action does not require an Environmental Impact Statement. The USACE made the determination to issue a permit for the Freeport Artificial Reef Project, which was issued in May 2012 (SWG-2010-00264).

8.2.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

8.2.6.1.1 Geology and Substrates

Affected Resources

The Freeport Artificial Reef Project is located on the continental shelf in Texas waters approximately 6 miles off the coast of Brazoria County, Texas. The nearshore deployment of artificial reef material would be implemented within a portion of the 160-acre permitted area that does not currently contain artificial materials. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats.

The nearshore deployment of artificial reef material would be implemented within the permitted area, avoiding areas where there are existing artificial reef materials (Figure 8-3). In general, the substrate consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

Environmental Consequences

The proposed Freeport Artificial Reef Project would be placed on Gulf sediments 55 feet below the surface of the water. Detailed surveys of the ocean bottom have been completed. Any hard outcrops or uneven surfaces identified by the surveys would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor, avoiding existing artificial reef structures and a 164-foot (50-meter) buffer zone surrounding the Vancouver Liberty Ship. Each of the 800 – 950 structures would weigh approximately 6,000 pounds and cover an approximately 43-square foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local Project area.

8.2.6.1.2 Hydrology and Water Quality

Affected Resources

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005). Although the Mississippi–Atchafalaya River System accounts for greater than 90% of freshwater discharge into the northern Gulf of Mexico, there are times when the Brazos River is the main source of fresh water to the inner Texas shelf. The Brazos River is the only major Texas river that does not discharge into an embayment system (DiMarco et al. 2012).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

There are no significant currents in the Freeport Artificial Reef Project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 45 feet below the water surface.

Environmental Consequences

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. Best management practices would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These best management practices along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

8.2.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The proposed Freeport Artificial Reef Project area is 6 miles offshore and is not classified for National Ambient Air Quality Standards (NAAQS) criteria pollutants under the Clean Air Act. The nearest county, Brazoria County, which falls within an area the EPA designates as the Houston-Galveston-Brazoria Intrastate Air Quality Control Region (HGB). The HGB is in attainment or unclassified with the NAAQS for all criteria pollutants except ozone. The EPA currently lists the HGB as nonattainment for existing ozone standards.

Implementation of the Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation.

Environmental Consequences

The Freeport Artificial Reef Project implementation would require the use of heavy equipment which would temporarily affect air quality in the Project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during transportation and deployment. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in greenhouse gas (GHG) emissions. Impact minimization measures would be employed to reduce the release of GHG during Project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Project:

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

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

Table 8-1. Estimated greenhouse gas impacts.

EQUIPMENT⁵	NUMBER OF 8-HOUR DAYS	CO₂ (METRIC TONS)⁶	CH₄ (CO₂e) (METRIC TONS)⁷	NO_x (CO₂e) (METRIC TONS)	TOTAL CO₂e (METRIC TONS)
Pickup truck	8	1.28	0.00	0.01	1.28
Excavator	8	2.80	0.00	0.02	2.80
Tugboat ⁸	4	64.00	0.12	0.48	64.60
Crane Barge	4	64.00	0.12	0.48	64.60
Supply Barge	4	64.00	0.12	0.48	64.60
TOTAL		196.08	0.36	1.47	197.88

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

Based on the assumptions described in the table above, and the small scale and short duration of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

8.2.6.1.4 Noise

Affected Resources

Implementation of the Freeport Artificial Reef Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the Project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

⁵ Emissions assumptions for all equipment based on 8 hours of operation.

⁶ CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

⁷ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

⁸ Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

Environmental Consequences

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate Project area would be aware of the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

8.2.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

8.2.6.2.1 Living Coastal and Marine Resources

The Freeport Artificial Reef Project consists of a permitted 160-acre artificial reef area, located approximately 6 miles off the coast of Brazoria County in a water depth of 55 feet. The Project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are existing artificial reef materials which would be avoided during Project implementation. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

Affected Resources

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the Project area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species including sharks, snapper, grouper, and mackerel can also be found in the Project area.

Environmental Consequences

Fauna in the Project area may be affected by the Freeport Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011). Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can. This Project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef Project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

8.2.6.2.2 Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act. The Freeport Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act.

Affected Resources

Endangered Species

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the U.S. Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS). No federally-listed, proposed, or candidate species have critical habitat in the Freeport Artificial Reef Project area.

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the Project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore coral reefs, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Due to the already existing reef structures in the permitted area, endangered or threatened species may utilize the Project area as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

Essential Fish Habitat

The Freeport Artificial Reef Project is located in an area that is designated as Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the Project location.

Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The Freeport Artificial Reef Project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 55 feet at the Project

location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the Project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 55 feet in the Project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian Manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the Project area, which is 6 miles offshore.

Environmental Consequences

The reef site is located at a depth of 55 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material. Deployment of the reef materials would be short in duration (4 days) and materials would be lowered slowly, providing fish and wildlife opportunity to leave the reef deployment area. Impacts to wildlife would be avoided via management guidelines and techniques as appropriate. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the Project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, sea turtle and smalltooth sawfish construction conditions would be followed (NMFS 2006).

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the Project area are temporarily disturbed. However, using monitors and adjusting Project activities would reduce the potential of impacts to protected species. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

8.2.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism

and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.2.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen (<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas pipelines, leases, and an anchorage area within a 5-mile radius of the Project. There would be no negative impacts to the exploration and production of oil and gas. The Project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts and there is a buoy in the Project area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

Environmental Consequences

Because the Freeport Artificial Reef Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Project. There would be indirect beneficial effects to the local economy due to increased fishing and diving opportunities provided by the artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Freeport Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Project would benefit the local economies adjacent to the Project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. Commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to

equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed Project. The proposed Project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 6 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed Project.

8.2.6.3.2 Cultural Resources

Affected Resources

The permitted area has been investigated for Historic Properties as documented in the report titled "Marine Remote-Sensing Survey for Archeological Assessment of the Vancouver Artificial Reef Expansion, Gulf of Mexico, Brazoria County, Texas" (Tubby 2012). The George Vancouver Liberty Ship was previously used as artificial reef material within the permitted area and is considered an historic resource. The ship is the only historic resource that was found and identified within the permit area as a result of the investigation and would be avoided during Project implementation. The USACE permit requires that a 50-meter avoidance zone surrounding the wreck of the George Vancouver be established.

Environmental Consequences

A detailed archaeology of the entire reef area has been conducted and all areas that could contain historic or culturally important resources would be avoided. A complete review of this Project under Section 106 of the National Historic Preservation Act 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.

8.2.6.3.3 Land and Marine Management

Affected Resources

The Freeport Artificial Reef Project area is located approximately 6 miles offshore of Brazoria County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2010-00264) for the Freeport Artificial Reef Project under Section 10 of the Rivers and Harbors Act in May 2012. During the permitting process, the Freeport Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

Environmental Consequences

The Freeport Artificial Reef Project would be located offshore, and would not be subject to zoning, land-use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the Project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, by following these requirements the Project would not have any impacts to the oil and gas production facilities and pipelines in the area of the Project. In addition, the Project is located greater than 5 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of 33 feet clearance above the reef. Therefore, land and marine management would be unaffected by the Freeport Reef Project.

8.2.6.3.4 *Aesthetics and Visual Resources*

Affected Resources

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore. The reef is already identified by a buoy with reflective TPWD decals.

Environmental Consequences

The use of barges and large equipment could have a temporary visual impact during the time of Project implementation. The deployment time would be short in duration, and therefore any visual impacts would be short as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The buoy is already in place, and therefore would not introduce a new visual component to the area. Therefore, the Freeport Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

8.2.6.3.5 *Tourism and Recreational Use*

Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Environmental Consequences

The size of the Freeport Artificial Reef Project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Recreational and commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access point from land is the Freeport Ship Channel to the northeast. The channel is serviced by public boat ramps, marinas, and harbors, which makes the Project very accessible to the public. In addition, during restoration scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the enhancement of the Freeport Reef would increase recreational fishing opportunities. In turn, this is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. These economic benefits would be concentrated in the service and retail industry sectors. Therefore, any adverse impacts to tourism and recreational use would be short-term and minor occurring only during construction when areas are temporarily closed to other uses. The Project should result in beneficial impacts to tourism and recreational uses over the long term.

8.2.6.3.6 *Infrastructure*

Affected Resources

The Freeport Artificial Reef Project area is located approximately 6 miles offshore of Brazoria County. The Project area is located in 55 feet of water and is permitted for a 33-foot clearance to ensure that it would not impede boat traffic. The Project is located less than 5 miles from the Freeport Harbor Anchorage area. The reef area is about 8 miles to the shipping fairway, approximately 5,230 feet to the oil and gas pipelines, and about 6 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.

Environmental Consequences

The Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Navigation occurring in the area would not be adversely affected by this Project since the structures would have a minimum 33-foot clearance. Therefore, infrastructure would be unaffected by the proposed Project.

8.2.6.3.7 *Public Health and Safety and Shoreline Protection*

Affected Resources

The Freeport Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 6 miles offshore and not in an area that would impact shoreline erosion. The Project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels.

Environmental Consequences

Because of the nature and location of the Freeport Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No

adverse effects to public health and safety and shoreline projection are expected as a result of this Project.

8.2.7 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), 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).

The proposed Freeport Artificial Reef Project would increase the amount of reef materials in an artificial reef site which is currently permitted for 160 acres, but only has materials in 40 acres. The Project would place predesigned concrete pyramids in the remaining portions of the permitted area onto sandy substrate at a water depth of 55 feet. The Project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.3 Matagorda Artificial Reef Project: Project Description

8.3.1 Project Summary

The proposed Matagorda Artificial Reef Project will create a new artificial reef site (BA-439) within Texas state waters in the Gulf of Mexico, approximately 10 miles offshore of Matagorda County, Texas. The proposed Project will create 160 acres of artificial reef, through deployment of predesigned concrete pyramids onto sandy substrate at a water depth of 60 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$3,486,398.

8.3.2 Background and Project Description

The purpose of the Matagorda Artificial Reef Project is to enhance recreational fishing (and limited diving due to water clarity) opportunities in Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide a significant fiscal boost to local economies.

The proposed Project will create a new artificial reef (BA-439) located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Brazos (BA-439) (Figure 8-4). The Project area is 160 acres of barren, sandy substrate at a water depth of 60 feet, about 10 miles offshore of Matagorda County, Texas.



Figure 8-4. Location of the proposed Matagorda Reef Project.

The location for the Matagorda Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD's Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs.

The Texas Sea Grant Extension Service and the Matagorda County local government were consulted for several years before TPWD applied for the reef site permit in 2009. The Texas Sea Grant Extension Service engaged in extensive communication with local fishermen (recreational and commercial), divers, the general public, and local government to assist in developing a local reef site that would enhance marine habitat, provide additional angling opportunities, and strengthen the local economy. The BA-439 reef location was approved after further discussion with the Matagorda County officials and verification that the site adhered to guidance provided in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan. The TPWD Coastal Resource Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides easy access for the local community, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending to benefit the local economy.

The Matagorda Artificial Reef Project will create a new reef by deploying 1,600 predesigned concrete pyramids randomly within the 160-acre Project area. Texas' artificial reefs are generally created by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high (Figure 8-5). This Project will use similarly structured pyramids. Each pyramid should penetrate the substrate by no more than 2 feet.

8.3.3 Evaluation Criteria

This proposed Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Matagorda Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The Project would enhance opportunities for public use and enjoyment of natural resources, helping to offset

adverse impacts to such uses caused by the Spill. 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 Framework Agreement).



Figure 8-5. An example of the predesigned pyramid structures.

The Project is technically feasible, utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The Project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Matagorda Artificial Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The Matagorda County local government, the Texas Sea Grant Service, local fishermen, divers, and the public provided input into the selection of the reef site. As a result, the proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues.

8.3.4 Performance Criteria, Monitoring and Maintenance

The Matagorda Artificial Reef Project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the Project objective, which is

to create an artificial reef through the random placement of 1,600 predesigned concrete pyramids within the permitted artificial reef site (BA-439).

Performance criteria for this Project will include a determination of successful construction of the Project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

Recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A buoy waiver was received from USCG so buoy maintenance is not expected for the Matagorda Reef Project. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

8.3.5 Offsets

The Early Restoration benefits provided by the Project, also known as NRD Offsets, are \$6,972,796 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed Project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.⁹

⁹ 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.

8.3.6 Cost

The total estimated cost to implement this Matagorda Artificial Reef Project is \$3,486,398. This cost reflects estimates developed from the most current information available to the Trustees at the time of the Project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

8.4 Matagorda Artificial Reef Project: Environmental Review

The proposed Matagorda Artificial Reef Project would create a new artificial reef site (BA-439) within Texas state waters in the Gulf of Mexico, approximately 10 miles offshore of Matagorda County, Texas (Figure 8-4). The proposed Project would create an artificial reef within the 160-acre permitted area, through deployment of predesigned concrete pyramids onto sandy substrate at a water depth of 60 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$3,486,398.

8.4.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Matagorda Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. There are no other artificial reef areas in state waters offshore of Matagorda County, Texas. This Project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues.

Compliance with state requirements, including the Texas Coastal Management Program, would be fulfilled prior to implementation. All federal, state, and local required permits would be secured prior to project implementation. In addition, compliance with federal requirements including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation.

TPWD obtained a USACE permit (SWG-2009-01139) for the Matagorda Artificial Reef Project under Section 10 of the Rivers and Harbors Act in December 2010. During the permitting process, the Matagorda Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. The USCG reviewed the Project and determined that private aids to navigation are not required for this Project.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's

Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NOAA Fisheries 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Matagorda Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

8.4.2 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 Matagorda Artificial Reef Project as part of Phase III Early Restoration.

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

8.4.3 Project Location

The Matagorda Artificial Reef Project is located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block, Brazos (BA-439) (Figure 8-4). The Project is located about 10 miles offshore from Matagorda County, Texas and 17 miles from the mouth of the Colorado River at a center point of 28.516972° N, 95.781252° W (North American Datum 1983). The permitted area is 160 acres of sandy substrate at a water depth of 60 feet. The reef site has been permitted for a 50-foot clearance (50 feet of clear water between the surface and any reef material), which allows for a 10-foot profile of material off the ocean bottom.

The location for the Matagorda Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.

The Project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The public, Matagorda County local government, the Texas Sea Grant Service, local fishermen and divers provided input into the selection of the reef site. The TPWD developed The Texas Artificial Reef Fishery Management Plan (TPWD 1990) which guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery

resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process.

8.4.4 Construction and Installation

Surveys of the Project area would be conducted prior to Project implementation to verify the location and avoid all hard bottom substrates and previously deployed artificial reef materials. This Project would create a new reef by deploying approximately 1,600 predesigned concrete pyramids in the Project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life (Figure 8-5). The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high. This Project would use similarly structured pyramids. Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the 160-acre permitted reef site.

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed.

It is expected that the pyramids would be transported directly from the manufacturer, therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Matagorda Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for Project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the Project area is expected to take 4 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or

early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the Project area.

8.4.5 Operations and Maintenance

No ongoing maintenance beyond the annual surveys is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A buoy waiver was received from the USCG, so buoy maintenance is not expected for the Matagorda Reef Project. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

8.4.6 Affected Environment and Environmental Consequences

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the Project area (USACE 2010).¹⁰ The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The EA and SOF found:

- The Project will result in the creation of an artificial reef that will augment natural fisheries habitat for juvenile reef fish for the benefit of the public;
- There are no existing natural reefs located within the Project site;
- Construction of the reef will enhance the fish and wildlife values of the site;
- Sport and recreational fishing will be enhanced in the area; and
- There will be minimal cumulative environmental impacts from this Project.

The USACE decided to issue the permit because it is consonant with National policy statues, and administrative directives; and that on balance, the total public interest would be best served by the issuance of the permit for the proposed work.

In the conclusion of the EA and SOF, the USACE made the determination to issue a permit for the Matagorda Reef Project, which was issued in December 2010 (SWG 2009-001139).

8.4.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique

¹⁰ For purposes of the proposed action under NRDA, the EA and SOF does not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF is discussed in this document for informational purposes only.

features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

8.4.6.1.1 *Geology and Substrates*

Affected Resources

The Matagorda Artificial Reef Project is located on the continental shelf in Texas waters approximately 10 miles off the coast of Matagorda County, Texas. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats. The nearshore deployment of artificial reef material would be implemented within a permitted area that does not contain existing artificial materials. The Project area covers 160 acres of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

Environmental Consequences

The proposed Project would be placed on Gulf sediments 60 feet below the surface of the water. Prior to reef construction, a survey of the project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor. Each of the 1,600 structures would weigh approximately 6,000 pounds and cover approximately 43 square-foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local Project area.

8.4.6.1.2 *Hydrology and Water Quality*

Affected Resources

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

There are no significant currents in the Project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 50 feet below the water surface.

Environmental Consequences

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. Best management practices would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These best management practices along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

8.4.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The proposed Matagorda Artificial Reef Project area is 10 miles offshore and is not classified for NAAQS criteria pollutants under the Clean Air Act. The nearest county, Matagorda County, is not listed as a nonattainment area for any pollutant by the U.S. Environmental Protection Agency (EPA).

Implementation of the Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation.

Environmental Consequences

Matagorda Artificial Reef Project implementation would require the use of heavy equipment which would temporarily affect air quality in the Project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during transportation and deployment. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during Project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Project:

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

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

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

Table 8-2. Estimated greenhouse gas impacts.

EQUIPMENT ¹¹	NUMBER OF 8-HOUR DAYS	CO ₂ (METRIC TONS) ¹²	CH ₄ (CO ₂ e) (METRIC TONS) ¹³	NO _x (CO ₂ e) (METRIC TONS)	TOTAL CO ₂ e (METRIC TONS)
Pickup truck ¹⁴	8	1.28	0.00	0.01	1.28
Excavator	8	2.80	0.00	0.02	2.80
Tugboat ¹⁵	4	64.00	0.12	0.48	64.60
Crane Barge	4	64.00	0.12	0.48	64.60
Supply Barge	4	64.00	0.12	0.48	64.60
TOTAL		196.08	0.36	1.47	197.88

Based on the assumptions described in the table above, and the small scale and short duration of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

8.4.6.1.4 Noise

Affected Resources

Implementation of the Matagorda Artificial Reef Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the Project area

¹¹ Emissions assumptions for all equipment based on 8 hours of operation.

¹² CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

¹³ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

¹⁴ Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

¹⁵ Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

Environmental Consequences

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate Project area would be aware of the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating, personal vehicle use, and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

8.4.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

8.4.6.2.1 Living Coastal and Marine Resources

The Matagorda Artificial Reef Project consists of a permitted 160 acre artificial reef area, located approximately 10 miles off the coast of Matagorda County in a water depth of 60 feet. The Project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are no existing artificial reef materials in the Project site. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

Affected Resources

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on

the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the Project Area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species including sharks, snapper, grouper, and mackerel can also be found in the Project area.

Environmental Consequences

Fauna in the Project area may be affected by the Matagorda Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials will provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011). Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can. This Project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef Project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

8.4.6.2.2 Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act. The Matagorda Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act.

Affected Resources

Endangered Species

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the FWS or NMFS. No federally-listed, proposed, or candidate species have critical habitat in the Project area.

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the Project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore coral reefs, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Since there are currently no artificial reef structures in the permitted area, no endangered or threatened species are likely to be utilizing the Project area at the time of Project implementation as habitat for foraging, breeding, or resting. The Project area has not been designated as critical habitat for any of the sea turtle species.

Essential Fish Habitat

The Matagorda Artificial Reef Project is located in an area that is designated as Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the Project location.

Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The Project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 60 feet at the Project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the Project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 60 feet in the Project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the Project area, which is 10 miles offshore.

Environmental Consequences

The reef site is located at a depth of 60 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material. Deployment of the reef materials would be short in duration (4 days) and materials would be lowered slowly, providing wildlife opportunity to leave the reef deployment area. Impacts would be avoided via management guidelines and techniques. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the Project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, sea turtle and smalltooth sawfish construction conditions would be followed (NMFS 2006).

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the Project area are temporarily disturbed. However, using monitors and adjusting Project activities will reduce the potential of impacts to protected species. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles, such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

8.4.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.4.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen (<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas platforms, leases, and pipelines within a 5-mile radius of the Project; however, there would be no negative impacts to the exploration and production of oil and gas. The Matagorda Artificial Reef Project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

Environmental Consequences

Because this Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Matagorda Artificial Reef Project. There would be indirect beneficial effects to the local economy due to increased fishing opportunities provided by the artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Matagorda Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Project would benefit the local economies adjacent to the Project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. It is expected the commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed Project. The Project is expected to provide a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 10 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed Project.

8.4.6.3.2 Cultural Resources

Affected Resources

At this time, there are no known historic or prehistoric sites in the permitted reef area. An archeological survey would be conducted prior to Project implementation to ensure that no historically or culturally significant areas would be impacted during the deployment of the artificial reef materials. If hard bottom substrates or other areas which could contain protected cultural resources are identified by the survey, these areas would be avoided during Project implementation.

Environmental Consequences

If any culturally or historically important resources are identified during Project preparations or pre-deployment surveys, such areas would be avoided during deployment of the pyramid structures. A complete review of this Project under Section 106 of the National Historic Preservation Act 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.

8.4.6.3.3 Land and Marine Management

Affected Resources

The Project area is located approximately 10 miles offshore of Matagorda County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2009-01139) for the Matagorda Artificial Reef Project under Section 10 of the Rivers and Harbors Act in December 2010. During the permitting process, the Matagorda Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. The USCG reviewed the Project and determined that a buoy is not required for this Project.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Matagorda Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

Environmental Consequences

The Matagorda Artificial Reef Project would be located offshore, and would not be subject to zoning, land-use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the Project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, by following these requirements the Project would not have any impacts to the oil and gas production facilities and pipelines in the area of the Project. In addition, the Project is located greater than 5 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of 50 feet clearance above the reef. Thus, the Project would not adversely impact shipping and navigation use in the Project area, and would be consistent with current uses. Therefore, land and marine management would be unaffected by the Matagorda Reef Project.

8.4.6.3.4 Aesthetics and Visual Resources

Affected Resources

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore.

Environmental Consequences

The use of barges and large equipment could have a temporary visual impact during the time of Project implementation. The deployment time would be short in duration and therefore any visual impacts would be short as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. Therefore, the Matagorda Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

8.4.6.3.5 *Tourism and Recreational Use*

Affected Resources

Currently an artificial reef does not exist in the area. According to TPWD data, artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Environmental Consequences

The size of the Project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Because the Matagorda Artificial Reef Project is not placing materials near an existing artificial reef, it would not have any impacts on existing recreational reef fishing in the area. Though unlikely, it is possible that recreational and/or commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access points from land include Freeport Ship Channel to the northeast, the Colorado River Channel to the northwest and Matagorda Channel to the south. Each channel is serviced by public boat ramps, marinas, and harbors, which makes the Project very accessible to the public. In addition, during restoration scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the construction of the Matagorda reef would increase recreational fishing opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Therefore, any adverse impacts to tourism and recreational use would be short-term and minor occurring only during construction when areas are temporarily closed to other uses. The Project should result in beneficial impacts to tourism and recreational uses over the long-term.

8.4.6.3.6 *Infrastructure*

Affected Resources

The Project area is located approximately 10 miles offshore of Matagorda County. The Project area is located in 60 feet of water and is permitted for a 50-foot clearance to ensure that it would not impede boat traffic. The Project is located about 21 miles from the Matagorda Channel Anchorage area. The reef area is about 8 miles to the shipping fairway, approximately 5,230 feet to the oil and gas pipelines, and about 2 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.

Environmental Consequences

The Matagorda Artificial Reef Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Therefore, infrastructure would be unaffected by this Project.

8.4.6.3.7 Public Health and Safety and Shoreline Protection

Affected Resources

The Matagorda Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 10 miles offshore and not in an area that would impact shoreline erosion. The Project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels.

Environmental Consequences

Because of the nature and location of the Matagorda Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release will be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No adverse effects to public health and safety and shoreline projection are expected as a result of this Project.

8.4.7 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), 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).

The proposed Matagorda Artificial Reef Project would create a new artificial reef site approximately 10 miles offshore of Matagorda County, Texas. It would create an artificial reef within the 160-acre permitted area, through deployment of predesigned concrete pyramids. The Project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.5 Mid/upper Texas Coast Artificial Reef - Ship Reef Project: Project Description

8.5.1 Project Summary

The proposed Ship Reef Project will enhance fishing and diving opportunities for Texas by sinking a ship to create an artificial reef about 67 miles offshore of Galveston, Texas in the Gulf of Mexico. Texas will acquire and sink a ship that is at least 200 feet long in waters that are approximately 135 feet deep. The ship will be cleaned of hazardous substances to meet Environmental Protection Agency (EPA) criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. The Project area (HI-A-424) is 80 acres of sandy substrate in the Gulf of Mexico. This Early Restoration project proposal would fund a portion of the costs to implement this project. The estimated cost for the NRD Early Restoration portion of this Project is \$1,785,765. Additional funds from donations to the TPWD Texas Artificial Reef Program will be used to complete the project.

8.5.2 Background and Project Description

The purpose of the Ship Reef Project is to enhance recreational fishing and diving opportunities for Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide a significant fiscal boost to local economies.

The proposed Project will create a new artificial reef (HI-A-424) in the Gulf of Mexico in the Outer Continental Shelf Block High Island (HI-A-424). It is located approximately 67 miles offshore from Galveston (Figure 8-6), Texas in about 135 feet of water. The project area covers 80 acres of what is believed to be barren, sandy substrate along the continental shelf. An archaeology / bottom survey is currently being contracted to characterize and survey the bottom at this reef site.



Figure 8-6. Location of the proposed Ship Reef Project.

The location for the Ship Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD’s Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004) and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when creating artificial reefs. The 80-acre ship reef project area was selected after an evaluation of 35 permitted reef sites in the TPWD General Permit Zone in the High Island Outer Continental Shelf Block of the Gulf of Mexico. High Island 424 (HI-A-424) was selected after consideration of numerous factors, including water depth, proximity to other reef sites, proximity to shipping lanes, navigational concerns, buoy marking requirements, proximity to the Flower Gardens Banks National Marine Sanctuary, potential user conflicts, interference with future petroleum operations, and constituency desires.

Texas will acquire and sink a ship that is at least 200 feet long in waters that are approximately 135 feet deep. The ship will be cleaned of hazardous substances to meet EPA criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. This Project will support the

recreational fisherman and divers in Texas by adding structure that will attract reef fish, and preserve the nautical heritage of the ship (Figure 8-7).



Figure 8-7. Example of a ship that was used to create an artificial reef in Texas.

The addition of a ship reef off of the northern coast of Texas has wide support from divers, anglers, fisheries managers, the public, and local governments. Ships are constructed of durable and stable material and once sunk, form complex habitats for attracting marine life, provide recreational opportunities for divers and anglers, and generate economic returns to local communities. The diving community has expressed interest in a ship reef that is designed specifically for diving. The TPWD's Artificial Reef Program recently received a petition of support for a ship reef project from the Texas Gulf Council of Diving Clubs with over 500 diver signatures.

8.5.3 Evaluation Criteria

This proposed Ship Reef Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Ship Reef Project is intended to enhance recreational fishing and diving opportunities in the Gulf of Mexico offshore of Texas. This proposed ship reef will benefit anglers and divers by creating additional habitat to attract a high diversity of reef species in an area that has good visibility for recreational diving activities. The Project would enhance opportunities for public use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. 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 Framework Agreement).

The Project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement). Cost

estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

This project area was chosen for placement of a ship artificial reef, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The creation of a ship reef off the northern coast of Texas has received wide support from divers, anglers, fisheries managers, the public, and local governments. As a result, the proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)). While the Trustees believe this to be a technically feasible project, should the Ship Reef Project become technically infeasible (e.g., due to a lack of appropriate ship options), the Trustees have also proposed as an alternate project an artificial reef project within Texas state waters (the Corpus Artificial Reef Project) in which predesigned pyramid reef structures will be deployed.

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues.

8.5.4 Performance Criteria, Monitoring and Maintenance

This Ship Reef Project includes monitoring efforts to ensure project methods are correctly implemented during implementation. Monitoring has been designed around the project objective, which is to create an artificial reef through the sinking of a ship within the artificial reef site (HI-A-424).

Performance criteria for this Project will include a determination of successful construction of the Project according to design, and then monitoring and maintenance to confirm that the ship is in place and available for recreational fishing and diving. In order to determine successful placement of the ship according to design plans, multi-beam side-scan surveys and/or divers will verify final location and orientation of the ship before and after project implementation. The post-implementation survey will also be used to confirm that the final Project meets all permit conditions, including USCG clearance restrictions.¹⁶ Monitoring using side-scan sonar and/or divers will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the ship. Recreational use of the reef observed during the annual monitoring will also be documented.

¹⁶ A permit decision is expected to be issued in late 2013.

Recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A lighted buoy, as required by the USCG, would be installed within the reef area. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

8.5.5 Offsets

The Early Restoration benefits provided by the Project, also known as (NRD) Offsets, are \$3,571,530 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to the NRD Early Restoration portion of its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.¹⁷

8.5.6 Cost

The total estimated cost to implement the Ship Reef Project is estimated to be \$3-4 million. The estimated cost for the NRD Early Restoration portion of this Project is \$1,785,765. Additional funds would come from donations to the TPWD's Artificial Reef Program. This cost reflects 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.

¹⁷ 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.

8.6 Mid/upper Texas Coast Artificial Reef - Ship Reef Project: Environmental Review

The proposed Ship Reef Project would create a new artificial reef site in deep waters of the Gulf of Mexico, approximately 67 miles south-southeast of Galveston, Texas (Figure 8-8). The proposed Project would create an artificial reef within an 80 acre reef site, through the sinking of a ship in water about 135 feet deep. Texas would acquire and sink a ship that is at least 200 feet long and that has been cleaned of hazardous substances to meet Environmental Protection Agency (EPA) criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. The Ship Reef Project would enhance recreational fishing and diving opportunities. The estimated cost for this Project is \$4,000,000 of which \$1,785,765 would be allocated from Early Restoration funds. Additional funds would come from donations to the TPWD's Artificial Reef Program.

8.6.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the spill, including recreational fishing and diving, beach use, camping, diving, and wildlife viewing. This Project is intended to enhance recreational fishing and diving opportunities by creating artificial reef habitat through the sinking of a ship in clear offshore waters.

The diving community has expressed interested in a ship reef that is designed specifically for diving. Sinking a ship in clear offshore waters that are appropriate for diving would alleviate a need for additional reef diving and fishing activities by Texas patrons. This Project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues..

The addition of a ship reef off of the northern coast of Texas has wide support from divers, anglers, fisheries managers, the public and local governments. Ships are constructed of durable and stable material and form complex habitats for attracting marine life, provide recreational opportunities for divers and anglers, and generate economic returns to local communities. The diving community has expressed interest in a ship reef that is designed specifically for diving. The TPWD's Artificial Reef Program recently received a petition of support for a ship reef project from the Texas Gulf Council of Diving Clubs with over 500 signatures. The Ship Reef Project was chosen to be appropriate, in part, because of public support for the site.

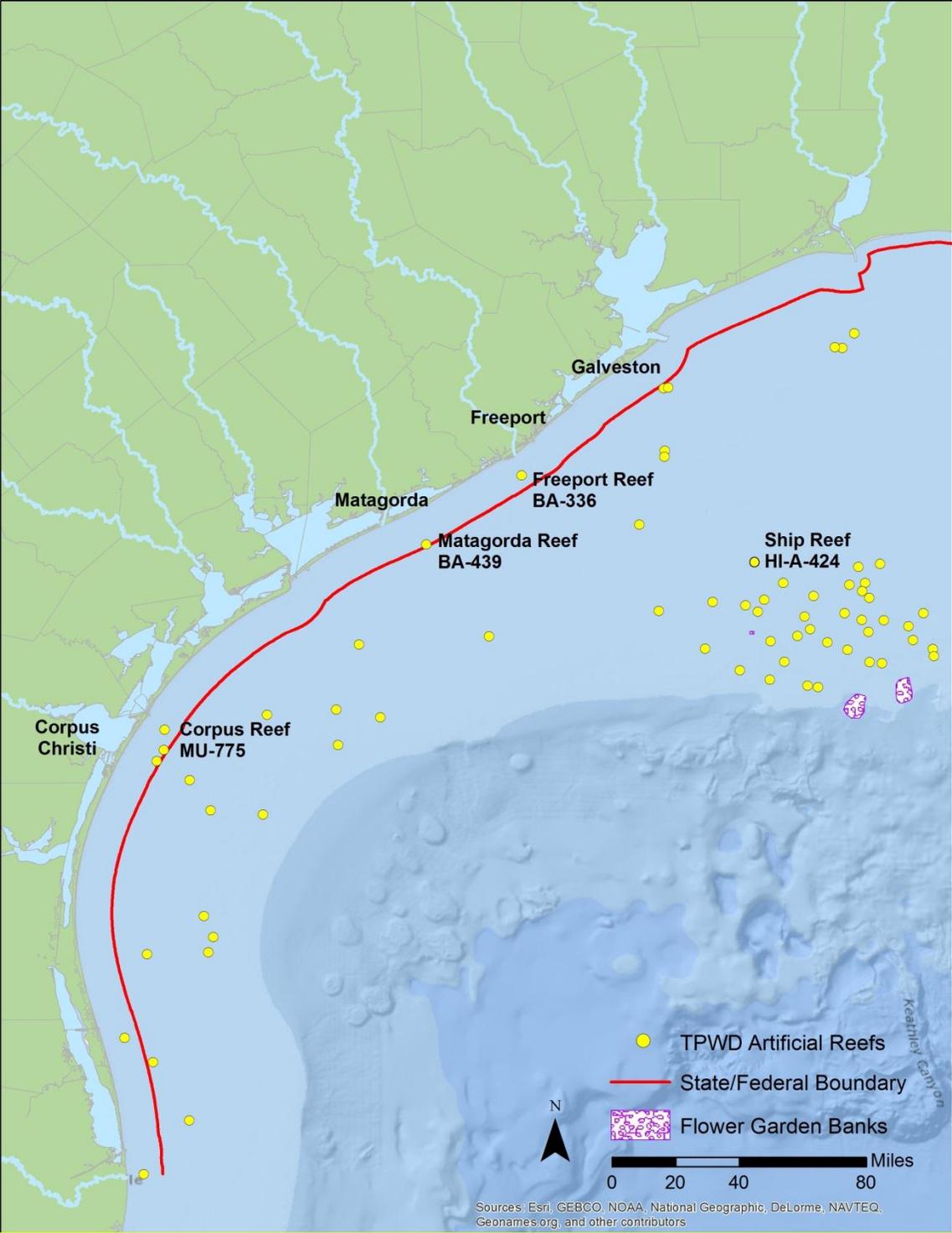


Figure 8-8. Location of the Ship Reef Project and other artificial reef locations along the Texas coast in the Gulf of Mexico.

All federal, state, and local required permits would be secured prior to Project implementation. In addition, compliance with federal requirements including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation.

The USACE reef site application was submitted on March 22, 2013 and was put out for public notice on June 3, 2013. A permit decision is expected to be issued in late 2013. The permit would require that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. The USCG has conducted a preliminary review of this Project. A buoy and a 60-foot clearance would likely be required.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004) and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when creating artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan. While the Trustees believe this to be a technically feasible project, should the Ship Reef Project become technically infeasible (e.g., due to a lack of appropriate ship options), the Trustees have also proposed an artificial reef project within Texas state waters (the Corpus Reef Project) in which predesigned pyramid reef structures would be deployed.

8.6.2 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 Ship Reef Project or the Corpus Artificial Reef Project as part of Phase III Early Restoration.

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

8.6.3 Project Location

The Ship Reef Project is located in the Outer Continental Shelf Block High Island (HI-A-424) of the Gulf of Mexico. The site is approximately 67 miles south-southeast of Galveston, Texas in federal waters at a center point of 28.444008° N, 94.285044° W (North American Datum of 1983). The reef site is 80 acres and the water depth is approximately 135 feet. The reef site is anticipated to be permitted for a 60-foot clearance (60 feet of clear water between the surface and the ship), which allows for a 75-foot profile of material off the ocean bottom.

The location for the Ship Reef Project was identified in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates. The 80 acre Ship Reef Project area was selected after an evaluation of 35 permitted reef sites in the TPWD General Permit Zone in the High Island Outer Continental Shelf Block of the Gulf of Mexico. High Island 424 (HI-A-424) was selected after consideration of numerous factors, including water depth, proximity to other reef sites, proximity to shipping lanes, navigational concerns, buoy marking requirements, proximity to the Flower Gardens Banks National Marine Sanctuary, potential user conflicts, interference with future petroleum operations, and constituency desires.

8.6.4 Construction and Installation

Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i.e. coral reefs, rock outcrops, etc.). Surveys of the Project area would be conducted prior to Project implementation to verify the location and avoid all hard bottom substrates.

TPWD would acquire a ship that is at least 200 feet long, visually complex and interesting for divers, and is able to be properly cleaned, modified and sunk (Figure 8-7). It is estimated that the surface area on the keel of the ship would be 12,500 square feet, which would cover less than 1% of the permitted 80 acres. That leaves sufficient space for other materials to be reefed at a later date if desired. Prior to sinking, the ship would be cleaned and would undergo modifications to meet clearance and safety requirements. Once the ship has been acquired, the exact method of cleanup, hull modification, and sinking would be determined. A sinking plan would be developed in coordination with the USCG to ensure safety of personnel participating and/or observing the sinking. The sinking plan would involve the use of explosives to overcome buoyancy and “drive” the ship to the bottom quickly and evenly to avoid the effects of surface winds and uneven flooding which would cause listing. The exact orientation and location of the ship would be determined during the development of the sinking plan. Small charges would be designed to provide just enough force to open pre-cut holes in the hull for flooding. The sinking plan would be designed with input from the NMFS to minimize the overall noise impacts above and below the water line. Other plans, including safety plans (for both people and wildlife) would be developed and approved by regulatory agencies. In addition, a lighted buoy, as required by the USCG would be installed within the permitted reef area.

The ship would be modified for sinking in an upright position on the ocean floor and would have a 60-foot clearance between the surface and the highest point of the ship. Divers would descend from the surface to the top of the ship at 60 feet and proceed to the main deck to be located at a depth of approximately 80 feet. They would then have access to the inside of the vessel at selected points. Ship masts would be left standing, and their tops cut and welded onto the deck. The ship would be modified to leave as much of its overall appearance as possible for habitat and diver attraction.

A safety zone radius of approximately 2,000 feet would be established around the reef site during the sinking to exclude all ship and submarine traffic not participating in the sinking action. The specific radius would be determined by the USCG on site. Any traffic within this radius would be warned to alter course or would be escorted from the site. Notices to aviators and mariners would be published in advance of the sinking exercise as coordinated with the USCG. An immediate "STOP WORK" would be ordered if any unauthorized craft entered the safety zone and could not be contacted. The "STOP WORK" would continue until the safety zone was clear of unauthorized vessels.

Request for Proposals (RFPs) to complete the artificial reef project would be developed and publicly noticed for bid when funds are secured. It may take 4 to 6 months to complete the request for proposals, bid review, and award of contracts. Once contracts for Project implementation are awarded, construction, clean-up, inspections, and sinking are expected to take approximately 11 to 16 months to complete. The date the contract is awarded may impact the timing of the Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after sinking the ship, side scan sonar would be used to verify the correct placement of materials in the Project area. The entire Project is expected to take approximately 18 months to complete.

There is a detailed discussion of the methods and procedures that would be used to implement this Project. The document is called *Texas Ship Reef Project Preliminary Methods*, which can be found here at this website

http://tpwd.texas.gov/landwater/water/environconcerns/damage_assessment/deep_water_horizon.pdf and will be available in the Administrative Record.

8.6.5 Operations and Maintenance

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A lighted buoy, as required by the USCG, would be installed within the permitted reef area. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

8.6.6 Affected Environment and Environmental Consequences

8.6.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into

geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

8.6.6.1.1 *Geology and Substrates*

Affected Resources

The proposed Ship Reef Project is located on the outer continental shelf in the Gulf of Mexico approximately 67 miles off the coast of Galveston, Texas. The location within the Project area for the ship would be selected such that any hard bottom substrates that may be identified in the pre-deployment surveys are avoided. In general, the substrate consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

Environmental Consequences

The Ship Reef Project site is located within the High Island Outer Continental Shelf Block (HI-A-424) in approximately 135 feet of water. Explosives would be used to sink the ship to quickly place the ship on the Gulf's floor rather than other types of flooding techniques. This would ensure correct orientation and placement. It is expected that some minor disturbance of the sediments would occur with the placement of the materials, but they would be short in duration and localized to the Project area. There would be some localized compaction in the Project site due to the placement of the ship, but this would not substantially change the substrate characteristics or local geology. Prior to sinking, a survey of the Project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials. Therefore, any adverse impacts to geology and substrates would be minor both in the short-term due to site disturbance and in the long-term due to minimal substrate compaction.

8.6.6.1.2 *Hydrology and Water Quality*

Affected Resources

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

Environmental Consequences

Creation of a ship reef would result in short-term, minor adverse impacts to water quality. Specifically, short-term increases in turbidity would occur as a result of the ship settling onto the ocean floor. Best management practices would include minimizing the size of explosives used during deployment of the ship. Additionally, all hazardous materials will be removed from the ship before reefing per EPA and US Maritime Administration National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs (2006). This will insure that water quality is not compromised from substances leaching from the ship itself. These best management practices along with other avoidance and impact

minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. USACE Section 10/404 and State Water Quality Certifications would be required and all permit conditions would be adhered to.¹⁸ Therefore, any adverse impacts to water quality would be short-term and minor. Given its location, the Ship Reef Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area.

8.6.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The Project area is located approximately 67 miles offshore and in an area that is not classified for NAAQS criteria pollutants under the Clean Air Act.

Implementation of the Project would include transportation of the ship to the Project area, which may include ship, barge, truck or other types of transportation.

Environmental Consequences

Project implementation would require the use of tugboats, support vessels and possibly aircraft. Available best management practices would be employed to prevent, minimize, and control potential air pollutants during Project implementation. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from vessels and aircraft would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during Project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Project:

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

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

¹⁸ A permit decision is expected to be issued in late 2013.

Table 8-3. Estimated greenhouse gas impacts.

EQUIPMENT ¹⁹	NUMBER OF 8-HOUR DAYS	CO ₂ (METRIC TONS) ²⁰	CH ₄ (CO ₂ e) (METRIC TONS) ²¹	NO _x (CO ₂ e) (METRIC TONS)	TOTAL CO ₂ e (METRIC TONS)
Tugboats ²²	4	64.00	0.12	0.48	64.60
Boats ²³	5	6.50	0.01	0.05	6.55
Pickup truck ²⁴	1	0.16	0.00	0.00	0.16
TOTAL		70.66	0.13	0.53	71.31

Based on the assumptions described in the table above, and the small scale and short duration of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

8.6.6.1.4 Noise

Affected Resources

Transportation and the use of explosives for sinking would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the Project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

Environmental Consequences²⁵

During transportation, the levels of noise would be consistent with the existing background noise in the respective areas. The sinking of the ship would produce noise due to the use of explosives. A buffer area would be determined and the public would not be allowed in the area while the ship sinking activities are occurring.

Because noise due to Project implementation is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in areas adjacent to the Project area would be aware of the increase in noise; however, it would not affect their activities. After

¹⁹ Emissions assumptions for all equipment based on 8 hours of operation.

²⁰ CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

²¹ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

²² Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

²³ Fuel economy assumptions for a 300 hp marine diesel powerboat and 1000 hp marine diesel passenger ferry based on Becker, no date.

²⁴ Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

²⁵ Potential impacts to marine species are addressed in the Biological Environment (Section 8.6.5.5).

completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers and divers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating, personal vehicle use, and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

8.6.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

8.6.6.2.1 Living Coastal and Marine Resources

The Ship Reef Project consists of a permitted 80-acre artificial reef area, located approximately 67 miles off the coast of Galveston Island, Texas in a water depth of around 135 feet. The Project area does not contain seagrass beds. An additional survey would be conducted prior to deployment of the ship to identify any hard substrates that would support corals or hard structure habitats. If any such substrates are identified, those areas would not be used to sink the ship. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

Affected Resources

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser

important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the Ship Reef Project area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species such as red snapper, grouper, ling, dorado, and black fin tuna can also be found in the Project area.

Environmental Consequences

This Project would affect marine and estuarine fauna. Many organisms would likely leave the area. However, those that do not leave the Project area may be affected at different intensities as a result of primarily the explosives used in the sinking of the ship. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the sinking of the ship. However, these types of species are not typically numerous in these areas. The relative abundance of sessile organisms would not be significantly impacted since the footprint is small. The small overall surface impact (with potential impact to sessile organisms) of the ship is considered a trade-off to the overall habitat potential of the ship itself. The existing habitat is sand-silt with little to no vertical relief. The ship would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011). Most impacts would be related to the techniques used to sink the ship. A sinking plan would be developed that would work to minimize underwater impacts from explosives. The explosive charges employed would be the smallest needed to puncture pre-cut plates in order to sink the ship. Detonations of explosives along the ship would be in a rapid series rather than simultaneous in order to minimize impacts to marine fauna. Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can. This Project would likely result in both short and long-term minor impacts related to disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. Benthic organisms that inhabited the footprint of the area upon which the ship comes to rest would be lost. However, it would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and mobile crustaceans.

8.6.6.2.2 Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act. The Ship Reef Project would be implemented several miles offshore in waters greater than 100 feet depth (where there is no bird

nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act.

Affected Resources

Endangered Species

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the FWS or NMFS. No federally-listed, proposed, or candidate species have critical habitat in the Project area.

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the Project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore coral reefs, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Since there are currently no artificial reef structures in the permitted area, no endangered or threatened species are likely to be utilizing the Project area at the time of Project implementation as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

Essential Fish Habitat

The Ship Reef Project is located in an area that is designated as Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the Project location.

Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The Project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis 2002; NMFS 2008). Because of the relatively shallow depth of 73 feet at the Project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the Project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer

continental shelf. Due to the relatively shallow depth of 135 feet in the Project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the Project area, which is 67 miles offshore.

Environmental Consequences

The reef site is located at a depth of around 135 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material. Sinking of the ship would only occur during daylight hours and should be completed within 1-2 days. Impacts to wildlife would be avoided via management guidelines and techniques. During deployment of the ship, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the zone of influence. Work would be halted until such time as the area is deemed safe to continue the operation. Additionally, sea turtle and smalltooth sawfish construction conditions would be followed (NMFS 2006).

Project deployment would have minor short-term impacts to protected species and their habitats in the area where the ship would be placed. Short-term minor impacts may occur if species using the Project area are temporarily disturbed. The use of monitors and adjustment of Project activities will reduce the potential of impacts to protected species. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles, such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

8.6.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.6.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

Artificial reefs enhance the fishing and diving opportunities at reef sites. A study from 1995 found that over 58,000 individuals visited artificial reefs. This study also surveyed boat captains and found that a ship was a preferred structure for future artificial reefs (Ditton et al. 1995).

There are oil and gas pipelines within a 5-mile radius of the Ship Reef Project; there would be no negative impacts to the exploration and production of oil and gas. The Project is not located near any

Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts and a lighted buoy would be in the permitted reef area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

Environmental Consequences

Because this Ship Reef Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Project. There would be indirect beneficial effects to the local economy due to increased fishing and diving opportunities provided by the artificial reef. Artificial reefs enhance the fishing and diving opportunities at reef sites. Given the demand for fishing and diving on artificial structures, the construction of the Ship reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Project would benefit the local economies adjacent to the Project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter and diving businesses. It is expected the commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels Overall, socioeconomics would be unaffected as a result of the proposed Project. The proposed Project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 67 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed Project.

8.6.6.3.2 Cultural Resources

Affected Resources

Automated Wreck and Obstructions Information System data documents no sunken vessels in the immediate vicinity of the Project area (HI-A-424). An archaeological survey of the permitted reef area would determine whether any historical or cultural resources are present in the area. If hard bottom substrates or other areas which could contain protected cultural resources are identified by the survey, these areas would be avoided during Project implementation. If the ship that is proposed for acquisition for this Project is a historical resource, it would be evaluated for its cultural significance and suitability for this Project before it is used.

Environmental Consequences

If any culturally or historically important resources are identified during Project preparations or pre-deployment surveys, such areas would be avoided during deployment of the ship. If the ship itself is a historic resource, it would be evaluated and a determination would be made about its suitability for this Project. A complete review of this Project under Section 106 of the National Historic Preservation Act 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.

8.6.6.3.3 Land and Marine Management

Affected Resources

The Project area (HI-A-424) is located in federal waters approximately 67 miles off of Galveston, Texas in 135 feet of water. The USACE reef site application was submitted on March 22, 2013 and was put out for public notice on June 3, 2013. The site permit is expected to be issued in late 2013. The permit would require that the Ship Reef Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. The USCG has conducted a preliminary review of this Project. A buoy and a 60-foot clearance would likely be required.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide beneficial impacts to local economies. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses,

avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

Environmental Consequences

The Ship Reef Project would be located offshore, and would not be subject to zoning, land use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the Project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, it would not have any impacts to the oil and gas production facilities and pipelines in the area of the Project. In addition, the Project is located greater than 2 miles from the designated shipping fairway and would comply with the USACE and USCG clearance requirements above the reef. Thus, the Project would not adversely impact shipping and navigation use in the Project area, and would be consistent with current uses. Therefore, land and marine management would be unaffected by the Ship Reef Project.

8.6.6.3.4 Aesthetics and Visual Resources

Affected Resources

The ship would be towed offshore to the permitted reef area and sunk. The ship would be on the ocean floor and would not be visible from the surface. The reef would be identified by a lighted buoy and associated signs.

Environmental Consequences

The use of large equipment could have a temporary visual impact during the time of Project implementation. The deployment time would be short and therefore any visual impacts would be short as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The lighted buoy and associated signs would introduce a new visual component to the area; however, these are common in the Gulf of Mexico and would not attract attention or detract from the view. Therefore, the Ship Reef Project is expected to have only minor short-term impacts aesthetics and visual resources.

8.6.6.3.5 Tourism and Recreational Use

Currently an artificial reef does not exist in the area. Artificial reefs enhance the fishing and diving opportunities at reef sites. A study from 1995 found that over 58,000 individuals visited artificial reefs. This study also surveyed boat captains and found that a ship was a preferred structure for future artificial reefs (Ditton et al. 1995). Given the demand for fishing and diving on artificial structures, the construction of the Ship reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers.

Environmental Consequences

Because the Ship Reef Project is 67 miles offshore and is not placing materials near an existing reef, it would not have any impacts on recreational uses in the area. Commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access points from land include the Freeport Ship Channel to the west-northwest and Galveston Harbor/Bolivar Roads Channel to the north-northwest. Each channel has nearby public boat ramps, marinas, and harbors, which makes the Project very accessible to the public. Therefore, no adverse impacts to tourism and recreational use are anticipated. Given the demand for fishing and diving on artificial structures, the construction of the Ship Reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Project is expected to result in beneficial impacts to tourism and recreational uses over the long-term.

8.6.6.3.6 Infrastructure

Affected Resources

The Project area is located approximately 67 miles off of Galveston, Texas and within approximately 7 miles of a shipping fairway, 3 miles of oil and gas pipelines, and 11 miles to the nearest oil and gas platform. The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline. There would not be any adverse impacts to oil and gas platforms or pipelines. The Ship Reef Project area would be marked with a navigational buoy.

Environmental Consequences

The Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed during the marine transport phase. Therefore, infrastructure will be unaffected from the proposed Project.

8.6.6.3.7 Public Health and Safety and Shoreline Protection

Affected Resources

The Project deployment would use mechanical equipment, boats, and barges that use oil, lubricants and fuels. The ship that would be acquired for use in this Project may have oil and hazardous waste that would need to be disposed of. The ship would be cleaned in accordance with United States Environmental Protection Agency's (EPA) and U.S. Maritime Administration's *National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs*. The hull would be modified to ensure safety for divers and meet requirements, inspections, and modifications stipulated by TPWD, EPA and the USCG. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. An explosives plan and associated safety procedures would be developed, reviewed, and approved by government agencies before Project implementation.

Environmental Consequences

Because of the nature and location of the Ship Reef Project, no impacts to shoreline erosion are anticipated as a result of the implementation of this Project.

The ship would be cleaned of debris, loose items, and hazardous substances to a level that meets or exceeds BMP guidelines and complies with health and safety statutes and regulations as set forth by the EPA, U.S. Department of Transportation Maritime Administration (MARAD), and Texas. All hazardous materials handled during ship cleaning would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. Pollution booms and any other required pollution response equipment would be staged at the facility, ready for deployment to guard against any pollution discharge. A Spill Prevention and Emergency Response Plan would be developed and approved. All federal and state regulations would be followed to clean, remove and dispose all hazardous materials generated from the cleaning of the ship. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into cleanup activities to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all ship cleaning and explosives personnel and authorized access zones would be established at the perimeter during ship cleaning and explosives use. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) as required and all federal regulations would be followed during the cleanup. A safety zone radius of approximately 2,000 feet would be established around the reef site to exclude all ship and submarine traffic not participating in the sinking action. The specific radius would be determined by the USCG on site. Any traffic within this radius would be warned to alter course or would be escorted from the site. Therefore, public health and safety and shoreline protection will be unaffected from the Ship Reef Project.

8.6.7 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), 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).

The proposed Ship Reef Project would create an artificial reef within an 80 acre reef site, through the sinking of a ship in water about 135 feet deep. Texas would acquire and sink a ship that is at least 200 feet long and that has been cleaned of hazardous substances. The Project is considered to fall under Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing and diving opportunities. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle

Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.7 Mid/upper Texas Coast Alternate Artificial Reef Project - Corpus Artificial Reef Project: Project Description

[The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).]

8.7.1 Project Summary

The proposed Corpus Artificial Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (MU-775) located within Texas state waters in the Gulf of Mexico and approximately 11 miles from Packery Channel (near Corpus Christi Bay, Texas). Previous deployments at the reef site placed artificial reef materials into the northwest quadrant and in the center of the 160-acre reef site. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre Project area onto sandy substrate at a water depth of 73 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$1,785,765. This Project is an alternative to the Ship Reef Project, and is proposed for implementation only in the event that the Ship Reef Project proves to be technically infeasible.

8.7.2 Background and Project Description

The purpose of the Corpus Artificial Reef Project is to enhance recreational fishing (and limited diving due to water clarity) opportunities in Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide a significant fiscal boost to local economies.

The proposed Project will increase the amount of reef materials in a currently permitted artificial reef site (MU-775), located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Mustang Island (MU-775) (Figure 8-9). The current reef site is permitted for 160 acres, but only has materials in northwest quadrant and in the center of the permitted area. The proposed Project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 73 feet, about 11 miles east of Packery Channel and Mustang Island State Park (near Corpus Christi Bay, Texas).

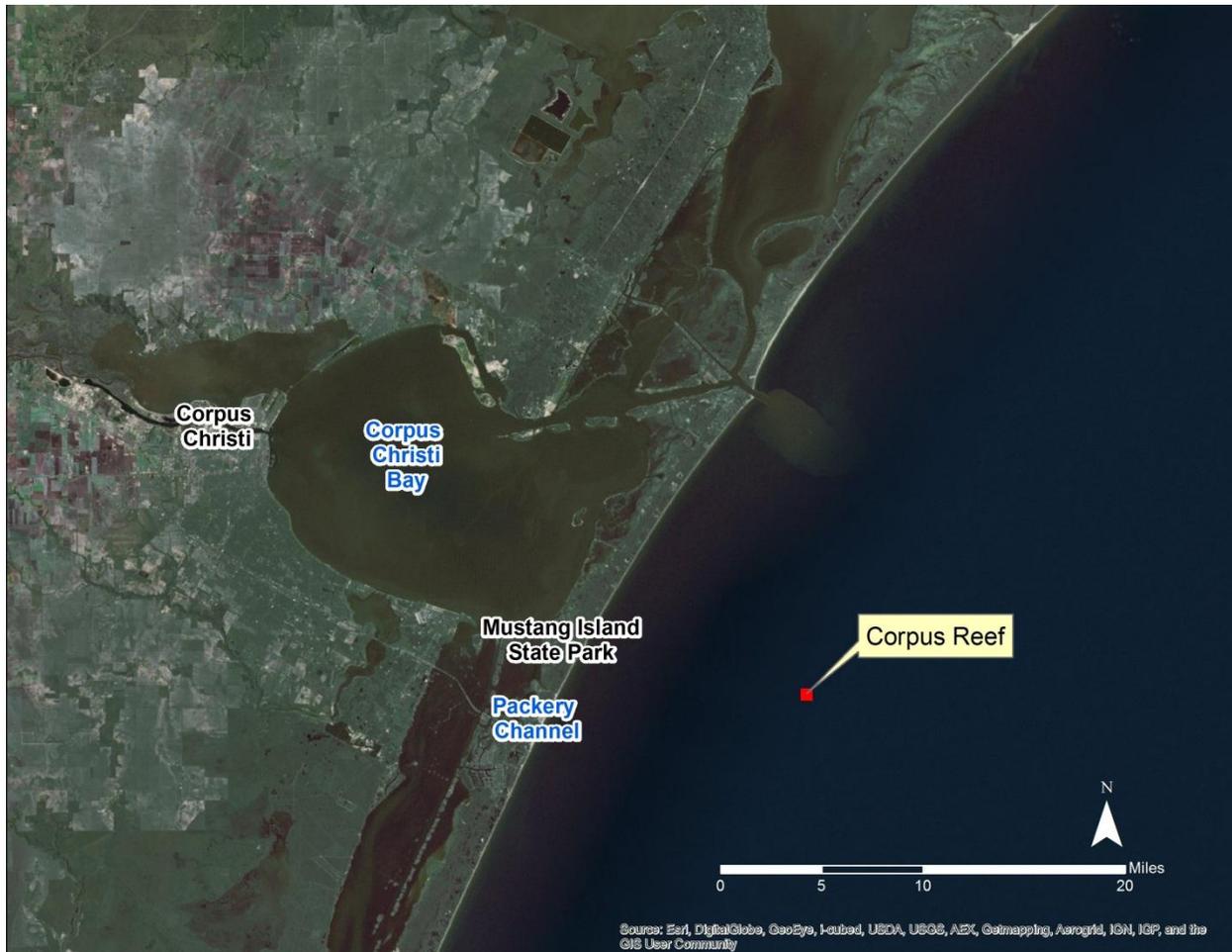


Figure 8-9. Location of the proposed Corpus Reef Project.

The location for the Corpus Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD’s Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs.

Consultations began with the Saltwater-Fisheries Enhancement Association and the City of Corpus Christi over the concept of reefs off Corpus Christi in Texas state waters in 2009. The MU-775 reef location was approved through several public city council meetings where numerous members of the public provided oral comments in support of the Project. Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan. The TPWD Coastal Resource Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides

easy access for the local population, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending to benefit the local economy.

Previous deployments at the permitted reef site placed artificial reef materials (predesigned pyramids and culverts) into the northwest quadrant and in the center of the 160-acre reef site. The Corpus Artificial Reef Project will randomly space 1,000 to 1,200 additional predesigned pyramids in the remaining portions of the permitted area.

Texas' artificial reefs are generally created by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high 2). This Project will use similarly structured pyramids. Each pyramid structure should penetrate the substrate by no more than 2 feet.



Figure 8-10. Examples of the predesigned pyramid structures.

8.7.3 Evaluation Criteria

This proposed Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Corpus Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The Project would enhance opportunities for public use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. 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 Framework Agreement).

The Project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The Project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. There were several public city council meetings where numerous members of the public provided oral comments in support of the Project. The proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>) and suggested to the State of Texas through other venues.

8.7.4 Performance Criteria, Monitoring and Maintenance

This Project includes monitoring efforts to ensure Project designs are correctly implemented during construction. Monitoring has been designed around the Project objective, which is to increase the amount of reef materials in a currently permitted artificial reef site (MU-775) through the placement of 1,000 to 1,200 predesigned concrete pyramids within the open portions of the permitted reef site.

Performance criteria for this Project will include a determination of successful construction of the Corpus Artificial Reef Project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing opportunities. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for two years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

Recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

8.7.5 Offsets

The Early Restoration benefits provided by the Project, also known as NRD Offsets, are \$3,571,530 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed Project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.²⁶

8.7.6 Cost

The total estimated cost to implement this Project is \$1,785,765. This cost reflects current 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.

²⁶ 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.

8.8 Mid/upper Texas Coast Alternate Artificial Reef Project - Corpus Artificial Reef Project: Environmental Review

[The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).]

The proposed Corpus Artificial Reef Project would increase the amount of reef materials in a currently permitted artificial reef site (MU-775) located within Texas state waters in the Gulf of Mexico and approximately 11 miles east of Packery Channel (near Corpus Christi Bay, Texas) (Figure 8-11). The current reef site is permitted for 160 acres, but already has materials in the northwest quadrant and in the center of the permitted area (Figure 8-11). The proposed Project would place predesigned concrete pyramids in the remaining portions (about 115 acres) of the 160-acre permitted area onto sandy substrate at a water depth of 73 feet. These improvements would enhance recreational fishing opportunities. The estimated cost for this Project is \$1,785,765.



Figure 8-11. Diagram of the 160-acre Corpus Artificial Reef Project area. Areas designated by the pyramid and culvert images received artificial reef materials from a separate contract in fall 2013.

8.8.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Corpus Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. This Project would enhance the public's use and enjoyment

of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill, submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>), and suggested to the State of Texas through other venues.

The Project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. There were several public city council meetings where numerous members of the public provided oral comments in support of the Project. The TPWD developed the Texas Artificial Reef Fishery Management Plan (TPWD 1990) which guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts and impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process.

Compliance with state requirements, including the Texas Coastal Management Program, would be fulfilled prior to implementation. All federal, state, and local required permits would be secured prior to project implementation. In addition, compliance with federal requirements including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation.

TPWD obtained a USACE permit (SWG-2010-01407) for the Corpus Artificial Reef Project under Section 10 of the Rivers and Harbors Act and under Section 404 of the Clean Water Act in May 2011.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are

consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

8.8.2 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 Corpus Artificial Reef Project or the Ship Reef Project as part of Phase III Early Restoration.

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

8.8.3 Project Location

The Corpus Artificial Reef Project is located within the Gulf of Mexico in the Outer Continental Shelf Mustang Island Block 775 (MU-775) offshore of Nueces County, Texas (Figure 8-9). It is located about 11 miles off Packery Channel and Mustang Island State Park (near Corpus Christi Bay, Texas) at a center point of 27.6464° N 97.0074° W (North American Datum of 1983). The permitted area is 160 acres of sandy substrate at a water depth of 73 feet. The reef site has been permitted for a 50-foot clearance (50 feet of clear water between the surface and any reef material), which allows for a 23-foot profile of material off the ocean bottom.

The location for the Corpus Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.

Consultations began with the Saltwater-Fisheries Enhancement Association and the government of the City of Corpus Christi over a nearshore reef concept in 2009. Several potential sites were determined and TPWD conducted bottom surveys with scientific divers to eliminate those sites whose bottom was too silty and areas whose bottom may not be hard enough to support the weight of artificial reefs. A “short list” of several reef sites was developed, with Corpus Reef providing the best alternative that would meet management goals. The Corpus Reef location was approved through several public city council meetings where numerous members of the public provided oral comments in support of the Project. Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan. The TPWD Coastal Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides easy access for locals, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending on the local economy.

8.8.4 Construction and Installation

Surveys of the Project area would be conducted prior to Project implementation to verify the location and avoid all hard bottom substrates and previously deployed artificial reef materials. This Project would deploy approximately 1,000 – 1,200 predesigned concrete pyramids (Figure 8-10) in the Project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring and were 8 feet high. This Project would use similarly structured pyramids. Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the remaining portions of the 160-acre permitted reef (areas without reef materials).

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed.

It is expected that the pyramids would be transported directly from the manufacturer, therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Corpus Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for Project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the Project area is expected to take 4 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the Project area.

8.8.5 Operations and Maintenance

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved

marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

8.8.6 Affected Environment and Environmental Consequences

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the Project area (USACE 2011).²⁷ The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The following factors were considered by the USACE during the evaluation process but were determined to not be particularly relevant to the permit application: shoreline erosion and accretion, aesthetics, land use, general environmental concerns, conservation, floodplain values, safety, energy needs, flood hazards, water supply and conservation, food and fiber production, and mineral needs. The EA and SOF found that the Corpus Artificial Reef Project would result in the creation of an artificial reef that would augment natural fisheries habitat for juvenile reef fish and provide sport and recreational fishing benefits for the public.

When considering the overall impacts that would result from this Project, in context with the overall impacts from similar past, present, and reasonably foreseeable future projects, the USACE concluded that their cumulative impacts are not considered to be significantly adverse. The USACE stated that it was likely they would receive similar projects in the future, which would go through a comparable review process.

The USACE stated that there have been no significant environmental effects identified resulting from the Project and the impact of this proposed activity on aspects affecting the quality of the human environment was evaluated and determined that this action does not require an Environmental Impact Statement.

The USACE reviewed and evaluated, in light of the overall public interest, the documents and factors concerning the permit application, as well as the stated views of other interested Federal and non-Federal agencies and the concerned public, relative to the proposed work in navigable waters of the United States. Based on their review, the USACE found that the proposed Project is not contrary to the public interest and that a permit should be issued. The permit was issued in May 2011 (SWG 2010-01047).

²⁷ For purposes of the proposed action under NRDA, the EA and SOF does not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF is discussed in this document for informational purposes only.

8.8.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

8.8.6.1.1 Geology and Substrates

Affected Resources

The Corpus Artificial Reef Project is located on the continental shelf in Texas waters approximately 11 miles east of Packery Channel off the coast of the Nueces County, Texas. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats. The nearshore deployment of artificial reef material would be implemented within the permitted area, avoiding areas where there are existing artificial reef materials (Figure 8-9). Except for the existing artificial reef structures, the substrate generally consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

Environmental Consequences

The proposed Project would be placed on Gulf sediments approximately 73 feet below the surface of the water. Prior to reef construction, a survey of the Project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor. Each of the 1,000 – 1,200 structures would weigh approximately 6,000 pounds and cover a 43-square foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local Project area.

8.8.6.1.2 Hydrology and Water Quality

Affected Resources

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the

freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

There are no significant currents in the Project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 63 feet below the water surface.

Environmental Consequences

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. Best management practices would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These best management practices along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the Corpus Artificial Reef Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

8.8.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The proposed Project area is 11 miles east of Packery Channel in offshore waters and is not classified for NAAQS criteria pollutants under the Clean Air Act. The nearest county, Nueces County, is not listed as a nonattainment area for any pollutant by the EPA.

Implementation of the Corpus Artificial Reef Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation.

Environmental Consequences

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the Project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during transportation and deployment. Any air

quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during Project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Corpus Artificial Reef Project:

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

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

Table 8-4. Estimated greenhouse gas impacts.

EQUIPMENT	NUMBER OF 8-HOUR DAYS	CO ₂ (METRIC TONS) ²⁸	CH ₄ (CO ₂ e) (METRIC TONS) ²⁹	NO _x (CO ₂ e) (METRIC TONS)	TOTAL CO ₂ e (METRIC TONS)
Pickup truck ³⁰	8	1.28	0.00	0.01	1.28
Excavator	8	2.80	0.00	0.02	2.80
Tugboat ³¹	4	64.00	0.12	0.48	64.60
Crane Barge	4	64.00	0.12	0.48	64.60
Supply Barge	4	64.00	0.12	0.48	64.60
TOTAL		196.08	0.36	1.47	197.88

²⁸ CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

²⁹ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

³⁰ Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

³¹ Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

Based on the assumptions described in the table above, and the small scale and short duration of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

8.8.6.1.4 Noise

Affected Resources

Implementation of the Corpus Artificial Reef Project would include transportation of the reef materials to the Project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the Project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

Environmental Consequences

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate Project area would be affected by the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

8.8.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

8.8.6.2.1 Living Coastal and Marine Resources

The Corpus Artificial Reef Project consists of a permitted 160-acre artificial reef area, located approximately 11 miles east of Packery Channel off the coast of Nueces County in a water depth of around 73 feet. The Project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are existing artificial reef materials in the Project site. The location of existing reef materials is known and they would be avoided during reef deployments

associated with this Project. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

Affected Resources

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the Project Area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species including sharks, snapper, grouper, and mackerel can also be found in the Project area.

Environmental Consequences

Fauna in the Project area may be affected by the Corpus Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident

fish (USACE 2011). Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can. This Project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

8.8.6.2.2 Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act. The Corpus Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act.

Affected Resources

Endangered Species

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the FWS or NMFS. No federally-listed, proposed, or candidate species have critical habitat in the Project area.

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the Project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore coral reefs, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Due to the already existing reef structures in the permitted area, endangered or threatened species may utilize the Project area as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

Essential Fish Habitat

The Project is located in an area that is designated as Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the Project location.

Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The Project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and are the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 73 feet at the Project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the Project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 73 feet in the Project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the Project area, which is 9 miles offshore.

Environmental Consequences

The reef site is located at a depth of around 73 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they would not be impacted during the deployment of the material. Deployment of the reef materials would be short in duration (4 days) and materials would be lowered slowly, providing fish and wildlife opportunity to leave the reef deployment area. Impacts would be avoided via management guidelines and techniques as appropriate. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the Project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, sea turtle and smalltooth sawfish construction conditions would be followed (NMFS 2006).

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the Project area are temporarily disturbed. However, using monitors and adjusting Project activities would reduce the potential of impacts to protected species. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a

positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

8.8.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.8.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen (<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas platforms, leases, pipelines, and a shipping fairway within a 5-mile radius of the Corpus Artificial Reef Project; however, there would be no negative impacts to the exploration and production of oil and gas. The Project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts and a lighted buoy is already in the permitted reef area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

Environmental Consequences

Because this Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Corpus Artificial Reef Project. There would be indirect beneficial effects to the local economy due to increased fishing opportunities provided by the artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Corpus Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Project would benefit the local economies adjacent to the Project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. Commercial fishermen note obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed Project. The Project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 11 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed Project.

8.8.6.3.2 Cultural Resources

Affected Resources

There are no known historic or prehistoric sites in the permitted reef area. An archeological survey would be conducted prior to Project implementation to ensure that no historically or culturally significant areas would be impacted during the deployment of the artificial reef materials. If hard bottom substrates or other areas which could contain protected cultural resources are identified by the survey, these areas would be avoided during Project implementation.

Environmental Consequences

If any culturally or historically important resources are identified during Project preparations or pre-deployment surveys, such areas would be avoided during deployment of the pyramid structures. A complete review of this Project under Section 106 of the National Historic Preservation Act would be completed prior to project implementation. This Project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Therefore, cultural resources would be unaffected by the Corpus Artificial Reef Project.

8.8.6.3.3 Land and Marine Management

Affected Resources

The Project area is located approximately 9 miles offshore of Nueces County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2010-01407) for the Corpus Artificial Reef Project under Section 10 of the Rivers and Harbors Act and under Section 404 of the Clean Water Act in May 2011.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reefing sites and materials, and defines parameters for prioritizing areas for reefing. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

Environmental Consequences

The Corpus Artificial Reef Project would be located offshore, and would not be subject to zoning, land use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the Project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, it would not have any impacts to the oil and gas production facilities and pipelines in the area of the Project. In addition, the Project is located greater than 2 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of

50 feet clearance above the reef. Therefore, land and marine management would be unaffected by the Corpus Reef Project.

8.8.6.3.4 *Aesthetics and Visual Resources*

Affected Resources

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore. The reef is already identified by a yellow 10-foot spar buoy with a flashing light and TPWD decals.

Environmental Consequences

The use of barges and large equipment could have a temporary visual impact during the time of Project implementation. The deployment time would be short and therefore any visual impacts would be short as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The lighted buoy is already in place and therefore would not introduce a new visual component to the area. Therefore, the Corpus Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

8.8.6.3.5 *Tourism and Recreational Use*

Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Environmental Consequences

The size of the Corpus Artificial Reef Project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Recreational and commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access point is Packery Channel which is 11 miles to the west. Each channel is serviced by public boat ramps, marinas, and harbors, which makes the Project very accessible to the public. In addition, during the scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the construction of the Corpus reef would increase recreational fishing opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Therefore, any adverse impacts to tourism and recreational use would be short-term and minor occurring only during construction when areas are temporarily closed to other uses. The Project should result in beneficial impacts to tourism and recreational uses over the long-term.

8.8.6.3.6 *Infrastructure*

Affected Resources

The Project area is located approximately 9 miles offshore of Nueces County. The Project area is located in around 73 feet of water and is permitted for a 50-foot clearance to ensure that it would not impede boat traffic. The Corpus Artificial Reef Project is located about 7 miles from the Aransas Pass Anchorage area. The reef area is about 3 miles to the closest shipping fairway, approximately 0.63 miles to the nearest oil and gas pipelines, and about 13 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.

Environmental Consequences

The Corpus Artificial Reef Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Therefore, infrastructure would be unaffected by this Project.

8.8.6.3.7 *Public Health and Safety and Shoreline Protection*

Affected Resources

The Corpus Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 9 miles offshore and not in an area that would impact shoreline erosion. The Project deployment would use mechanical equipment boats, and barges that use oil, lubricants, and fuels.

Environmental Consequences

Because of the nature and location of the Corpus Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No adverse effects to public health and safety and shoreline projection are expected as a result of this Project.

8.8.7 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), 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).

The proposed Corpus Artificial Reef Project would increase the amount of reef materials in an artificial reef site which is permitted for 160 acres, but only has materials in the northwest quadrant and in the center of the permitted area. The project would place predesigned concrete pyramids in the about 115 acres of the remaining portions of the 160-acre permitted area. The Project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.9 Sea Rim State Park Improvements: Project Description

8.9.1 Project Summary

Sea Rim State Park is located along the upper Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas (Figure 8-12). The proposed Sea Rim State Park Improvements Project would construct two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station, and one fish cleaning shelter in the Park. These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this Project is \$210,100.

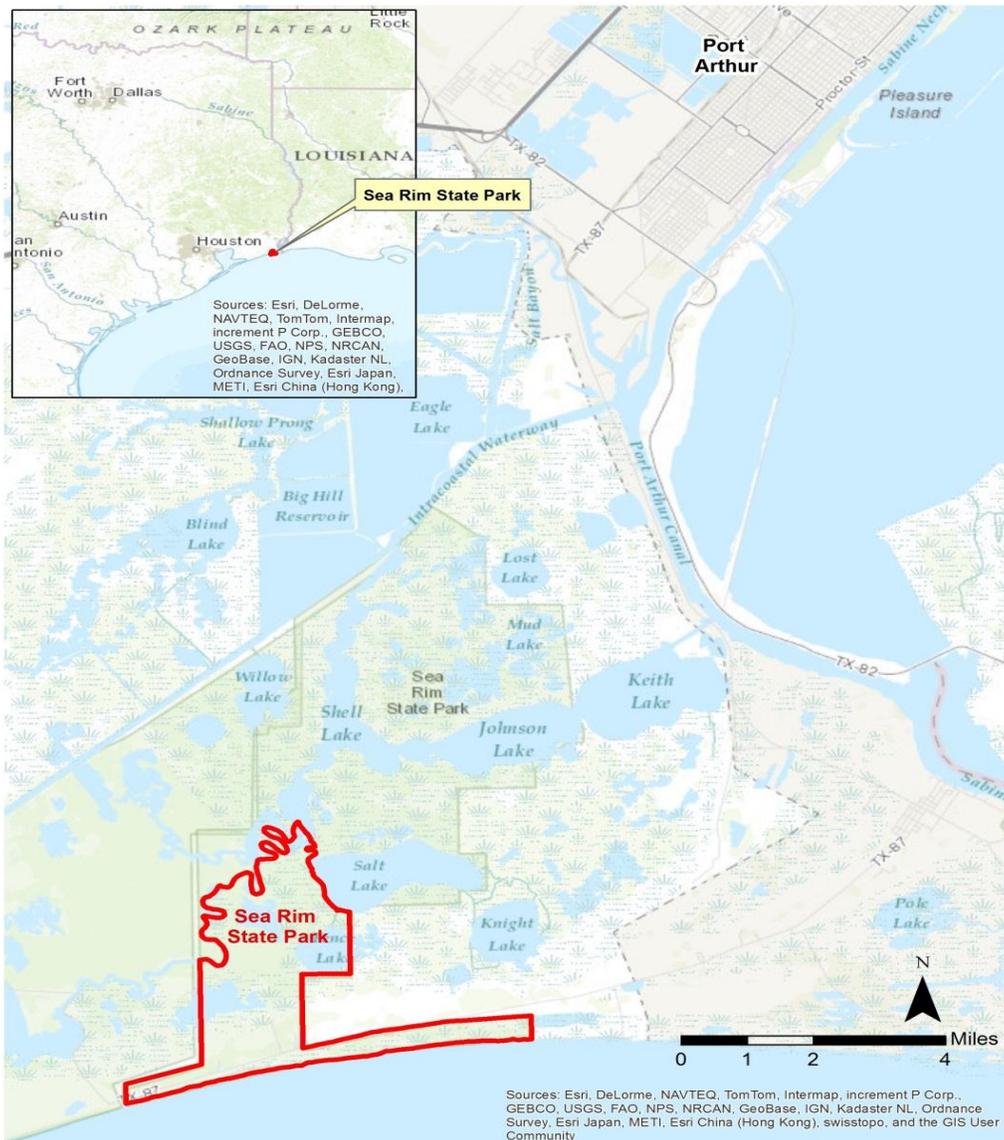


Figure 8-12. Location of Sea Rim State Park.

8.9.2 Background and Project Description

The proposed Sea Rim State Park Project will restore and improve recreational facility infrastructure to enhance recreational access and opportunities on the Texas coast. Sea Rim State Park, which includes 4,141 acres of marshland with 5 miles of beach shoreline, is located in Jefferson County, Texas, southwest of Port Arthur. Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. White and brown shrimp, crabs, and various sport fishes, such as red drum, speckled trout, and flounder, thrive in the park's lakes and bayous. It is in an excellent location for recreational activities involving natural resources, including bird/wildlife watching, fishing, boating, camping, beach going, etc. Currently, visitors to Sea Rim State Park are required to be self-sufficient because much of the Park's infrastructure was damaged by Hurricanes Rita (2005) and Ike (2008). To guide the restoration process, TPWD started a master planning process in 2010 to identify appropriate restoration efforts for the Park. Amenities proposed by this Project are consistent with the goals identified during the planning process and will help improve and enhance recreational opportunities along the Texas coast. Specifically, the Sea Rim State Park Project includes construction of two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station (vault toilet), and one fish cleaning shelter in the Park. The goals of biological conservation balanced with recreation opportunity will be supported by:

- Producing a new development footprint no larger than the original;
- Minimizing the losses of wetlands that experience surface inundation;
- Minimizing the losses of dunes over 6 feet in elevation; and
- Using sustainable construction methods to create energy efficient structures.

The Fence Lake viewing platform will provide wildlife viewing opportunities accessible by kayaks and other shallow draft boats. The platform, located in open water in Fence Lake, will have a vessel docking area and a raised platform to provide visitors a high vantage point to see above the nearby tall shoreline vegetation.

The Willow Pond viewing platform and associated boardwalk will provide access to existing infrastructure to help improve viewing opportunities in coastal vegetation and wetland habitats. The new boardwalk will connect to a previously constructed section of boardwalk that is currently isolated and not accessible due to damage from recent hurricanes.

The comfort station will be constructed near the Park's boat ramp and will be similar to other pre-fabricated comfort stations used in Texas State Parks. The comfort station will have two restrooms and is intended to serve day-use visitors who are accessing the trails and/or using the boat ramp (Figure 8-13).



Figure 8-13. Example of a comfort station (vault toilet).

The fish cleaning shelter will be located on the beach side of the Park within and adjacent to the equestrian parking lot. This facility will improve experiences for anglers by allowing them to process their catch on site.

8.9.3 Evaluation Criteria

This proposed Sea Rim State Park Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Project would enhance the public's use and enjoyment of natural resources, helping to offset a portion of the adverse impacts to such uses caused by the Spill. Creating the proposed infrastructure (viewing platforms, comfort station, and a fish cleaning shelter) will provide visitors increased opportunities for viewing wildlife while also maintaining sanitary conditions during the users' fishing and personal activities. 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 Framework Agreement).

The Project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement).

Cost estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. §990.54(a)(1)). Developments proposed by this Project are consistent with the goals identified during the master planning process and will help improve and enhance recreational opportunities along the Texas coast. As a result, the proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3) and Sections 6e of the Framework Agreement).

To ensure the opportunity for community participation, public comments were acquired during the master planning process through a public meeting (held in April 2010 in Port Arthur, Texas), personal conversations, and emailed letters. . All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Sea Rim State Park.

Recreational use projects in general and this specific Project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

8.9.4 Performance Criteria, Monitoring and Maintenance

This Sea Rim State Park Project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the Project objective, which is to construct two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station, and one fish cleaning shelter in Sea Rim State Park to enhance recreational use of the Park.

Performance criteria for this Project will include a determination of successful construction of the Project according to design to ensure that the opportunity for recreational use of the Park will be enhanced. Monitoring efforts will also be implemented to ensure that the Project is constructed in accordance with construction documents. The State Park currently has visitation monitoring procedures to capture the number of daytime visitors, overnight visitors, and participants in interpretive programs. This information will be collected and shared annually to document performance monitoring of the Project for 5 years after construction completion.

Ongoing maintenance of the constructed facilities would be the responsibility of Sea Rim State Park, which is owned and managed by the TPWD.

8.9.5 Offsets

The Early Restoration benefits provided by the Project, also known as NRD Offsets, are \$420,200 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed Project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.³²

³² 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.

8.9.6 Cost

The total estimated cost to implement this Project is \$210,100. This cost reflects estimates developed from the most current information available to the Trustees at the time of the Project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

8.10 Sea Rim State Park Improvements: Environmental Review

Sea Rim State Park is located along the upper Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas (Figure 8-12). The proposed Sea Rim State Park Improvements Project would build two viewing platforms, a comfort station (vault toilet), and a fish cleaning shelter. These improvements would enhance opportunities for visitor use and enjoyment of Park resources. The estimated cost for this Project is \$210,100.

8.10.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing and diving, beach use, camping, and wildlife viewing. Creating the proposed infrastructure (viewing platforms, comfort station, and a fish cleaning shelter) would provide visitors increased opportunities for a portion of these recreational activities while also maintaining sanitary conditions during the users' fishing and personal activities.

To guide the restoration process for the Park, TPWD started a master planning process in 2010 to identify appropriate restoration efforts. To ensure the opportunity for community participation, public comments were acquired during the master planning process through a public meeting (held in April 2010 in Port Arthur, Texas), personal conversations, and e-mailed letters. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Sea Rim State Park. Amenities proposed by this Project are consistent with the goals identified during the master planning process and would help improve and enhance recreational opportunities along the Texas coast.

All federal, state, and local required permits would be secured prior to Project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements, including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act, would be fulfilled prior to implementation. The Trustees determined the Sea Rim State Park Improvements Project is consistent with the goals and policies of the Texas Coastal Management Program and will send a letter to the TGLO to seek concurrence. The application for a USACE permit for the Fence Lake viewing platform has been submitted and a permit decision is pending. The Trustees have started discussions with USACE regarding permit requirements for the Willow Pond viewing platform and boardwalk.

Sea Rim State Park is operated by the TPWD, whose mission includes protecting, enhancing and increasing recreational opportunities throughout the state. The Sea Rim State Park Improvements Project meets TPWD's objectives by increasing access to and participation in outdoor recreational opportunities. The agency's mission and objectives are described in detail in TPWD's Land and Water Resources Conservation and Recreation Plan (2013b). In addition, Sea Rim State Park will follow guidance described in the State Parks Division Operating Plan (TPWD 2012a).

The Texas Parks and Wildlife Commission regulations adopted in September 1996, govern the health, safety and protection of persons and property within state parks, historical parks, scientific areas or forts, including encompassed waters, administered by the TPWD. The proposed Project would follow

Texas Administrative Code and TPWD Rules and Regulations including the State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59). The TPWD State Park Division also follows Division Procedures established in 2010 and revised in 2013 for exotic, feral, and nuisance animal control.

All improvements would comply with Americans with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards as well as federal, state, and local law concerning construction standards and building codes to protect public health, safety, and welfare.

8.10.2 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 Sea Rim State Park Project as part of Phase III Early Restoration.

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

8.10.3 Project Location

Sea Rim State Park is located along the northern Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas (Figure 8-12). The Park consists of 4,141 acres of marshland and 5 miles of beach shoreline in the western portion of the Chenier Plain. The Park is surrounded by state and federal wildlife management areas and refuges (J.D. Murphee Wildlife Management Area, McFaddin National Wildlife Refuge, and Texas Point National Wildlife Refuge). Highway 87 divides the beachfront portion of the Park from much of the marshland areas and lakes, including Fence Lake. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes, and dune swale wetlands that abut the Gulf of Mexico.

Fence Lake, a tidally influenced shallow lake, is located on the northeast section of the Park, north of Highway 87 (Figure 8-14). Fence Lake is shallow (2-3 feet deep) and is connected to the Sabine-Neches Ship Chanel and Sabine Lake (a major bay) through an 11-mile chain of canals and smaller lakes (Figure 8-12). The proposed viewing platform would be located on the southern end of Fence Lake.

The proposed Willow Pond viewing platform and associated boardwalk would be located on the Gulf (southern) side of Highway 87 within the beach/dune system that consists of saline prairie and isolated small wetland habitats (Figure 8-14).

The proposed comfort station would be located in an existing parking area near a boat ramp north of Highway 87 (Figure 8-14).

The proposed fish cleaning shelter is also located on the Gulf (southern) side of Highway 87 within the beach/dune area and is adjacent to existing infrastructure and a parking lot (Figure 8-14). The construction area abuts a small wetland area.

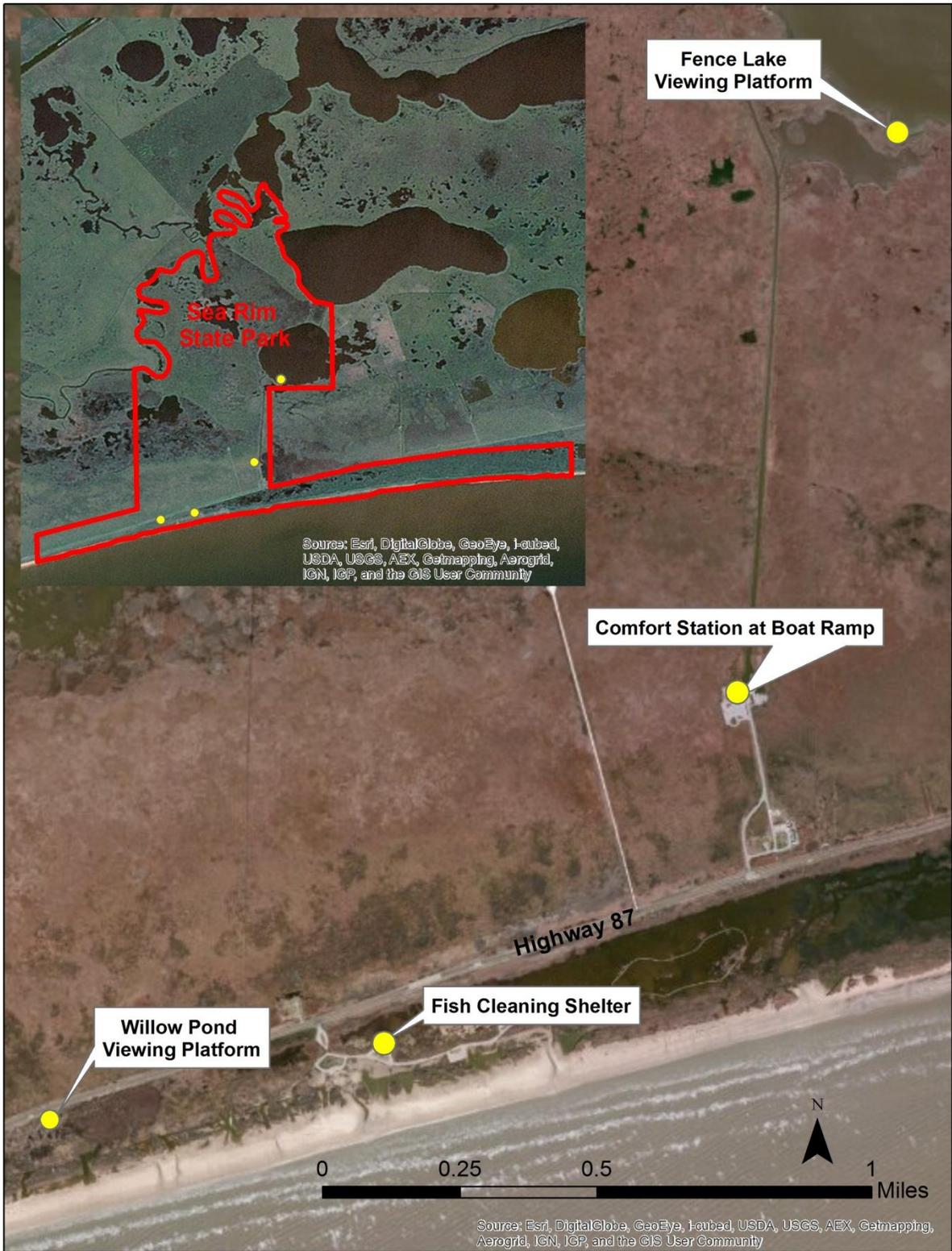


Figure 8-14. Location of the proposed improvements within Sea Rim State Park.

8.10.4 Construction and Installation

The proposed improvements are located in different places within the Park. The combined improvement footprint and construction limit for all four improvements would impact less than 0.5 acres of the existing Park (400 sq. feet at Fence Lake, 6,300 sq. feet at Willow Pond, 2,300 sq. feet at the comfort station, and 2,700 sq. feet at the fish cleaning shelter). To the extent feasible, new facilities would be located within the pre-existing Park footprint. This Project is still in the design phase and modifications may occur as the engineering designs become finalized.

8.10.4.1 Fence Lake Viewing Platform

Fence Lake is located to the north of Highway 87 and is connected to an existing boat ramp via a canal. The viewing platform, to be sited in a small cove on the southern shore of Fence Lake, would consist of a 10-foot by 14-foot raised, fixed platform and an adjacent 6-foot by 4-foot floating platform. The smaller floating platform would be equipped with cleats to tie off boats and would serve to facilitate passengers exiting boats and accessing the raised platform. Users would reach the fixed platform via a ladder adjacent to the floating platform. The additional height on the fixed platform would provide visitors a high vantage point to see above the nearby tall shoreline vegetation. The preliminary engineering design is shown below (Figure 8-15). Conceptually, there would be six pilings supporting the fixed platform. Pilings would likely be steel pipes or treated wood and they would measure approximately 12 inches and be spaced 5 feet lengthwise and 7 feet crosswise. Platform materials would likely consist of composite decking, fiberglass reinforced polypropylene, or a grate decking system from a manufacturer. Spacing of the decking would comply with Americans with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards and would allow for light penetration.

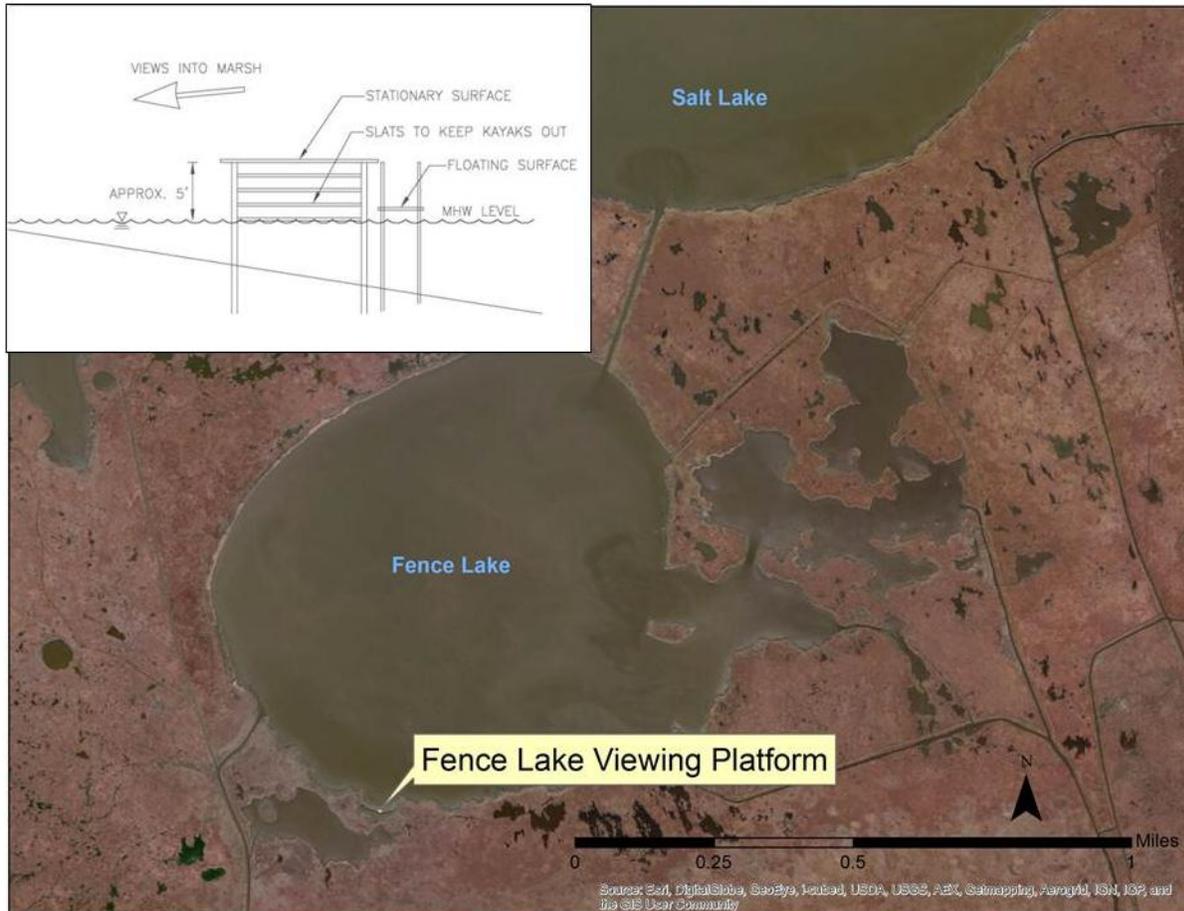


Figure 8-15. Location of the viewing platform on Fence Lake and the preliminary platform design.

Grading and Ground Disturbance

A 20-foot by 20-foot construction zone would be established around the worksite, which would be on the water of Fence Lake (Figure 8-16). About six 12-inch by 12-inch pilings, depending on the final design, would be driven into the sediments of Fence Lake with the aid of moderate sized excavation equipment or pile drivers. The platform would be constructed on the pilings and a floating platform would be attached to the structure.

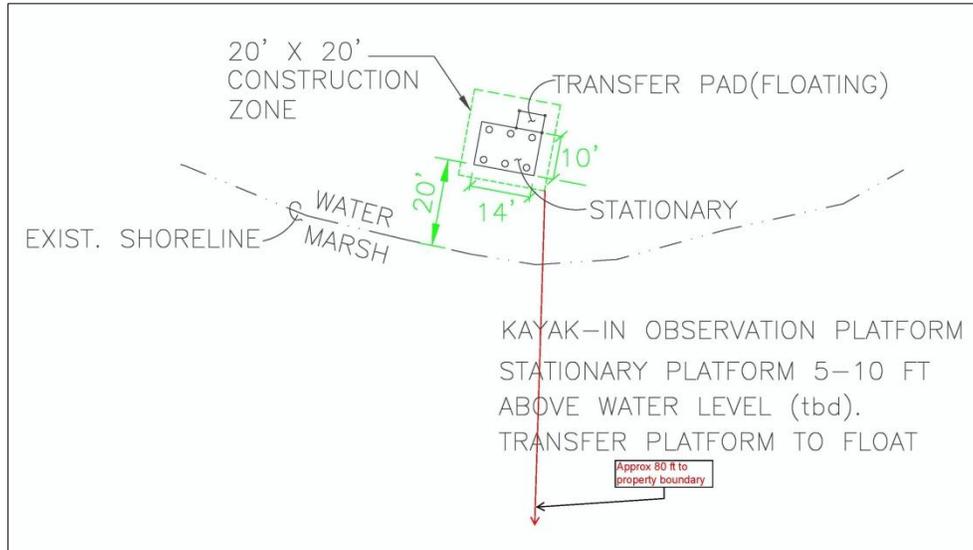


Figure 8-16. Site plan for the Fence Lake viewing platform.

Mobilization, Staging, and Stockpiling

Materials would be transported to the worksite using an airboat or other marine vessel. Most materials would be transported in and out of the site daily. However, a small barge or other vessel would likely stay at the site adjacent to the work area. From the boat, equipment would be used to drive the pilings into the lake bed. After the pilings are set and stabilized, the platform would be constructed on top of the pilings.

8.10.4.2 Willow Pond Viewing Platform

The Willow Pond boardwalk and viewing platform would be located on the Gulf side (south) of Highway 87. The viewing platform would consist of a 16-foot by 8-foot observation platform which would be connected to a 5-foot wide, 235-foot long boardwalk. The boardwalk will be connected to an adjacent road and nearby parking area (Figure 8-17). Additionally, the boardwalk would also connect to a previously constructed section of boardwalk that is currently inaccessible.



Figure 8-17. Location of the viewing platform and boardwalk on Willow Pond with an image of a boardwalk.

Grading and Ground Disturbance

The Willow Pond viewing platform would cause ground disturbance by placing support structures into the substrate. The maximum footprint of the construction area is anticipated to be 6,300 sq. feet (0.14 acres). A 20-foot construction zone (15 feet on one side and 5 feet on the other) around the boardwalk and platform would be established to allow access for construction personnel and equipment, and to limit the geographic scope of the impacts. Construction activities would include ingress and egress of construction equipment and workers, driving of pilings, and construction of the decking and associated structures.

Mobilization, Staging, and Stockpiling

Existing roads and/or parking areas would be used to stage and stockpile materials for the Willow Pond platform and boardwalk. Materials can also be staged at the existing parking lot at the camping loop restroom until they are needed for construction. Equipment would include all-terrain vehicles, shredders, and a moderate sized rubber track compact radius excavator to drive the pilings for the boardwalk.

8.10.4.3 Comfort Station

The comfort station would be constructed north of Highway 87 near the boat ramp and would be similar to other pre-fabricated comfort stations in Texas State Parks. The comfort station would have separate men's and women's restrooms and is intended to serve day-use visitors who are accessing the trails and/or using the boat ramp.

Grading and Ground Disturbance

Construction activities would occur on an existing asphalt parking lot and a grassy median which overlays approximately 4 feet of fill material. The construction area would extend approximately 10 feet from the walls of the structure and 5 feet from the sidewalks (Figure 8-18). Installation of the comfort station would include excavation of a 14-foot long by 6-foot wide by 8-foot deep hole to accommodate the pre-constructed sub-surface waste vaults.

Mobilization, Staging, and Stockpiling

The existing parking lot would be used to stage construction materials. Construction equipment would consist of a backhoe, tractor trailer, and crane to prepare the site and place the station.



Figure 8-18. Location of the comfort station.

8.10.4.4 Fish Cleaning Shelter

The fish cleaning shelter would be constructed on the northeast side of an existing parking lot on the Gulf side (south) of Highway 87. The fish cleaning shelter would be located adjacent to the equestrian parking lot and is near the beach (Figure 8-19). The building slab would be designed so that water would drain into an adjacent gravel area to aid in cleaning the area (Figure 8-20). Solids would be captured by the perforated garbage hole in the cleaning table and then disposed of in the dumpster. Although this shelter would be replacing a temporary rinse shower that was built in 2011, it would still provide access to potable water for patrons on the beach side of the Park.



Figure 8-19. Location of the fishing cleaning shelter with an example of a fish cleaning shelter.

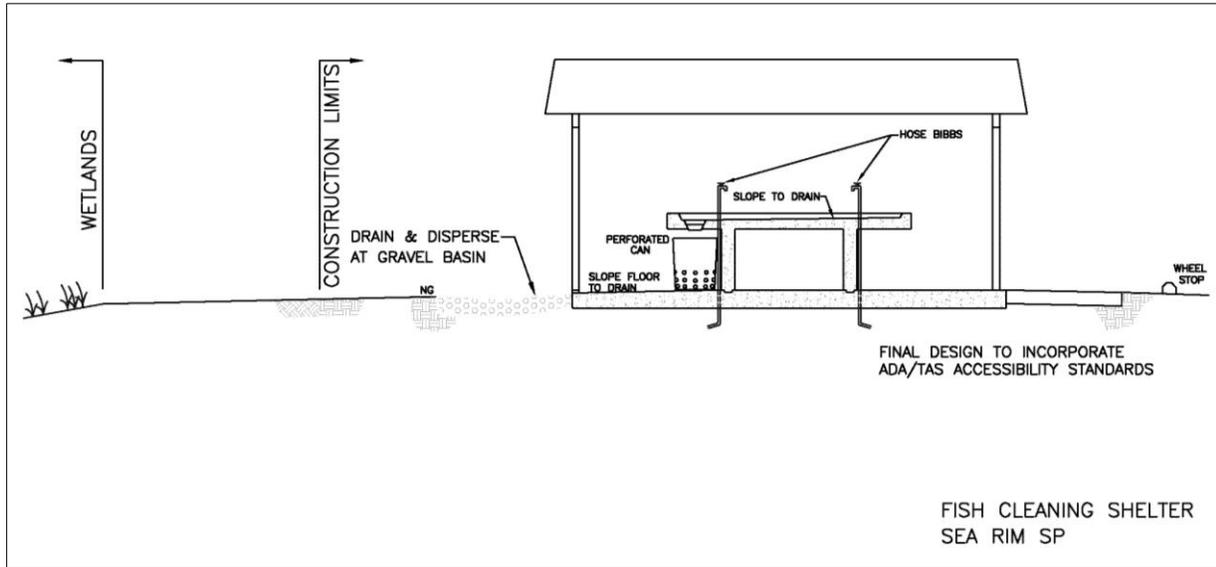


Figure 8-20. Preliminary design for the fish cleaning shelter.

Utilities

The fish cleaning shelter would connect to the existing water supply that is currently being used for the temporary rinse shower.

Grading and Ground Disturbance

The fish cleaning shelter would disturb both an area currently covered with asphalt and adjacent vegetation in order to construct proper flooring for the facility. The shelter would be about 15 feet by 17.5 feet (Figure 8-21). The construction limits would be about 10 feet around the building and 5 feet surrounding the sidewalks.

Mobilization, Staging, and Stockpiling

Adjacent roads and/or parking areas would be used to stage and stockpile materials for the shelter.

8.10.4.5 Construction Schedule for all Improvements

Although a construction schedule has not yet been finalized, each improvement is expected to take fewer than 30 days to complete (30 days for Fence Lake, 25 days for Willow Pond, 20 days for the comfort station, and 25 days for the fish cleaning shelter). All construction would occur during daylight hours, Monday through Friday. The date the contract is awarded may impact the timing of the Sea Rim State Park Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions.

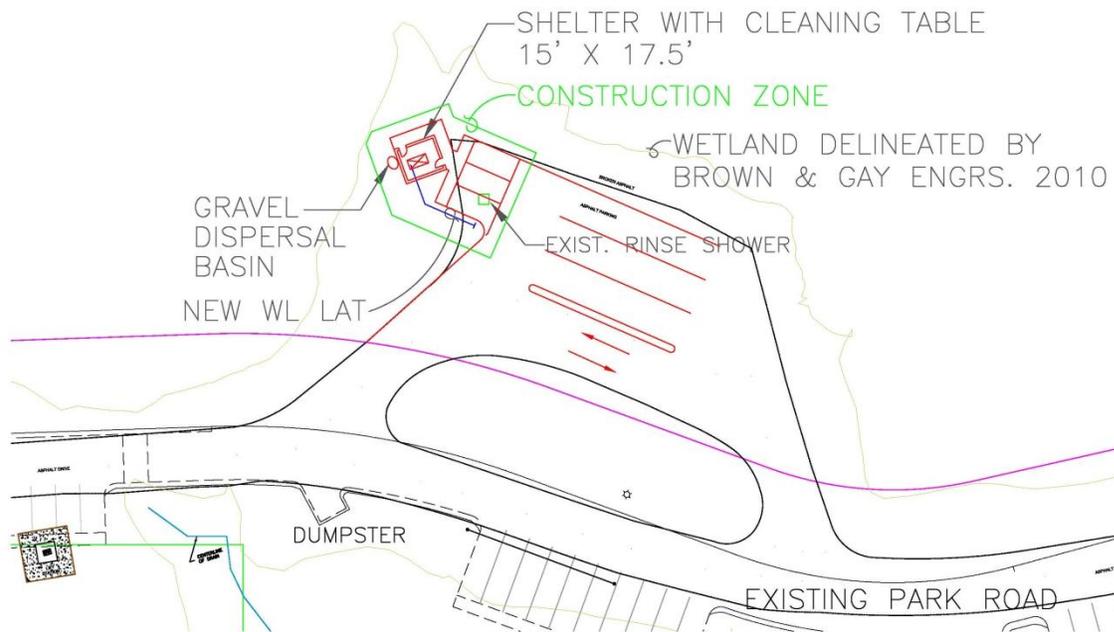


Figure 8-21. Site plan for the fish cleaning shelter and the location of existing development and environmental features.

8.10.5 Operations and Maintenance

Sea Rim State Park is open 7 days a week year-round. Recreational activities available at the park include camping, wildlife observation, birding, beach combing, walking nature trails, canoeing, kayaking, beach swimming, fishing and waterfowl hunting. During hunting season, hunters are allowed in the Park no earlier than 4:30 a.m. Ongoing maintenance of the constructed facilities would be the responsibility of Sea Rim State Park, which is owned and managed by the TPWD. During construction, there would be monitoring efforts to ensure that wildlife and habitat is protected and that the Sea Rim State Park Project designs are correctly implemented. Maintenance and other activities at the Park follow all guidance provided by the TPWD State Park Division Operating Plan (TPWD 2012a).

8.10.6 Affected Environment and Environmental Consequences

The proposed Sea Rim State Park Project has a small footprint and three of the items (comfort station, Willow Pond viewing platform, and fish cleaning shelter) are either being developed within the footprint of existing infrastructure or would be connected to existing infrastructure. Best management practices would be used during construction to minimize impacts.

8.10.6.1 Physical Environment

Sea Rim State Park has lakes, bayous, canals, water control structures, emergent marshes, beaches and coastal uplands and is located within the Coastal Prairies physiographic region. Specifically, the Project area is located within the Chenier Plain which formed over thousands of years from the reworking of Mississippi River delta sediments. The description of the physical environment of the Project area is

divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

8.10.6.1.1 Geology and Substrates

Affected Resources

Within the Project area there are two geological zones: the gulf shore beach/dune zone and the brackish water wetlands and lakes zone. The gulf shore beach/dune zone consists of a thin layer of sand over clay deposits from the Sabine and Mississippi Rivers. The brackish water wetlands and lakes zone consist of clays overlaid with mucky peat formations which is consistent with backwater marsh deposits of silt and detritus that are common with tidally influenced wetlands. The Gulf shore on the upper coast of Texas has retreated several miles inland over the past millennia. In addition, the geology of the site continues to be altered by tropical storms and hurricanes. In the past 10 years, two major hurricanes, Hurricanes Rita (2005) and Ike (2008), significantly impacted the Project area's geology. The dunes and dune swale wetlands were severely impacted during Hurricane Ike, which altered the protective function of the beach/dune system and exposed the clay ridge to erosion.

Soils present throughout the Project area have been characterized as being frequently flooded. However, the soil in the comfort station construction area was previously altered by the addition of fill. As a result, the area only floods during large storm events. Soils in the fish cleaning shelter construction area may flood, but the area is not considered a wetland. The Fence Lake viewing platform is located on submerged lands and the sediment consists of a soft, muddy bottom. Soils throughout the Project area may have received a recent deposit of sand resulting from the over washing of the coastal dunes during Hurricanes Rita and Ike.

Environmental Consequences

Alterations to substrates through fill, compaction, grading, and earth moving activities would be limited to the local Project areas and would not change the local geologic features or characteristics of the soil. There would likely be grading of the substrate in the comfort station and fish cleaning stations Project area. Substrate at the comfort station is comprised of fill (up to 4 feet below the surface) and the surface mainly covered with exotic grasses and asphalt present as a result of previous developments. Both viewing platforms would have minimal disturbances associated with the installation of the structures. There may be minor impacts associated with the equipment used during the construction of the Willow Pond viewing platform. As a result, Project implementation would likely have short-term and long-term minor adverse impacts to affected soils.

Specific impact minimization measures would be implemented during construction. These would include following established best management practices such as the implementation of an erosion control and storm water management plan; the installation of sediment traps prior to commencement of construction activities; operating outside of set-backs from wetland areas; and ongoing construction monitoring to ensure compliance.

8.10.6.1.2 Hydrology and Water Quality

Affected Resources

Hydrology

The specific Project area is comprised of brackish lakes, emergent marshes and coastal uplands. The beach/dune system consists of small coastal dunes and dune swale wetlands that are supported by a hydrologic freshwater lens which is recharged by rainfall. Generally, the water in Fence Lake is turbid due to unconsolidated muddy bottom substrates and salinity averages around 10 parts per thousand or lower. In years where rainfall is high, salinity decreases which allows for the colonization by freshwater aquatic plants. The plants are able to stabilize the sediments and reduce turbidity in the lake. Recent storms have breached the beach ridge enabling saltwater intrusion and siltation into the adjacent brackish wetlands. Altered hydrology from such activities as construction of the Gulf Intracoastal Waterway and navigational channels has also caused significant increases in salinity which has caused land loss in marsh areas.

The proposed comfort station located at the boat ramp is surrounded by marsh that is tidally connected via a boat channel to Fence Lake. The Fence Lake viewing platform is located within the tidally influenced Fence Lake. Fence Lake is then connected via tidal channels to Salt Lake, Salt Bayou, Johnson Lake, Keith Lake and finally to the Sabine-Neches Ship Channel, Sabine Pass and the Gulf of Mexico. Heavy rainfall in the vicinity of these projects could cause the water level to rise above normal elevations until the rainfall drains out of the system, which may take a week or more. Likewise, storm tides may inundate the area with gulf waters which would slowly drain away over a similar period of time.

The Willow Pond viewing platform and the fish cleaning station are surrounded by freshwater and brackish marshes that are hydraulically connected to the Gulf of Mexico. The Willow Pond viewing platform is located within a marshy low area between the beach dunes and an older dune ridge further inland upon which Highway 87 was built. Rainfall can build up enough to overflow directly into the Gulf of Mexico. Freshwater can also seep into the Willow Pond area from the surrounding landscape. Rainfall on the dunes soaks into the sand and into a freshwater lens that sits on top of a permanently saline water table. This fresh groundwater then seeps into Willow Pond which in turn seeps out into the Gulf or occasionally during storm events, opens directly into the Gulf and drains via a temporary surface connection.

The fish cleaning shelter is located on an upland dune ridge surrounded by brackish marsh. Rainfall quickly percolates into the sand of the dune ridge at and around the Project site and then seeps out into the marsh similar to the manner described above. However, this marsh has a much larger watershed and it is connected to the Gulf of Mexico via a permanent tidal channel. This channel is blocked at its mouth during prolonged dry periods and most summer seasons when there is neither the freshwater drainage nor high enough tides to maintain water exchange over a low beach berm. During these times the marsh may become fresh, hyper saline, or completely dry dependent upon the amount of rainfall.

Water Quality

Surface waters that flow into the Project area meet their assigned water quality standards, except for bacteria. There are restricted consumption advisories in the Gulf of Mexico due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

Environmental Consequences

Sea Rim State Park Project activities must comply with local, state, and federal hydrology and water quality requirements. Construction activities in the Fence Lake Project and Willow Pond areas may be subject to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act which would require authorization from the USACE.

Construction may result in modifications to hydrology at the site. Natural hydrologic flows would be altered to some degree by the introduction of an impermeable surface for the comfort station and fish cleaning shelter. The impermeable surfaces could increase rates of runoff during storm events. However, the increase in impervious surface area is small and therefore, any adverse impacts to hydrology would be short-term or long-term but minor.

Construction of the Fence Lake viewing platform may temporarily increase turbidity. However, the effects would be minor and localized, and expected to be short-term. Construction of the platform would not cause long-term adverse water quality impacts, nor would it alter the hydrology in the Project area. Coordination with USACE has been started and a permit application has been submitted for the Fence Lake viewing platform. Disturbance to the water quality and hydrology, if any, caused by construction of the Willow Pond platform and boardwalk would be small and localized, and short in duration. The fish cleaning shelter would be designed to collect all refuse and waste from the shelter, which would be disposed of in the waste collection system within the Park. The comfort station would have minor long-term beneficial impacts on water quality by containing waste in the vaults, which would be pumped out on a regular schedule. Where necessary, all runoff would be controlled with sediment fencing around the construction zone to reduce impacts to the adjacent wetlands. No other negative effects to water quality are expected. Therefore, any adverse impacts to water quality would be short-term and minor.

8.10.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The Project area is located within Jefferson County, Texas, which is currently in attainment with NAAQS for all criteria pollutants (EPA 2013). Since this Project would not be located in a nonattainment or maintenance area, it is exempted from conformity analysis under CAA.

Implementation of the Sea Rim State Park Project would include transportation and heavy construction equipment, which may include airboats, tugboats/barges, trucks, forklifts, backhoes, semi-tractor trailer, front-end loaders, and a crane.

Environmental Consequences

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the Project vicinity due to construction vehicle emissions. Excavation associated with construction of portions of the improvements may produce fine particulate matter. However, this impact would be short-term, only occurring during active construction activities. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Available impact minimization measures would be employed to reduce the release of GHG during Project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Sea Rim State Park Project:

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

The use of gasoline and diesel-powered construction vehicles and equipment, including airboats, trucks, front-end loaders, forklifts, cranes, backhoes, and tugboats/barges, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

Based on the assumptions described in the table above, and the small-scale and short duration of the construction portion of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

Table 8-5. Estimated greenhouse gas impacts.

EQUIPMENT ³³	NUMBER OF 8-HOUR DAYS	CO ₂ e (METRIC TONS) ³⁴	CH ₄ (CO ₂ e) (METRIC TONS) ³⁵	NO _x (CO ₂ e) (METRIC TONS)	TOTAL CO ₂ e (METRIC TONS)
Sea Rim - Fence Lake Platform- 30 days					
Airboat	30	39.00	0.06	0.30	39.03
Barge/tugboat ³⁶	15	240.00	0.45	1.80	242.25
Pickup truck	30	4.80	0.00	0.03	4.80
Semi-tractor trailer	10	3.40	0.00	0.02	3.40
Sea Rim - Willow Pond Boardwalk & Platform - 25 days					
Pickup truck ³⁷	25	4.00	0.00	0.03	4.00
Semi-tractor trailer	5	1.70	0.00	0.01	1.70
Front-end loader	15	5.25	0.00	0.03	5.25
Rough terrain forklift	15	5.25	0.00	0.03	5.25
Sea Rim - Comfort Station - 20 days					
Pickup truck	20	3.20	0.00	0.02	3.20
Semi-tractor trailer	5	1.70	0.00	0.01	1.70
Front-end loader	15	5.25	0.00	0.03	5.25
Crane	1	0.29	0.00	0.00	0.29
Sea Rim - Fish Cleaning - 25 days					
Pickup truck	25	4.00	0.00	0.03	4.00
Backhoe	25	8.75	0.01	0.05	8.75
Semi-tractor trailer	15	1.70	0.00	0.01	5.10
Front-end loader	25	8.75	0.01	0.05	8.75
Crane	1	0.29	0.00	0.00	0.29
TOTAL		337.04	0.53	2.45	343.01

³³ Emissions assumptions for all equipment based on 8 hours of operation.

³⁴ CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

³⁵ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

³⁶ Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

³⁷ Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

8.10.6.1.4 Noise

Affected Resources

The primary sources of ambient (background) noise in the Project area are operation of vehicles, humans, recreational vessels, and natural sounds such as wind and wildlife. The levels of noise in the Project area varies, depending on the season, and/or the time of day, the number and types of sources of noise, and distance from the sources of noise. Noise-sensitive land users in the Project area include Park users.

Environmental Consequences

Implementation of the Sea Rim State Park Project would include transportation of construction materials to the Project area, which may include boats and a semi-tractor trailer truck or other types of transportation. The heavy equipment used for transportation and construction would produce noise. Construction equipment and pile driving noise is known to disturb fish and nesting shorebirds. Construction noise can also be a nuisance to visitors using the Park. Recreational users in the vicinity of the Fence Lake viewing platform and the fish cleaning platform would have the opportunity to relocate to other areas of the Park during construction activities. Noise should not inhibit recreation use in the vicinity of the comfort station Project area since it is a parking area and boat launch. Few visitors are expected in the Willow Pond Project area because there are currently no trails or walkways that provide access into the area. Although there are boardwalks in part of the Project area, they do not connect to any existing infrastructure and a park patron would have to walk through the grasses and bushes to reach the boardwalk. Because construction noise is temporary and unlikely to result in users changing their activities, any negative impacts to the human environment during construction activities would be short-term and minor.

Once facilities are constructed, noise would be generated from facility operations, vehicles associated with these facilities, and recreational users. Overall, long-term noise effects from increased recreational activities and users would be minor, but consistent with the overall type and decibel level of a state park experience.

8.10.6.2 Biological Environment

The Park includes 4,141 acres of marshland with 5 miles of beach shoreline in the western portion of the Chenier Plain. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes and dune swale wetlands abutting the shore of the Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

8.10.6.2.1 Living Coastal and Marine Resources

The Park includes 4,141 acres of marshland with 5 miles of beach shoreline in the western portion of the Chenier Plain. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes and dune swale wetlands abutting the shore of the Gulf of Mexico. Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway.

Flora

Affected Resources

The Sea Rim State Park Project consists of four separate improvements, located in different areas of the Park. The Fence Lake viewing platform site does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There is shallow lake bottom consisting of unconsolidated silts and clays. The shoreline vegetation of the lake is dominated by common reed. The Willow Pond boardwalk and viewing platform Project area is within saline prairie and marsh habitat. Dominant vegetation at the Willow Pond viewing platform includes salt bush, high tide bush, American bulrush, saltmarsh mallow, salt cedar, and marsh hay cordgrass. A boardwalk and viewing platform is being built in the Project area to minimize impacts to vegetation. Vegetation at the comfort station includes non-native turf grasses which are mostly comprised of Bermuda grass. Development of the comfort station would eliminate all vegetation in that Project area. The fish cleaning shelter Project area consists of a mix of non-native and native grasses and sedges. Plant species are dominated by Bermuda grass, bitter panicum, and American bulrush. A portion of the Project footprint would be in an area with existing vegetation.

Environmental Consequences

In order to minimize environmental impacts, the comfort station, Willow Pond viewing platform, and fish cleaning shelter would be located within the footprint of current or former developments at Sea Rim State Park. The Willow Pond viewing platform would be connected to an existing boardwalk that was damaged from recent hurricanes. The fish cleaning shelter and comfort station would be built, in part, on an existing parking lot. In addition, all Project areas are small and vegetation types to be impacted are common to the area. Therefore any short-term and long-term adverse impacts to vegetation would be minor.

Fauna

Affected Resources

Wildlife that have been observed in Sea Rim State Park include but are not limited to the following: alligators, mink, nutria, raccoon, rabbit, opossum, skunk, river otter, muskrat, warblers, swallows, vireos, grosbeaks, buntings, and flycatchers. At dawn and dusk, bobcats and coyotes can sometimes be seen. White and brown shrimp, crabs, and various sport fishes, such as red drum, speckled trout and flounder, thrive in the Park's lakes and bayous. Rich with plankton and organic matter, the marshland waters serve as a nursery for various species of aquatic life, supporting marine fisheries and migratory waterfowl. Fish commonly found in Fence Lake includes striped mullet, mud minnows, pinfish, hardhead catfish, red drum, and sheepshead. Common crustaceans include blue crab, white shrimp, and grass shrimp.

Environmental Consequences

The Willow Pond viewing platform, comfort station, and fish cleaning shelter would be located within previously disturbed/developed areas of the Park. Many mobile wildlife species would avoid areas near or within construction areas but would likely return to the area after construction activities cease. All

Project areas are small in size and construction activities would be short in duration (estimated to be less than 30 days per improvement). Any adverse effects to fauna would be short-term and minor.

Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act.

Affected Resources

Endangered Species

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the FWS or NMFS. No federally-listed species or other species of concern under the NMFS' jurisdiction are expected to be in the Project area due to the Sea Rim State Park Project location and habitat conditions. No federally-listed or proposed species have designated or proposed critical habitat in the Project area. None of the improvements would be constructed on the beach; therefore appropriate habitat for sea turtles does not exist in the Project area.

The red knot and piping plover are the only proposed or federally-listed species that may be in the Project area. Although piping plover (listed) and red knot (proposed), occur in the Park, habitat present in or adjacent to the Project areas is considered marginal at best. Typically, red knots and piping plovers only use beach or shoreline habitat. Marginal habitat for the piping plover does exist near the fish cleaning shelter, which is located next to an existing parking lot that is already in use. The red knot has rarely been observed within the Park and is only known to be found on the beach. There are no improvements planned for the beach. Based on local knowledge and best professional judgment, appropriate habitat for the red knot does not exist in the Project area.

Bald and Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. No golden eagles have been observed in Sea Rim State Park and bald eagles are not known to nest within Sea Rim State Park.

Migratory Birds

Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. Migratory birds are also protected under the Migratory Bird Treaty Act. Nesting of migratory birds is not known within the Project area, but is possible. Bird rookeries are not within or near the Project area.

Essential Fish Habitat

NMFS confirmed that no Essential Fish Habitat as described by the Magnuson-Stevens Fishery Conservation and Management Act occurs in the Project area.

Marine Mammals

The Fence Lake viewing platform is the only development which would occur in open water. The Lake is extremely shallow (2-3 feet deep), isolated from direct access to adjacent bays, and is not known to be used by any marine mammals. No marine mammals are expected in the Project area.

Environmental Consequences

It is possible that migratory birds may nest in the Sea Rim State Park Project area. There is no mechanical clearing of vegetation with this Project, but there would be enough disturbances to displace or destroy nests, eggs or chicks. Therefore, at least the initial site access, clearing, and construction effort would be conducted outside of the spring nesting season (March 15th to July 1st). Once the site has been cleared and construction commenced, nesting birds would avoid the construction area and further work can occur throughout the year. Construction activities would produce enough noise and disturbance to prevent birds from nesting in the area, thereby preventing impacts to nesting birds.

The fish cleaning shelter is the only proposed improvement close to the beach. Therefore special management practices during construction of the fish cleaning shelter would be used to prevent any potential impacts to piping plovers. The special management practices include having an onsite monitor, avoiding work after dark, maintaining a speed limit of 10 mph, and stopping work if the birds are observed foraging within 100 feet of the work site. The onsite monitor would have stop work authority and would be present at the site when construction is occurring near the fish cleaning shelter. The trained monitor would survey the area daily prior to the initiation of any construction activity and periodically throughout the day. If vehicles/equipment are left in the Project area, the areas around the tires would be surveyed before moving the vehicle. The monitor would keep a daily log documenting all surveys conducted during the fish cleaning shelter construction Project.

Any impacts to protected species if they occur at all would be expected to be short-term and minor.

8.10.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.10.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

In 2012 the population in Jefferson County was estimated to be over 250,000 which accounted for 1% of the Texas population. Approximately 43% of the population in Jefferson County is white (not Hispanic or Latino), 18% is Hispanic or Latino, 34% is black or African American, and 4% is Asian. Almost 18% of the county population speaks a language other than English at home. Median household income (2007-2011) in Jefferson County and the state is \$42,883 and \$50,920, respectively, with 19% of the county

and 17% of the state living below the poverty level (U.S. Census Bureau 2013). Local and out of town visitors frequent Sea Rim State Park.

Environmental Consequences

No residential communities are located adjacent to the proposed Sea Rim State Park Project. As a result, there would be no potential for short-term impacts from construction of the new facility. Construction materials are generally purchased from the local area. If a local contractor is awarded the bid, this would provide stimulus to local businesses. Any contractor mobilization to the area would provide stimulus to local service industries. Indirect beneficial effects to the local economy may be anticipated as a result of increased recreational and tourism opportunities. These economic benefits would likely be concentrated in the service and retail industry sectors. Sea Rim State Park would also see increases in revenue. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Overall, socioeconomics would not be adversely impacted as a result of the proposed Project. The Project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with visitation to the Park and tourism.

8.10.6.3.2 Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. Although Jefferson County is considered to be minority, the Project would not result in a high and adverse impact to any of the analyzed resource categories, including environmental and economic categories.

8.10.6.3.3 Cultural Resources

Affected Resources

The area of potential effect for reviews under Section 106 of the National Historic Preservation Act includes areas of direct and indirect impact. It is believed that the discovery of and/or the disturbance of intact cultural resources is highly unlikely at any of the proposed construction Project locations. The Texas State Historic Preservation Officer provided concurrence on July 3, 2013 to a letter submitted by TPWD's Cultural Resources Program. The letter is summarized below:

TPWD believes that the discovery of, and/or the disturbance of intact cultural resources is highly unlikely at any of the proposed construction project locations. All proposed construction sites are greater than 1 kilometer away from any known archeological sites or high probability areas. Physical inspections at three locations (Fence Lake, comfort station and fish cleaning shelter) have shown that no cultural resources exist. During 1978, the Fence Lake shoreline was intensely searched from above and no new archeological sites were discovered. An additional investigation was conducted at Fence Lake in 2013 and no shell middens or other cultural features were found at that location. A subsurface investigation in the comfort station project area found there is over 4 feet of fill in the area. In the fish cleaning shelter location, a subsurface investigation observed approximately 2 feet of fill. The fourth location (Willow Pond), even though there is little chance of encountering any cultural resources, will be monitored during construction of the boardwalk extension and wildlife viewing platform.

Environmental Consequences

No cultural resources are expected to be impacted by the Sea Rim Park Project. Since only an above-ground survey of the Willow Pond worksite was completed, the area would be monitored during construction to ensure that no archaeological sites are disturbed. The Texas State Historic Preservation Office has provided concurrence that discovery of, and/or the disturbance of intact cultural resources is highly unlikely as a result of this Project. A complete review of this Project under Section 106 of the National Historic Preservation Act 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.

8.10.6.3.4 Land and Marine Management

Affected Resources

The Sea Rim State Park Project is located within Sea Rim State Park on state-owned lands. The majority of the Park is undeveloped and consists of marsh, beach, dune, and lake habitats. The addition of these improvements to the Park is in accordance with the Sea Rim State Park master planning process and will meet several objectives of TPWD's Land and Water Resources Conservation and Recreation Plan (2013b). Additionally, Sea Rim State Park operates under the guidance of TPWD's State Park Division Operating Plan (TPWD 2012a). All standards and provisions of these plans and relative regulations would be adhered to, including Texas State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59) and Texas Accessibility Standards issued under the authority of the Texas Government Code, Chapter 469. The Trustees have concluded that the Project is consistent with the goals and policies of the Texas Coastal Management Program and will send a letter to the TGLO to seek concurrence.

Environmental Consequences

The Sea Rim State Park Project would not change the current land use, zoning, or cause any amendments to management plans that relate to the Project area. The area would remain designated

for open space recreational use, which allows for developed camping facilities and other structures related to outdoor activities such as boating and fishing. Land use and management authority at the Park would remain under the purview of the TPWD, and development at the Park would comply with the guidance established for coastal recreational land uses and the requirements of the Coastal Zone Management Act. Thus, no impacts would occur to Land and Marine Management under the proposed Project.

8.10.6.3.5 *Aesthetics and Visual Resources*

Affected Resources

The general character of the area can be described as a rural park with few developments on site. Most recreational activities on site involve the use of the natural setting. For example, activities such as bird watching and fishing benefit from the natural settings to enhance experiences. Improvements proposed in this Project provide enhanced opportunities for recreational experiences while maintaining a small footprint, which is an objective identified during the Sea Rim State Park master planning process. During the construction of the improvements, the materials, and equipment would be staged adjacent to the worksites. The proposed construction is consistent with the surrounding structures and typical of amenities located within Texas coastal state parks.

Environmental Consequences

Temporary impacts to visual resources would result from construction of the improvements. Large construction equipment would temporarily reduce the aesthetic values of the Project area. The footprint of each improvement is small and construction duration for each improvement is short (less than 30 days). The addition of the structures would change the view shed, but the construction would be consistent with the other amenities located in the Park. The structures would not negatively attract attention, dominate the view, or detract from user activities or experiences. Any adverse impacts to aesthetic and visual resources would be short-term and minor.

8.10.6.3.6 *Tourism and Recreational Use*

Affected Resources

Numerous recreational opportunities are available to local residents and visitors within Sea Rim State Park. Visitors generally come to the Park to access the beach, fish, hunt, use the public boat ramp, and view wildlife. Recreational fishing and hunting activities are managed according to federal, state, and park regulations.

The Park has historically averaged 6,800 to 9,100 visitors per year, but since the Park was severely damaged by Hurricanes Rita and Ike, visitation has dropped significantly due to the lack of facilities. The Park is a stop on the Great Texas Coastal Birding Trail and remains a popular destination for birdwatchers in southeastern Texas despite the lack of facilities. The adjacent wildlife management area and refuges (J.D. Murphee Wildlife Management Area, McFaddin National Wildlife Refuge, and Texas Point National Wildlife Refuge) are popular waterfowl hunting areas. Having these other natural areas in the vicinity of the Park enhances the ecological value for wildlife species by improving habitat connectivity. There are three paddling trails and three foot trails located in the Park (Figure 8-22). The

shoreline itself is popular for walking and horseback riding is allowed on the beach. Primitive camping is allowed in designated areas.

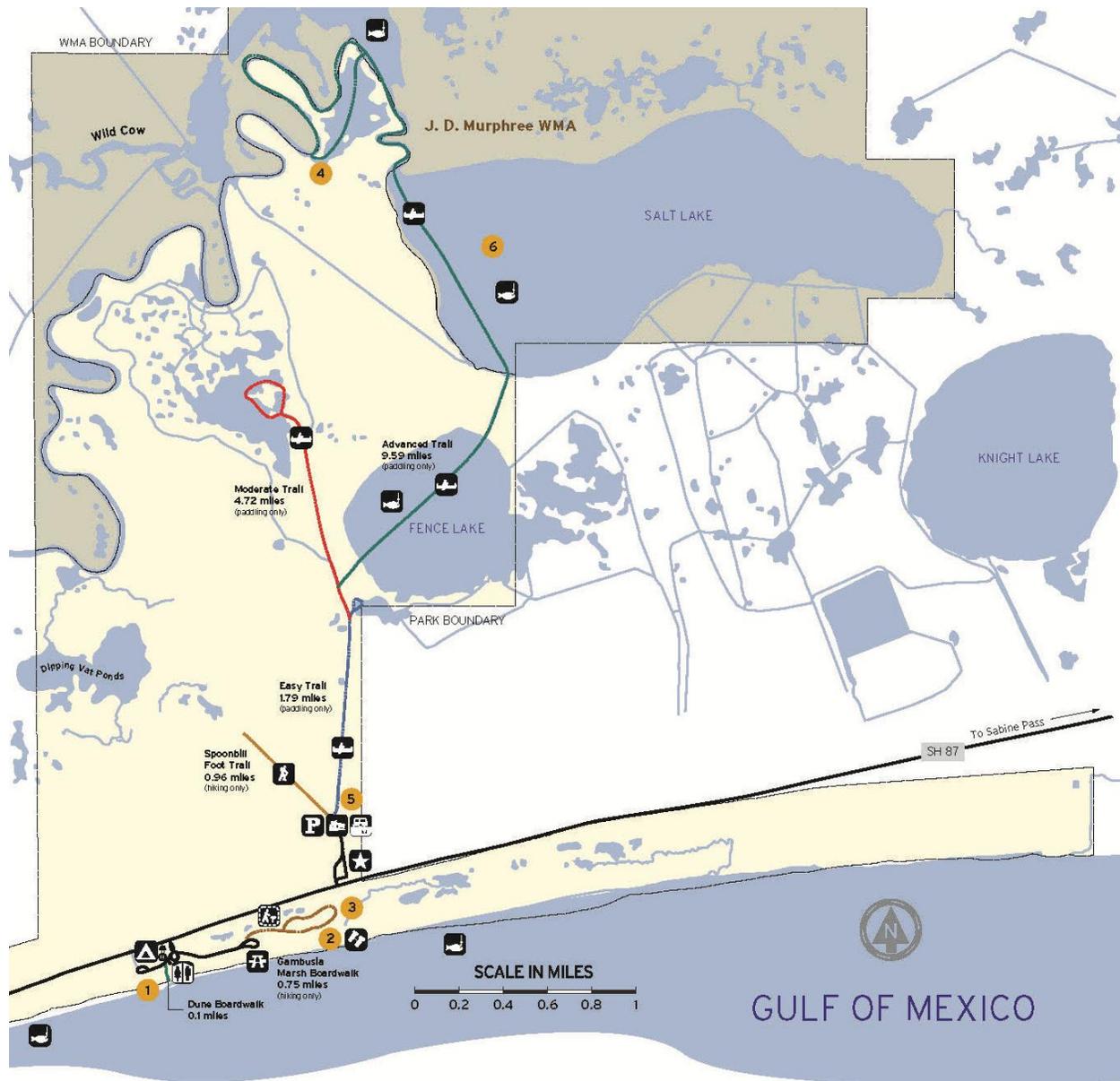


Figure 8-22. Locations of trails within Sea Rim State Park.

Environmental Consequences

The addition of the proposed improvements would support the current use of the Park and are expected to increase the visitation and enhance the users' experience. Because the Park is included on the Great Texas Coastal Birding Trail, the viewing platforms would enhance birding opportunities within the Park. The viewing platforms would also enhance other wildlife viewing opportunities within the Park. The fish cleaning station and comfort station would enhance Park resources for both the beach users and anglers. This suite of improvements would complement the ongoing restoration in the Park and is

consistent with the goal of balancing biological conservation with recreational opportunities. During the construction period, recreational experience would be impacted from noise and visual disturbances associated with the use of heavy equipment. Access to certain areas could also be restricted or impacted to some degree during construction activities. During construction of the comfort station, it may be necessary to close a portion of the parking lot for staging. However, this would be short in duration and would not have significant impacts to public access or use of the boat ramp. The construction of the Fence Lake and Willow pond viewing platforms would not alter existing public access points. The construction of the fish cleaning station may interrupt the use of the parking area and rinse station adjacent to the construction area, but this would be temporary. The fish cleaning shelter would replace the temporary rinse shower. While these temporary inconveniences would result in minor short-term impacts on tourism and recreational use during the construction, over the long term, improved access and enhanced facilities are anticipated to benefit tourism and recreational use. Overall, implementation of the Sea Rim State Park Project would contribute positively to visitor experience and public access. Any adverse impacts to tourism and recreational use would be short-term and minor.

8.10.6.3.7 Infrastructure

Affected Resources

No additional infrastructure would be needed to implement the Project. The viewing platforms and comfort station would not need any utilities. Water for the fish cleaning station is currently onsite. Road access and parking for all improvements are currently present.

Highway 87 is not a major thoroughfare and use is limited to local Park and Wildlife Refuge/Area traffic. West of the Park Highway 87 runs into and ends in the McFaddin National Wildlife Refuge. Heading east Highway 87 connects to the Texas Point National Wildlife Refuge, J.D. Murphee Wildlife Management Area and then to Port Arthur, Texas.

Environmental Consequences

The Sea Rim State Park Project would not impact any existing public infrastructure or road, but it may temporarily impact Park facilities during the alteration of water and staging of materials. During the construction activities, there would be short-term localized disruptions of parking and facilities within the Park. No additional utilities would be needed to implement and/or maintain the Project. Construction activities should not alter the operational capacities of the Park. The addition of the fish cleaning shelter and comfort station would provide a long-term benefit to recreational users. Any adverse impacts would be short-term and minor.

8.10.6.3.8 Public Health and Safety and Shoreline Protection

Affected Resources

The Sea Rim State Park Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All waste generated during construction of the improvements would be disposed in the appropriate waste or recycle collection receptacles in the Park. All occupational and safety regulations and laws would be followed to ensure safety of all workers and the

public. The addition of the comfort station would help improve environmental health within the Park. Shoreline protection and stabilization efforts are managed by the State.

Environmental Consequences

No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. Soil and sediment stabilization measures would be incorporated into the Sea Rim State Park Project design as needed in areas where the potential exists for erosion to occur in order to protect resources and ensure public health and safety. No adverse effects to public health and safety and shoreline protection are expected as a result of this Project.

8.10.7 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), 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).

The proposed Sea Rim State Park Project would build two viewing platforms, a comfort station (vault toilet), and a fish cleaning shelter in the Sea Rim State Park. The Project is considered to fall under Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance visitor use and enjoyment of Park resources. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.11 Galveston Island State Park Beach Redevelopment: Project Description

8.11.1 Project Summary

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, southwest of the City of Galveston in Galveston County, Texas (Figure 8-23). The proposed Galveston Island State Park Beach Redevelopment Project includes the building of multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of the Park. These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this Project is \$10,745,060.

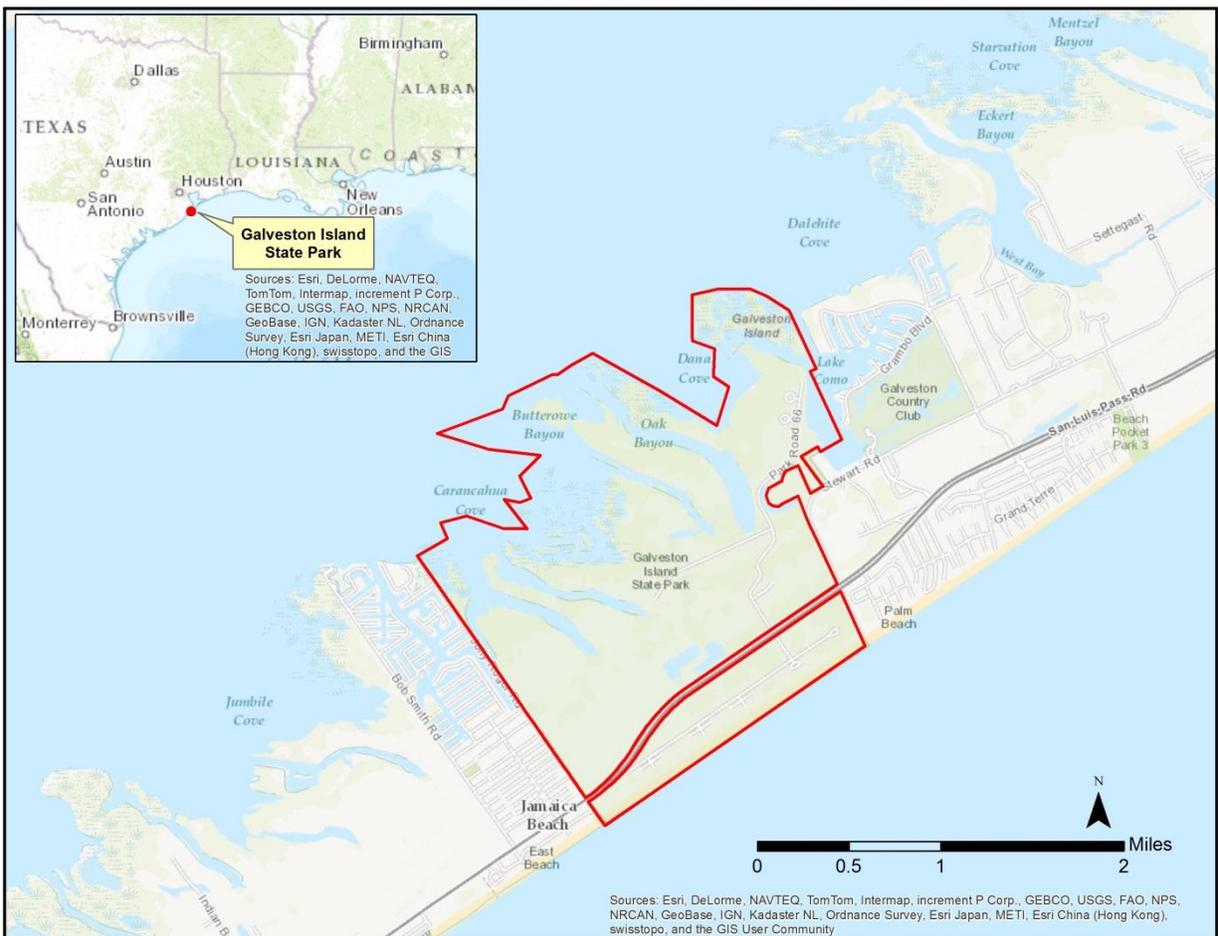


Figure 8-23. Location of Galveston Island State Park.

8.11.2 Background and Project Description

The proposed Galveston Island State Park Project will restore infrastructure for recreational facilities to enhance recreational access and opportunities on the Texas coast. Galveston Island State Park is located on the west end of Galveston Island, south of Houston, Texas, along the upper Texas coast. The Park features 2,000 acres of upper Gulf Coast barrier island ecosystem. The Park contains an array of coastal habitats that host a surprising variety of wildlife and is visited by birds from throughout the eastern hemisphere during the spring and fall migration seasons. Wading and shore birds, mottled and

mallard ducks, raccoons, armadillos and marsh rabbits are found in the park, which is ideal for wildlife observation and photography. Bay and surf fishing for spotted seatrout, sandtrout, redfish, black drum, croaker and flounder is also popular.

Historically, the Park provided camping facilities and associated amenities that were accessible to day- and overnight-visitors. However, in 2008 Hurricane Ike caused severe devastation and destroyed much of the Park's infrastructure (Figure 8-24). To guide the restoration process, TPWD developed the Galveston Island State Park Master Plan in 2011 to identify appropriate restoration efforts for the Park (TPWD 2011). Developments proposed by this Project are consistent with the Master Plan and will help improve and enhance recreational opportunities along the Texas coast. Specifically, the proposed Galveston Island State Park Project includes the building of multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of the Park.



Figure 8-24. Destruction caused by Hurricane Ike at Galveston Island State Park.

The Galveston Island State Park Project will provide greater access to visitors and enhance their recreational experiences. At the campsite facilities (Figure 8-25), comfort stations with associated parking spots are paired with rinse showers. The beach access boardwalks will provide access to the beach from multi-use campsites and tent campsite areas across the dunes (Figure 8-25). The multi-use campsites are currently designed to be RV accessible and equipped with water and electric hook-ups. Each site would also have a picnic shelter and grill within close proximity. Native trees and shrubs will be planted to provide a screen between the campsites. The location of the campsites has been designed

to account for future dune migration. An RV septic dump station is planned for the Park. Additionally, this Project proposes to build multiple tent campsites with associated amenities, which may include boardwalks and parking spaces. The equestrian facilities will include limited trailer parking and access to horse corral pens as well as the beach.

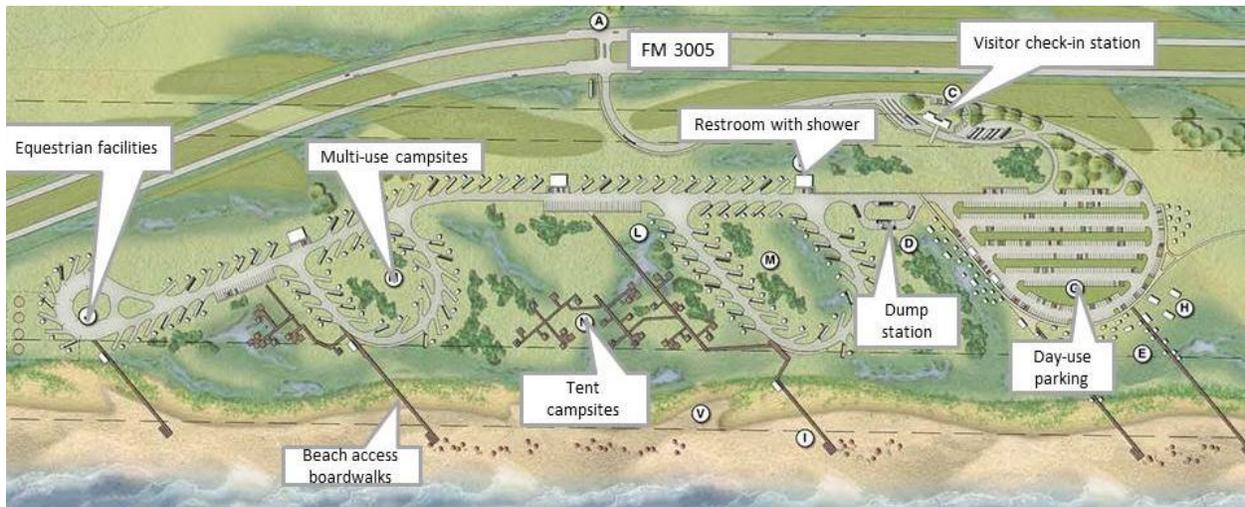


Figure 8-25. Artist rendering of Galveston Island State Park beach development highlighting camping loops, tent platforms and beach access boardwalks.

8.11.3 Evaluation Criteria

This proposed Galveston Island State Park Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Project would enhance opportunities for public use and enjoyment of natural resources, helping to offset a portion of the adverse impacts to such uses caused by the Spill. Creating the proposed infrastructure will provide facilities for over-night and day-use visitors as well as access and facilities for equestrian use. 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 Framework Agreement).

The Project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. 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 Framework Agreement).

Cost estimates are based on similar past projects, and demonstrate that the Project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1)). Developments proposed by this Project are consistent with the Park Master Plan and will help improve and enhance recreational opportunities along the Texas coast. As a result, the proposed Project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

Public comments were acquired prior to the development of the Galveston Island State Park Master Plan through stakeholder meetings/workshops, public meetings, and surveys. The planning team

designed a multi-faceted public engagement strategy that canvassed a local, state, and national audience. Emphasis was placed on reaching out to not only past visitors, but to connect with those audiences that have never been served by Galveston Island State Park or even the state park system in general. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Galveston Island State Park.

Recreational use projects in general and this specific Project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

8.11.4 Performance Criteria, Monitoring and Maintenance

This Project includes monitoring efforts to ensure Project designs are correctly implemented during construction. Monitoring has been designed around the Project objective, which is to construct multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of Galveston Island State Park to enhance recreational use of the Park.

Performance criteria for this Project will include a determination of successful construction of the Project according to design to ensure that the opportunity for recreational use of the Park will be enhanced. Monitoring efforts will also be implemented to ensure that the Project is constructed in accordance with construction documents and the Master Plan for the Park. The State Park currently has visitation monitoring procedures to capture the number of daytime visitors, overnight visitors, and participants in interpretive programs. This information will be collected and shared annually to document performance monitoring of the Project for 5 years after construction completion.

Ongoing maintenance of the constructed facilities would be the responsibility of Galveston Island State Park, which is owned and managed by the TPWD.

8.11.5 Offsets

The Early Restoration benefits provided by the Project, also known as NRD Offsets, are \$21,490,120 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed Project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.³⁸

³⁸ 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.

8.11.6 Cost

The total estimated cost to implement this Project is \$10,745,060. This cost reflects estimates developed from the most current information available to the Trustees at the time of the Galveston Island State Park Project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

8.12 Galveston Island State Park Beach Redevelopment: Environmental Review

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, which is located on the upper Texas coast, near Houston, Texas. The park is located southwest of the City of Galveston in Galveston County, Texas (Figure 8-23). The proposed Galveston Island State Park Beach Redevelopment Project (Galveston Island State Park Project) includes the building of multi-use campsites, tent campsites, beach access boardwalks, equestrian facilities, visitor check-in station, and restroom and shower facilities on the beach side of the Park. At the campsite facilities, comfort stations with associated parking spots are paired with rinse showers. The proposed beach access boardwalks would provide access to the beach from multi-use campsites and tent campsite areas across the dunes. The multi-use campsites are currently designed to be RV accessible and equipped with water and electric hook-ups and a dump station. Each site would also have a picnic shelter and grill within close proximity. This redevelopment would enhance visitor use and enjoyment of Park resources. The estimated cost for this Project is \$10,745,060.

8.12.1 Introduction and Background

The proposed Galveston Island State Park Project would restore infrastructure for recreational facilities to enhance recreational access and opportunities on the Texas coast. In 2008 Hurricane Ike caused severe devastation and destroyed much of the Park's infrastructure (Figure 8-24). The Park lost approximately 80 feet of beach and two-thirds of its camping facilities. Utilities and structures were destroyed, and the entire Park was inundated with salt water. After Hurricane Ike, the TPWD worked with the Texas Department of Transportation to remove debris. Prior to the debris cleanup, TPWD consulted with the Texas Historical Commission under Section 106 of the National Historic Preservation Act, and the Texas Historical Commission concurred with the cleanup plan. Large heavy equipment was used to bulldoze, scrape, and level the beach, pushing all asphalt, concrete, posts, and other park structures into debris piles. Large items of debris were removed from the piles and the remaining sand was returned to the beach. New plumbing, lift stations, electric and water hookups were installed. Park recovery efforts were focused within the footprint of pre-existing facilities. Part of the recovery efforts also included replanting areas near the camping loop.

To guide the restoration process, TPWD developed the Galveston Island State Park Master Plan in 2011 to identify appropriate restoration efforts for the Park (TPWD 2011). Park amenities proposed by this Project are consistent with the Master Plan and would help improve and enhance recreational opportunities along the Texas coast. Specifically, the proposed Galveston Island State Park Project includes the building of multi-use campsites, tent campsites, visitor check-in station, beach access boardwalks, equestrian facilities, and restroom and shower facilities on the Gulf side of the Park (Figure 8-26). In efforts to restore the presence of recreational resources within the Park and retain them for future generations, a dune field buffer would be preserved, which extends 250 feet from the current beginning of the dune line at the beach. This area would be specifically reserved for dune field and wetland swale restoration, and allow for the natural migration of these systems. No development outside of beach access boardwalks would be permitted in this buffer area. In addition to the creation of this dune field buffer, the Master Plan aggregated recreation amenities such as multi-use campsites and

day-use facilities into the smallest development footprint attainable. This would allow for a greater area of undisturbed and restored natural area located on the eastern edge of the property.

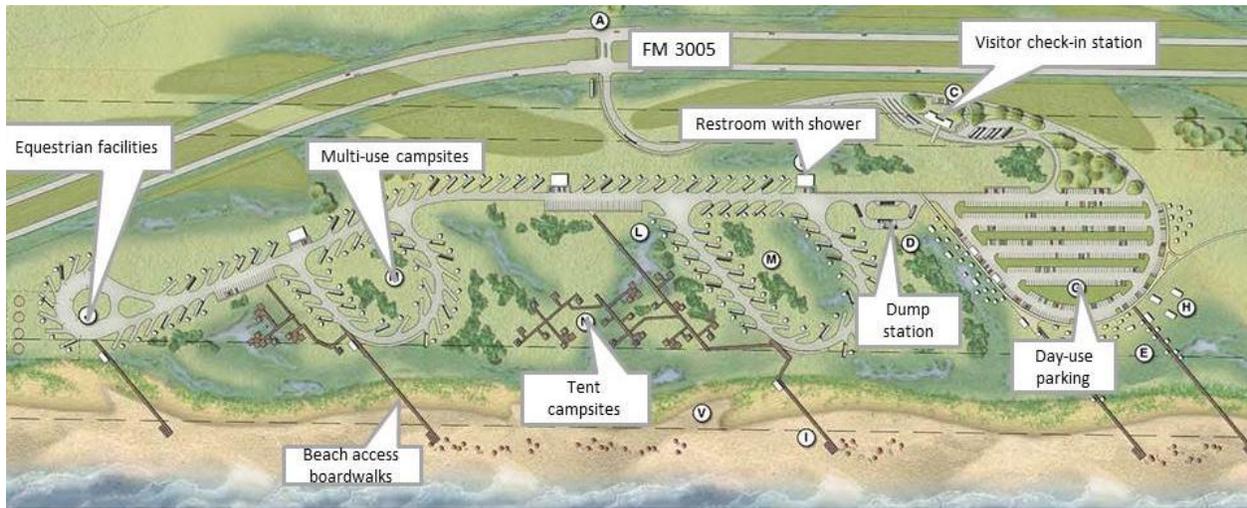


Figure 8-26. Artist rendering of Galveston Island State Park beach development highlighting camping loops, tent platforms and Gulf beach access boardwalks. The artist rendering is developed by studioOutside; however it has been modified for this figure.

The Galveston Island State Park Project would provide greater access to visitors and enhance their recreational experiences. Prior to Hurricane Ike, there were 150 multi-use campsites, no campsites designated for tents only, and no horse corrals. Currently only 33 camping facilities continue to function at the GISP beachside following the destruction by Hurricane Ike. These camping facilities are insufficient to meet public demand. Post-Ike public input has consistently shown an interest in greater capacity. This Project would replace the existing campsites and bring the total number of campsites closer to pre-Ike capacity with about 10 tent campsites and over 100 multi-use campsites. Currently, the beach-side day use area has parking for approximately 205 cars. The proposed Project would result in a total of about 520 parking spaces (exact numbers to be determined after construction documents have been completed).

Public comments were acquired prior to the development of the Galveston Island State Park Master Plan through stakeholder meetings/workshops, public meetings, and surveys. The planning team designed a multi-faceted public engagement strategy that canvassed a local, state, and national audience. Emphasis was placed on reaching out to not only past visitors, but also those audiences that have never been served by Galveston Island State Park or the state park system in general. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Galveston Island State Park. Recreational use projects in general and this specific Project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

The Individual Permit Application to the USACE referred to all of the redevelopment improvements proposed for the Gulf beachside of Galveston Island State Park (TPWD 2013a). The redevelopment of

the beachside day-use and overnight camping facilities in Galveston Island State Park would include multi-use campsites, a visitor check-in station, picnic shelters, restrooms, dump stations, parking, connecting drives, and beach access boardwalks. The USACE permit application also includes a mitigation plan to address 2.67 acres of permanent impacts to wetlands due to construction. The mitigation plan for these impacts would create, restore, and enhance over 12 acres of wetlands. This wetland mitigation would not be funded through Early Restoration. Additional portions of the permit application **not** paid for by DWH Early Restoration funds include:

- Access road and day use parking
- Tent parking areas
- RV Dump Station
- Camp Loop Roads and Spurs

The sections below describe all improvements that are part of this Project including those not paid for by the DWH Early Restoration Funds unless otherwise stated.

Compliance with state requirements, including the Texas Coastal Management Program, would be fulfilled prior to implementation. All federal, state, and local required permits would be secured prior to Project implementation. In addition, compliance with federal requirements including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation.

A preliminary jurisdictional wetland determination was completed and accepted by the USACE (SWG-2012-00631) on October 30, 2012 and would remain valid for 5 years (until 2017). An application for a standard Individual Permit under Section 404 of the Clean Water Act and associated supplemental information for the Galveston Island State Park Beach Redevelopment Project located in Galveston County, Texas was submitted to the USACE - Galveston District in February 2013 (TPWD 2013a) and is awaiting approval from the USACE. A threatened, endangered, and rare species habitat assessment as well as an alternatives analysis were prepared and submitted to the USACE for review as part of the Individual Permit Application (TPWD 2013a). A permit decision as well as an Environmental Assessment is expected to be issued by the USACE in late 2013.

In September 2012, TCEQ stated that Section 401 water quality certification for this individual Section 404 permit application could be assumed if the work meets conditions of the TCEQ best management checklist TCEQ (TPWD 2013a, Section 3).

The Trustees determined the Galveston Island State Park Project is consistent with the goals and policies of the Texas Coastal Management Program and will send a letter to the TGLO to seek concurrence.

All facilities and boardwalks would comply with Texas Accessibility Standards and Americans with Disabilities Act Guidelines as well as federal, state, and local law concerning construction standards and building codes to protect public health, safety, and welfare. The Project would also comply with the standards in the TGLO's Dune Protection and Improvement Manual for the Texas Gulf Coast (TGLO 2005).

Galveston Island State Park is operated by the TPWD whose mission includes protecting, enhancing and increasing recreational opportunities throughout the state. The Galveston Island State Park Project meets TPWD's objectives by increasing access to and participation in the outdoor recreational opportunities. The agency's mission and objectives are described in detail in TPWD's Land and Water Resources Conservation and Recreation Plan (2013b). In addition, Galveston Island State Park would follow guidance described in the State Parks Division Operating Plan (TPWD 2012a).

The Texas Parks and Wildlife Commission regulations adopted in September 1996, govern the health, safety and protection of persons and property within state parks, historical parks, scientific areas or forts, including encompassed waters, administered by the TPWD. The proposed Project would follow Texas Administrative Code and TPWD Rules and Regulations including the State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59). The TPWD State Park Division also follows Division Procedures established in 2010 and revised in 2013 for exotic, feral, and nuisance animal control.

8.12.2 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 Galveston Island State Park Project as part of Phase III Early Restoration.

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

8.12.3 Project Location

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, southwest of the City of Galveston and northeast of and adjacent to the community of Jamaica Beach in Galveston County, Texas (Figure 8-23). Galveston Island is part of a series of barrier islands and bay-lagoon systems that separate much of the Texas coastal mainland from the Gulf of Mexico. Most undeveloped parts of the island are characterized by coastal prairies and marshlands with some areas containing coastal dunes. Because barrier islands serve as transition zones between land and ocean, they support a variety of distinct eco-regions, including beaches, prairies and wetlands. Each supports a diverse array of life. The barrier island also protects the mainland from storms, while the lagoons, bay and salt marshes serve crucial functions in the life cycles of many fish, birds, and other wildlife.

The proposed Galveston Island State Park Project is located entirely within Galveston Island State Park, which is bound by 13 Mile Road to the east, Jolly Roger Road to the west, Gulf of Mexico to the south, and West Bay to the north. Residential and commercial properties occur on both sides of Galveston Island State Park with the Village of Jamaica Beach serving as a primary residential area to the west of the site. Within the Park, the proposed campground area is bordered to the northwest by Farm to Market (FM) 3005 (Figure 8-27).



Figure 8-27. Location of proposed developments within Galveston Island State Park. The red line outlines the entire 37 acres of the construction footprint.

8.12.4 Construction and Installation

Construction activities are described in detail in the Individual Permit Application (SWG-2012-00631, TPWD 2013a).³⁹ The current design plans for the Galveston Island State Park Project place the beach redevelopment back from the Gulf beachfront to account for future beach migration. The height at which the beach access boardwalks are built would also take dune migration and growth into account. This Project is in the design phase and adjustments would be made as the construction documents are finalized.

Construction on the beach redevelopment being funded outside of DWH Early Restorations has already begun. Portions of the proposed redevelopment would occur in an area where existing campgrounds are being used. Overnight beach camping would be suspended during construction of the new campsite facilities.

³⁹ A permit decision is expected to be issued in late 2013.

8.12.4.1 Visitor Check-in Station

The check-in process, and resulting queuing, would be minimized by the addition of three vehicle lanes. Temporary short-term parking for cars and recreational vehicles would also provide for a better traffic flow into the Park.

8.12.4.2 Day-Use Facilities

The beach-side day-use area currently has parking for approximately 205 cars. It is estimated that approximately 520 day-use parking spaces would be created. However, the exact number of parking spaces would be determined after construction documents have been generated. Day-use parking and facilities would reside directly southeast of the Park check-in station, and would be organized into a loop drive that surrounds an open 'events' field. Restrooms would be provided in this area to support beach day-use activities. A pedestrian trail would surround the parking loop and transition into beach access boardwalks that would crossover the preserved dune fields to the beach beyond.

8.12.4.3 Multi-Use Campsites

A series of multi-use campsites (at least 100 total sites) would be located between the highway and dune field buffer to facilitate overnight lodging in close proximity to the beach (Figure 8-28). The multi-use campsites would incorporate a series of loop drives that orient views toward the dunes and beach, while positioning the facility for future dune field migration. In order to maximize primary capacity within the multi-use area, campsites would be offset from one another approximately 50 feet on center, with loops approximately 220 feet apart. The natural areas created between loops would be reserved for native grasses and swales to incorporate stormwater collection. There would be comfort stations located for multi-use and tent campsites with limited parking at each location. Each multi-use campsite would be equipped with electric and water hook-ups and have a picnic shelter and grill located nearby. A dump station would be located to serve the entire site. Beach access boardwalks would be located at the southern end of each loop and crossover the dune field to the beach. Parking and trail connections to tent campsites would converge at the connection of loop road to the beach access boardwalk.



Figure 8-28. Example of multi-use campsites.

8.12.4.4 Beach Access Boardwalks

Beach access boardwalks would provide access to the beach from the multi-use campsites, equestrian facilities, and day-use facilities area (Figure 8-29). These boardwalks would span the dune field buffer. The primary purpose of building the boardwalks would be to facilitate access from parking areas to the beach while protecting the dunes and surrounding habitat. The boardwalks would be angled to deter wind erosion of dunes.

Current designs plan for five beach access boardwalks and boardwalks to access the tent platforms for a total of approximately 2,700 linear feet of elevated boardwalk. Boardwalks would be about 10 feet wide and constructed with wood. There would be 12-inch x 12-inch wooden piles, approximately 24 feet long, driven into the ground approximately 8 feet on center. The total boardwalk footprint is anticipated to be approximately 21,600 square feet.

Boardwalks are generally constructed so that there is no removal of vegetation and there are no cuts in the dunes. All facilities and boardwalks would comply with Texas Accessibility Standards and Americans with Disabilities Act guidelines, they would meet the standards in TGLO’s Dune Protection and Improvement Manual for the Texas Gulf Coast (TGLO 2005) as well as federal, state, and local laws concerning construction standards and building codes to protect public health, safety, and welfare.



Figure 8-29. Example of proposed boardwalks.

8.12.4.5 Tent Campsites

About 10 tent campsites would be located between the multi-use campsite loops behind the dune field buffer (Figure 8-28). Campers would access these sites from small parking bays that would be located at the intersection of multi-use loop drives and beach access boardwalks. Tent campsites would provide elevated tent platforms for overnight camping along the beach. The current design anticipates the tent platforms to be 20 feet by 20 feet. However, construction documents have not been developed and these dimensions are preliminary.

8.12.4.6 Picnic Shelters

Similar to the tent campsites, picnic shelters would provide platforms slightly elevated above the ground. The shelters would be covered with a roof and open to admit breezes from all directions. Picnic shelters adjacent to multi-use campsites may contain a grill.

8.12.4.7 Equestrian Facilities

Currently there are no equestrian facilities located in the Park although horses can access the beach from adjacent city-owned areas on either end of the Park. Horses are allowed on the beach from November 1 through February 28. The equestrian facilities would include eight overnight equestrian trailer parking spaces and access to four horse corral pens. A small equestrian trail head would be located at the end of the multi-use campsites that links to the beach for seasonal (winter) use. The trail would be fenced and signed designating its use.

8.12.4.8 Utilities

Proposed utilities would be replacing those lost from Hurricane Ike. New utilities would be installed below ground would include water, sanitary sewer, and electrical. All new utilities lines are encompassed within the 37-acre construction footprint. The new utility lines would be connected to existing service lines at the edge of the construction footprint. The location of the wastewater lines, water lines, electric lines and their connection points as well as dump station as currently designed can be seen in in the Galveston Island State Park Individual Permit Application (TPWD 2013a). No capacity upgrade to the utility connections (including water services) would be needed. Engineering designs for this Project have not been fully developed. However, all new utility lines would be installed in accordance with federal, state, and local laws concerning construction standards and building codes to protect public health, safety, and welfare.

Electrical demands would exceed what is currently being used but are not expected to exceed the capabilities of existing feeder lines. Center Point Energy supplies electricity to the site and anticipates the capacity required for the redevelopment. Current elevated electrical lines running through the proposed Park construction areas would be relocated to the main highway by the power company (Center Point Energy) at their expense.

Park sewer lines are connected to City of Galveston via pressure lines. A dump station is planned to be included on the northeast side of the development as part of the campground improvements. However, it will be paid for by a separate funding source.

Storm water would be directed to constructed wetlands and/or ditches. It is anticipated that storm water impacts would be similar to or less than the impacts before the Hurricane.

8.12.4.9 Lighting

Standards for new construction implemented by TPWD include the use downward facing lights. Other lights would be directed away from the beach. Park construction work would be conducted during daylight hours so additional lighting should not be necessary.

8.12.4.10 Grading and Ground Disturbance

Over 200 structures including concrete picnic shelters, restrooms and the visitor center were previously demolished after Hurricane Ike as specified in the permit application (TPWD 2013a). Remaining pavement and buried utility lines within the demolition zone were excavated and removed. The proposed redevelopment, including new utilities, would require grading within the Project area which has a construction footprint of 37 acres. It has been anticipated that there would be approximately 15.61 acres of impervious surface cover from this Project. The footprint of impervious cover includes the roads, parking areas, day-use area, multi-use campsites, tent campsites, visitor check-in station, picnic shelters, restrooms, a dump station, and beach access boardwalks. The size of impervious area in the Park redevelopment is 2.7 acres less than the original pre-Ike development (Figure 8-30). This is a conservative approximation. Items such as the boardwalks and campsites may have surfaces which allow water to pass through. For additional details and maps, see the Galveston Island State Park Individual Permit Application (TPWD 2013a).

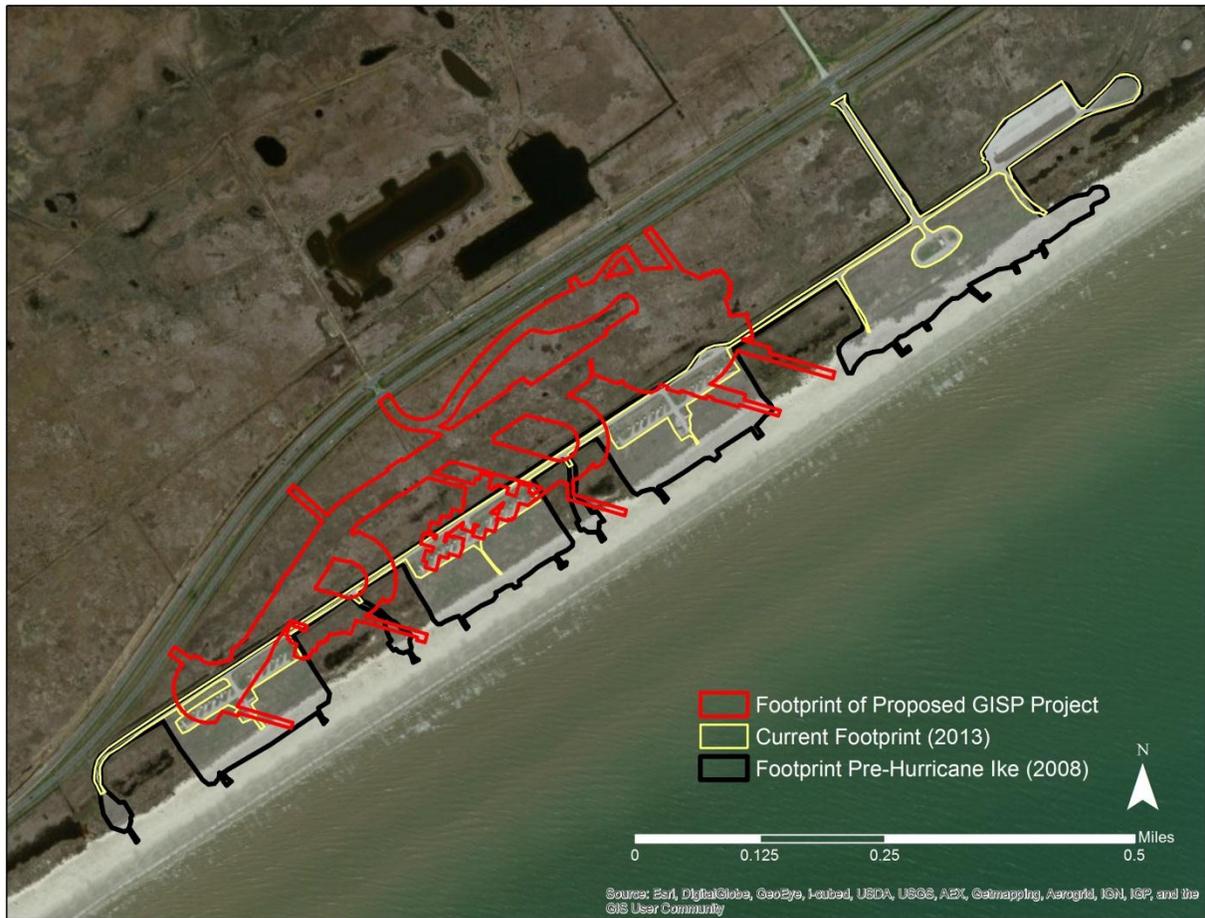


Figure 8-30. Location of proposed Galveston Island State Park Project footprint in comparison to the footprint of the Park facilities present pre-Hurricane Ike (2008).

8.12.4.11 Mobilization, Staging, and Stockpiling

Temporary staging areas for material, supplies, and equipment during construction would be located within disturbed areas of the former campground and adjacent parking lots on Park property. Heavy equipment such as large excavators, dump trucks, bulldozers, graders, pavers, concrete trucks, and semi-trailers may be used during construction. Equipment usage would be determined by the contractor.

Construction waste would be removed by the contractor to an appropriate landfill of their choice using dump trucks and roll-off dumpsters or as specified by TPWD Infrastructure.

8.12.4.12 Construction Schedule

Although a construction schedule has not yet been finalized, construction is anticipated to take approximately 19 months to complete unless severe weather delays construction. Work hours, in general, would be during daylight hours for 5-6 days per week. The construction schedule would be managed so as to avoid impacts to protected species. Construction of beach access boardwalks would only occur from October 2 to March 31 to avoid sea turtle nesting season.

8.12.5 Operations and Maintenance

Galveston Island State Park is open 7 days a week year-round. Recreational activities at this park include camping, wildlife observation, birding, beach combing, walking nature trails, kayaking, fishing, and beach swimming. Ongoing maintenance of the constructed facilities would be the responsibility of Galveston Island State Park, which is owned and managed by the TPWD. During construction, there would be monitoring efforts to ensure that wildlife and habitat is protected and that Galveston Island State Park Project designs are correctly implemented. (For specific monitoring efforts, see Section 3.2 Biological Environment.) The only new maintenance activity required would be possible periodic cleaning of the new horse corrals when facility users did not adequately complete this task themselves. Maintenance and other activities at the Park follow all guidance provided by the TPWD State Park Division Operating Plan (TPWD 2012a).

8.12.6 Affected Environment and Environmental Consequences

The USACE Individual Permit Application (SWG-2012-00631) included background information about the project, preliminary design plans and an assessment of impacts to wetlands (Section 1), a preliminary jurisdictional determination approval letter (Section 2), the Texas Commission on Environmental Quality (TCEQ) Tier I Water Quality Checklist Certification (Section 3), a coastal zone consistency determination application (Section 4), a cultural resources report (Section 5), a threatened, endangered, and rare species habitat assessment (Section 6), an alternatives analysis (Section 7), and a wetland mitigation plan (Section 8) (TPWD 2013a).⁴⁰ All of the alternatives related to the design and configuration of the new facilities attempted to minimize impacts to the surrounding environment and reduce external effects resulting from weather events. The preferred alternative, which is consistent with the redevelopment project proposed here, would rebuild camping facilities with access to the beach; protect facilities from weather, beach erosion, and subsidence; provide sufficient facilities to meet public demand; rebuild facilities with safe direct access to the beach; preserve the contiguous natural beach environment and habitat; and minimize wetland impacts by limiting the development footprint. The Individual Permit Application and its analysis are therefore incorporated by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21) as applicable. This summation is not fully inclusive of the extensive information found in the Individual Permit Application. Readers should reference the Individual Permit Application for complete information. A permit decision as well as an Environmental Assessment is expected to be issued by the USACE in late 2013.

8.12.6.1 Physical Environment

Galveston Island is part of a series of barrier islands and bay-lagoon systems that separate much of the Texas coastal mainland from the Gulf of Mexico. Most undeveloped parts of Galveston Island are characterized by coastal prairies and marshlands with some areas containing coastal dunes. Habitats in the Galveston Island State Park Project area include wetlands, bayous, coastal uplands and the beach/dune system. The description of the physical environment of the Project area is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

⁴⁰ The USACE Individual Permit Application (SWG-2012-00631) can be downloaded from this website: http://tpwd.texas.gov/landwater/water/environconcerns/damage_assessment/deep_water_horizon.phtml

8.12.6.1.1 *Geology and Substrates*

Affected Resources

The Project area geology consists of recent barrier island deposits containing mostly sandy soils with limited silts and clays. The Project area is generally flat to lightly rolling. The Project area is subject to occasional flooding by high storm surges associated with tropical weather systems and is prone to ponding after heavy rainfall. Approximately 25 acres of palustrine wetlands exist within the Project area.

The area between the Galveston Island State Park Project and the Gulf waters consists of beaches composed of mainly sandy marine substrates with varied amounts of shell fragments. Beach sand is on the land area immediately adjacent to the Gulf from the median tide line to the back of the coastal dunes. It is reworked by tide and wind. The lower areas are inundated daily by high tides. Moving away from the Gulf and into the Project area are soils on a series of old, abandoned beach ridges and wet swales that parallel the Gulf. The soil along the ridges tends to be nonsaline to moderately saline and moderately alkaline fine sand. These soils are rapidly permeable above the high water table and therefore, there is little surface runoff. The soil in the wet swales is slightly to moderately saline and moderately alkaline very fine sand. Surface water on these soils is very slow to pond. These soils occasionally flood from storm tides and frequently flood from heavy rains. The majority of the Project area has nonsaline and moderately alkaline, fine sand. These soils are rapidly permeable above the high water table with very slow surface runoff. This soil is occasionally flooded by storm tides and is susceptible to wind erosion if left unprotected after being disturbed.

The Project area is located seaward of FM 3005 within the coastal prairie and beach/dune system that abuts the Gulf shore. Dunes approximately 80 to 120 feet in width were lost during Hurricane Ike, but some recovery of the frontal dune ridge has occurred do to the implementation dune restoration methods including sand-fencing. A dune field buffer which is approximately 250-foot wide would be preserved. This area would be specifically reserved for dune field and wetland swale restoration, and allow for the natural migration of these systems. No development outside of the elevated beach access boardwalks and trails would be permitted in this buffer area. The construction of the boardwalks would help prevent human impacts to the vegetation. A designated, fenced horse-only trail would be installed to help prevent impacts to vegetation. Signs would be used to keep people and horses off of the dunes. If significant disturbance of dunes is identified anywhere in the buffer zone, fencing would be used to prevent access to affected areas of the dunes. Currently there is intermittent fencing present in the area. The boardwalks would be oriented at an angle to the shoreline face to deter wind erosion of dunes.

Environmental Consequences

Construction of all developments including those not paid for with Early Restoration funds would impact approximately 37 acres. A portion of the 37 acres is within the footprint of the campground area that was damaged as a result of Hurricane Ike. Soil in this area is not expected to be impacted more than it was in the original development.

During construction, contractors would remove soils and bring in fill materials to support the driveways, structures, and parking areas. Large equipment including front end loaders and bulldozers would be used to fill in low areas and level the sites before construction. Backhoes and trenching equipment would be used to install new water, electric, and sewer lines to connect to the existing public infrastructure. The beach access boardwalks would be constructed at a minimum of 3 feet above the dunes, and all impacts to dune vegetation would be minimized to ensure stability of the dune system. The height at which the beach access boardwalks are built would also take dune migration and growth into account. The construction of the boardwalks would help prevent human impacts to the vegetation. A designated horse-only trail would be fenced and would help prevent impacts to vegetation. The boardwalks from the campsites and facilities to the Gulf beach would condense foot traffic through designated pathways. This would reduce impacts to sensitive dune vegetation that lead to blowouts and weaknesses in the dunes that impact their protective function against storm surges. Best management practices regarding erosion control would be employed which includes the planting of native vegetation near the campsites.

Alterations to soil through fill, compaction, grading, and earth moving activities would result in short-term and long-term minor adverse impacts to affected soils. However, the Galveston Island State Park Project is reducing the area impacted compared to the facilities that were present pre-Hurricane Ike. Specific impact minimization measures would be implemented during campground construction. These would include following established best management practices such as the implementation of an erosion control and storm water management plan, the installation of sediment traps prior to commencement of construction activities; and ongoing construction monitoring to ensure compliance. The beach access boardwalks would provide long-term benefits to the dune habitats by minimizing human traffic through the dunes and limiting development within the dune buffer. The implementation of the proposed Project would therefore result in short-term and long-term minor impacts to soils similar to what existed prior to Hurricane Ike.

8.12.6.1.2 Hydrology and Water Quality

Affected Resources

Hydrology

The Project area is located on Galveston Island, Texas which is a barrier island that separates the Gulf of Mexico from West Bay. The Project area habitats include wetlands, bayous, coastal uplands and the beach/dune system. The Gulf Coast Aquifer underlies the island and is the main source of groundwater. In addition to the aquifer, the beach/dune system is supported by a hydrologic freshwater lens which is recharged by rainfall. The area is directly impacted by storms and storm surges which continue to alter the landscape and the adjacent wetlands. The current Flood Insurance Rate Map for the Project area depicts the property as lying completely within a Special Flood Hazard Area and within a 100-Year Floodplain Boundary.

Wetlands within the Project site are hydrologically associated with the Gulf of Mexico by groundwater connection. There are no streams within the Project area and its hydrology is mostly subsurface. A beachside topographic survey and soil pit examination showed that the seasonal (winter and spring)

high water table parallels the surface elevation. Based on prior studies was it surmised that groundwater movement follows the slope of the land's surface.

Water Quality

Galveston Island, Texas has become extensively developed over the past decade with only a few pockets of undeveloped land left. This has led to more storm-water runoff into the adjacent bays which sometimes exceed TMDL for bacterial content. There are restricted consumption advisories in West Bay for all species of catfish due to elevated levels of polychlorinated biphenyls (PCBs) and dioxin. In addition, there are restricted consumption advisories for tuna, jack, mackerel, shark, and bill fish species on the Gulf side of the Project area due to elevated levels of mercury. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

Onsite water quality is expected to improve by using wetlands to filter nutrients and metals from storm water. Existing impervious development would be deconstructed and removed. Runoff and rainfall is expected to filter through the sandy soils and enter into the groundwater. The existing and constructed wetlands would likely be connected to the groundwater and would be able to naturally treat the water through natural wetland processes such as denitrification. It would help return the site's hydrology to a more natural state by both dampening runoff, and increasing the duration of wetland discharge to the water table and subsequent slow seepage of these cleaner waters into the Gulf and Bay.

Environmental Consequences

This Project would alter hydrology and water quality at the site. Construction of the facilities, driveways, and parking areas would result in adverse modifications to the hydrology of the site over the long-term due the addition of impermeable surfaces. However, this Project is smaller than the original campground as it was designed pre-Hurricane Ike. Overall, the Galveston Island State Project is expected to cause minor, short-term adverse impacts to the localized hydrology and water quality during construction.

The introduction of an impermeable surface upon current soils would increase runoff during storm events, resulting in faster hydrographic peaking and potential for erosion and sedimentation of ancillary waterways. Additionally, horses and runoff from cars and other vehicles have the potential to impact water quality. Although this Project does propose to create equestrian facilities, horses may currently use the Park. Impacts from horses could potentially have a long-term minor effect on water quality. The degree to which impacts would occur would be reduced through the implementation of aforementioned best management practices described under the Geology and Substrates Section above. Despite the incorporation of these practices, however, natural hydrologic flows would be altered to some degree by the establishment of the campground and associated facilities. These adverse impacts would be long-term but are expected to be relatively minor.

8.12.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The Project area is located in Galveston County, Texas and falls within an area the EPA designates as the Houston-Galveston-Brazoria Intrastate Air Quality Control Region (HGB). The HGB is in attainment or unclassified with the NAAQS for all criteria pollutants except ozone. The EPA currently lists the HGB as nonattainment for existing ozone standards.

Implementation of the Galveston Island State Park Project would include transportation and heavy construction equipment, which may include bulldozer, barge, truck, backhoe, tractor trailer, front-end loaders, and crane.

Environmental Consequences

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the Project vicinity due to construction vehicle emissions. Excavation associated with construction of portions of the Galveston Island State Park Project may produce fine particulate matter. However, this impact would be short-term, only occurring during active construction activities. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Available minimization practices would be employed to reduce the release of GHG during Project implementation. The following measures have been identified to reduce or eliminate GHG emissions from the Project:

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

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, front-end loaders, forklifts, bulldozers, backhoes, and skid steers, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this Project.

Table 8-6. Estimated greenhouse gas impacts.

EQUIPMENT⁴¹	NUMBER OF 8-HOUR DAYS	CO₂ (METRIC TONS)⁴²	CH₄ (CO₂e) (METRIC TONS)⁴³	NO_x (CO₂e) (METRIC TONS)	TOTAL CO₂e (METRIC TONS)
Bulldozer	200	76.00	0.04	0.40	76.00
Front-end loader	280	98.00	0.06	0.56	98.00
Semi-tractor trailer	320	108.80	0.06	0.64	108.80
Rough terrain forklift	100	35.00	0.02	0.20	35.00
Ditch Witch boring unit	120	42.00	0.02	0.24	42.00
Pickup truck ⁴⁴	760	121.60	0.08	0.76	121.60
Backhoe	280	98.00	0.06	0.56	98.00
Skid steer	150	52.50	0.03	0.30	52.50
TOTAL		631.90	0.37	3.66	631.90

Based on the assumptions described in the table above, and the small scale and short duration of the Project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

8.12.6.1.4 Noise

Affected Resources

The primary sources of ambient (background) noise in the Project area are operation of vehicles, humans, recreational vessels, and natural sounds such as wind and wildlife. City noise is mainly from vehicles and also occasional human activities. The levels of noise in the Project area varies, depending on the season, and/or the time of day, the number and types of sources of noise, and distance from the sources of noise.

Environmental Consequences

Park visitors and wildlife may be sensitive to changes in noise sources or levels due to the Galveston Island State Park Project. Instances of increased noise are expected during construction of the Project.

⁴¹ Emissions assumptions for all equipment based on 8 hours of operation.

⁴² CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

⁴³ CH₄ and NO_x emissions assumptions and CO₂e calculations based on EPA 2011b.

⁴⁴ Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

The proposed Project would generate construction noise associated with equipment during construction of the campground and other amenities. Construction equipment and pile driving noise is known to disturb nesting shorebirds. Construction noise can also be a nuisance to residents living on the shorelines adjacent to Project construction activities or to Park visitors.

Minimization measures that serve to limit noise during construction include: limiting activity at Project sites to daytime hours; limiting truck traffic ingress/egress to the site to daytime hours; promoting awareness that producing prominent discrete tones and periodic noises (e.g., excessive dump truck gate banging) should be avoided as much as possible; and requiring that work crews seek pre-approval for any weekend activities, or activities outside of daytime hours. Because construction noise is temporary, any negative impacts to the human environment during construction activities would be short-term and minor.

Once facilities are constructed, noise can be generated from facility operations and the vehicles associated with these facilities. However, these noise levels would be representative of a campground and similar in nature to those generated prior to the hurricanes. Overall, long-term noise effects from personal vehicle use, swimming and other recreational activities would be minor.

8.12.6.2 Biological Environment

The park features 2,000 acres of upper Gulf Coast barrier island ecosystem. Barrier Islands move and change constantly through the action of waves, wind and tides. Because barrier islands serve as transition zones between land and ocean, they support a variety of distinct eco-regions, including beaches, prairies and wetlands. Each supports a diverse array of life. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

A threatened, endangered, and rare species habitat assessment as well as an alternatives analysis were prepared and submitted to the USACE for review as part of the Individual Permit Application (TPWD 2013a). This summation is not fully inclusive of the extensive information found in the Individual Permit Application (SWG-2012-00631). Readers should reference the Environment Assessment for complete information. A permit decision as well as an Environmental Assessment is expected to be issued by the USACE in late 2013.

8.12.6.2.1 Living Coastal and Marine Resources

Flora

Affected Resources

The Project area contains beach, dune, and grassland prairie habitats that have interspersed wetlands. The grassland prairie contains mixed shrub and grass sites and/or woody plant dominated areas. Although there are many plant species in the area, the Park was historically over grazed and still has not fully recovered. The beach/dune habitat is constantly changing as a result of sand transport from winds and storms. The Galveston Island State Park Project lies within the Marsh/Barrier Island vegetation type. This area is distributed in the barrier islands along the Gulf Coast, with Sea oats-Seacoast Bluestem Grassland distributed from high tide mark to leeward marshes on sandy coastal barrier islands. These habitat types support a unique array of plant and animal communities. Some commonly associated

plants within this area include: croton, single-spike paspalum, Pan American balsamscale, flat sedge, sea purslane and cenicilla, bulrush, beach morning glory, goat foot morning glory, sea rocket, and lime pricklyash.

The management of Galveston Island State Park natural resources includes restoring native plant communities to their Pre-European settlement condition. The Park had been heavily grazed for many years prior to being purchased by the State and this caused the tall-grass prairie native to the site to become depauperate of species including important dominant grasses such as little bluestem.

Environmental Consequences

Campground development would likely adversely impact native vegetation. Efforts would be made to limit the removal of native vegetation. The construction of the boardwalks would help prevent human impacts to the vegetation. A designated horse-only trail would be fenced and would help prevent impacts to vegetation. Signs would be used to keep people and horses off of the dunes. Currently, there are about 40 signs planned along the dunes facing the beach. If significant disturbance of dunes is identified, fencing would be used to prevent access to the dunes. Currently there is intermittent fencing present in the area. Horses are restricted to the winter months and to the beach. Due to the saline environment of the beach front, the chances of invasive species being introduced through hay is greatly reduced. Although Bermudagrass is saline-tolerant, it is already pervasive in the dune area. Native vegetation would be managed as part of the campground maintenance plan. Efforts to identify and eliminate any non-native plant species would be implemented. Although some vegetation would be removed, the short-term and long-term impacts overall would be minor given the area affected.

Fauna

Affected Resources

Galveston Island State Park contains a mosaic of coastal habitats that host a variety of wildlife and is visited by birds from throughout the eastern hemisphere during the spring and fall migration seasons. Wading and shore birds, mottled and mallard ducks, raccoons, armadillos and marsh rabbits are found in the Park, which is ideal for wildlife observation and photography. Beach or surf fishing for spotted seatrout, sandtrout, redfish, black drum, croaker and flounder is also popular.

Environmental Consequences

Many mobile wildlife species would avoid areas near or within construction areas. However, species would likely return to the area after activities cease. There is sufficient suitable feeding and resting habitat available along the Gulf beaches to support additional bird use. The increase in human activities at the Park is not expected to exceed the effect that was present pre-Hurricane Ike. Overall campground construction would be expected to have short-term minor impacts on wildlife species.

Protected Species

Protected species may include a discussion of species protected under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and/or Bald and Golden Eagle Protection Act. The Galveston Island State Park Project would be developed approximately 200 feet (above mean high water) from the Gulf shoreline,

therefore the discussion that follows focuses on species protected by the Endangered Species Act, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act.

Endangered Species Act

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either the FWS or NMFS. Section 6 of the Individual Permit Application (SWG-2012-00631) addresses Threatened, Endangered, and Rare Species that may be impacted by the Galveston Island State Park Project (TPWD 2013a). No federally-listed species or other species of concern under the NMFS's jurisdiction are expected to be in the Project area due to the Galveston Island State Park Project location and habitat conditions. The Project area contains suitable habitat for the following federally-listed and proposed species: Eskimo curlew, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, piping plover, and red knot. No federally-listed or proposed species have designated or proposed critical habitat in the Project area.

Eskimo curlews are presumed to be extinct because they have not been observed since the 1960s. If by happenstance this species is identified in the Project area during construction of the Project, construction would cease and FWS would be contacted to determine protective measures for this species.

Beach areas that could be used for nesting activities are located within the Project footprint. Although nesting habitat for the five sea turtle species is present, only the Kemp's ridley is known to nest on Galveston Island. Sea turtle nest detection patrols occur on the entire Texas Gulf of Mexico beachfront during the sea turtle nesting season in coordination with the National Park Service's Sea Turtle Recovery Project. Any sea turtle nests located are excavated and the eggs are relocated to Padre Island National Seashore, on the southern Texas coast, for incubation.

Only the beach access boardwalks are proposed for construction in potential beach nesting area. TPWD directives and standard operating procedures ensure Project construction in potential nesting areas would be completed outside of the nesting season. Therefore, the construction of beach access boardwalks (the only proposed development that would affect sea turtle nesting) has been scheduled to avoid nesting season, which extends from April 1st until October 1st. In addition, equestrian use is not anticipated to impact sea turtles since horses are only permitted on the Park beach during the winter months (outside of turtle nesting season).

Piping plovers do not nest at Galveston Island State Park, but could occasionally use the sandy areas near the dunes and the beach during the non-breeding season. Only beach access boardwalks are proposed for construction in these habitats. Wintering habitat preferred by piping plovers in Texas includes very sparsely vegetated tidal mudflats, sand flats, or algal flats. Although Galveston Island does contain piping plover critical habitat, no designated critical habitat for piping plover exists within the Project area. Red knots (proposed for listing) are primarily found in intertidal marine habitats in Texas. They rely on shoreline habitat for feeding and resting.

Bald and Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. No golden eagles have been observed in Galveston Island State Park and bald eagles are not known to nest within the Park.

Migratory Birds

Located along the Greater Texas Coastal Birding Trail, Galveston Island State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. Migratory birds are also protected under the Migratory Bird Treaty Act. Nesting of migratory birds is not known within the Project area, but is possible. Bird rookeries are not within or near the Project area.

Environmental Consequences

Impacts to protected species and their habitats may occur during construction of portions of the Galveston Island State Park Project, but would be localized. Disturbance to individual species would occur in the construction areas; however, there would be no change in the diversity or local populations of protected species.

The redevelopment would have no effects on nesting sea turtles. Only Kemp's ridley sea turtles are known to nest on Galveston Island. Park lights are not a concern for these sea turtles because they nest during the day and eggs from any sea turtle nests observed would be relocated in coordination with the National Park Service's Sea Turtle Recovery Project. Additionally, construction of the beach access boardwalks within the nesting area would be conducted outside the nesting season.

Piping plovers and red knots could be in the Project area, therefore special management practices during construction would be used to prevent any impacts to red knots or piping plovers.⁴⁵ The special management practices include having an onsite monitor, avoiding work after dark, maintaining a speed limit of 10 miles per hour, and stopping work if the birds are observed foraging within 100 feet of the work site. The onsite monitor would have stop work authority and would be present at the site when construction is occurring. The trained monitor would survey the area daily prior to the initiation of any construction activity and periodically throughout the day. If vehicles/equipment are left in the Project area, the areas around the tires would be surveyed before moving the vehicle. The monitor would keep a daily log documenting all surveys conducted.

It is possible that migratory birds may nest in the Project area. There would be enough disturbances to displace or destroy nests, eggs or chicks. Therefore, at least the initial site access, clearing, and construction effort would be conducted outside of the spring nesting season (March 15th to July 1st). Once the site has been cleared and construction commenced, nesting birds would avoid the construction area and further work can occur throughout the year. Construction activities would

⁴⁵ Since the Red Knot is a proposed species (not federally-listed), these recommendations are discretionary. If this species becomes listed prior to completion of the proposed project, then the special management practices would apply to the red knot. Regardless, the special management practices will be implemented in areas that may have piping plovers.

produce enough noise and disturbance to prevent birds from nesting in the area, thereby preventing impacts to nesting birds.

The designated paths to the beach (boardwalks) would concentrate visitors to the south side of the beach and minimize effects to wildlife and habitats by protecting the dunes and reducing the area of impacts. The camping facilities are proposed to house fewer sites than what was present pre-Hurricane Ike. Therefore, this development is not expected to increase impacts beyond what was previously present. Any impacts to protected species if they occur at all would be expected to be short-term and minor.

8.12.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. The human uses and socioeconomics includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

8.12.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

In 2012 the population in Galveston County was estimated to be over 300,000 which accounted for just over 1% of the Texas population. Approximately 59% of the population in Galveston County is white (not Hispanic or Latino), 23% is Hispanic or Latino, 14% is black or African American, and 3% is Asian. Around 18% of the county population speaks a language other than English at home. Median household income (2007-2011) in Galveston County and the state is \$59,645 and \$50,920, respectively, with 13% of the county and 17% of the state living below the poverty level (U.S. Census Bureau 2013).

Tourism is an important socioeconomic component of Galveston, Texas and Galveston Island State Park averaged 250,000 visitors per year prior to Hurricane Ike. Due to the destruction of the facilities in 2008, visitation to the Park has dropped off substantially. Galveston Island State Park is an important component to the recreation and social value of the island. The Park is a stop on the Great Texas Coastal Birding Trail and a popular destination for birders. Reconstruction of the Park's visitor check-in station, camping facilities, amenities, and day use parking should increase visitation and expenditures at local restaurants, shops, and convenience stores. Staffing levels at the Park prior to Hurricane Ike included 16 full-time personnel and 5 seasonal positions. In comparison, current staff levels are 10 full-time personnel and four seasonal positions. It is anticipated that staffing levels would return to pre-Ike levels after completion of the Galveston Island State Park Project.

Environmental Consequences

Construction materials are generally purchased from the local area. If a local contractor is awarded the bid, this would provide stimulus to local businesses. Any contractor mobilization to the area would provide stimulus to local service industries. TPWD has predicted that there would be an increase in

recreational use of the Park as a result of this Project. Increased visitation would benefit the local economy and could lead to the need for additional staff at the Park. It is anticipated that six new full-time positions and one new seasonal position would be created after completion of the Galveston Island State Park Project. Galveston Island State Park would also see increases in revenue. There would be indirect beneficial effects to the local economy due to increased recreational and tourist activity in response to campground and other recreational improvements at the Park. These economic benefits would be concentrated in the service and retail industry sectors. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Overall, socioeconomics would not be adversely impacted as a result of the proposed Project. The Project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with visitation to the Park and tourism.

8.12.6.3.2 Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% 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%, 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 Trustees find that this project location does not meet the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. Galveston County is not considered to be minority and low income. There are no adverse effects to low income or minority populations anticipated from the proposed Project.

8.12.6.3.3 Cultural Resources

Affected Resources

Galveston Island State Park was severely impacted by Hurricane Ike in 2008. TPWD worked with the Texas Department of Transportation to remove debris. Prior to the debris cleanup project, TPWD consulted with the Texas Historical Commission under Section 106 of the National Historic Preservation Act, and the Texas Historical Commission concurred with the cleanup plan. Two archeological surveys were conducted within the Project area, covering of 103 acres in Galveston Island State Park. The area surveyed is on the Gulf beach side of the Park, southeast of FM 3005. Pedestrian survey and intensive shovel testing found no archeological sites in the 103-acre survey area (which includes the proposed Project area) on the Gulf beach front of the Park. A comprehensive cultural resources report was submitted with the USACE permit application.

The Texas State Historic Preservation Office has provided concurrence that there would be no effect to cultural resources as a result of this Project. A complete review of this Project under Section 106 of the National Historic Preservation Act would be completed as environmental review continues. This Project would be implemented in accordance with all applicable laws and regulations concerning the protection of the cultural and historic resources.

Environmental Consequences

No cultural resources are expected to be impacted by this Project. The development of the part of the Park southeast of FM 3005 would not affect any cultural resources that are eligible for listing in the National Register of Historic Places or designation as State Archeological Landmarks. No further cultural resources work is recommended for this part of the Park. A complete review of this Project under Section 106 of the National Historic Preservation Act 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.

8.12.6.3.4 Land and Marine Management

Affected Resources

The Galveston Island State Park Project is located within Galveston Island State Park on state-owned lands. Surrounding land uses include residential neighborhoods with mixed retail northeast and southwest of the Park. FM 3005 runs through the Park connecting residential areas of Galveston Island. The addition of these amenities to the Park is in accordance with the Galveston Island State Park Master Plan (TPWD 2011) and would meet several objectives of TPWD's Land and Water Resources Conservation and Recreation Plan (TPWD 2013b). Additionally, Galveston Island State Park operates under the guidance of TPWD's State Park Division Plan (TPWD 2012a). All standards and provisions of these plans and relative regulations would be adhered to, including Texas State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59) and Texas Accessibility Standards issued under the authority of the Texas Government Code, Chapter 469. The Trustees determined that the Project is consistent with the goals and policies of the Texas Coastal Management Program and would send a letter to the TGLO to seek concurrence.

Environmental Consequences

The Galveston Island State Park Project would not change the current land use, zoning, or cause any amendments to management plans that relate to the Project area. The area would remain designated for open space recreational use, which allows for developed camping facilities and other structures related to outdoor activities such as boating and fishing. Land use and management authority at the Park would remain under the purview of the TPWD, and development at the Park would comply with the guidance established for coastal recreational land uses and the requirements of the Coastal Zone Management Act. Thus, no impacts would occur to Land and Marine Management under the proposed Project.

8.12.6.3.5 *Aesthetics and Visual Resources*

Affected Resources

The general visual character of this region can be described as semi-urban, with surrounding areas maintaining a low-density residential quality representative of current and historic land uses. Residential communities in this region are interspersed with commercial developments located along major roadways, with some larger areas remaining in agricultural use or as undeveloped open space. The topography is flat to gently sloping. Most recreational activities on site involve the use of the natural setting. For example, activities such as bird watching and fishing benefit from the natural settings to enhance experiences. The redevelopment proposed in this Project enhances recreational experiences while maintaining a small footprint, which is an objective in the Galveston Island State Park Master Plan. During the redevelopment construction, the materials, workers, and equipment would be staged adjacent to the worksites. The proposed construction is consistent with the surrounding structures and typical of amenities located within Texas coastal state parks.

Environmental Consequences

Temporary impacts to visual resources would result from construction of the proposed Galveston Island State Park Project. Large construction equipment such as backhoes for campground construction would temporarily obstruct the shoreline views for visitors and recreational users at the site. The addition of the structures would change the viewshed, but the construction would be consistent with the other amenities located in the Park. The structures would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Any adverse impacts to aesthetic and visual resources would be short-term and minor.

8.12.6.3.6 *Tourism and Recreational Use*

Affected Resources

Galveston Island State Park averages 250,000 visitors per year, but since the Park was severely damaged by Hurricanes Ike visitation dropped significantly due to the lack of available facilities. The Park is a stop on the Great Texas Coastal Birding Trail and remains popular destination for birders. The Park is also a popular day use and Gulf beach access point for visitors from the Houston/Galveston metro areas. In addition, visitors come to fish, kayak, and view wildlife. There are three paddling trails and ten foot trails located in the Park (Figure 8-31). The shoreline itself is popular for walking and horseback riding is allowed on the beach. The Park transects the island and provides visitors with a complete view of the habitats that exist from the Gulf beach to the bays on barrier islands. Galveston Island State Park is a popular destination for local schools and education programs that use the Park as an outdoor laboratory and learning venue.

Galveston Island State Park has historically been one of the most visited state parks in Texas. It serves local and national tourists, especially residents of nearby Houston and Galveston. Redevelopment of the Gulf beachside facilities is necessary to meet the public demand for visitors of the Gulf Beach on Galveston Island. Development of the proposed Galveston Island State Park Project is expected to generate economic benefits throughout Galveston County as visitor expenditures, including food service, lodging, fuel, retail, and recreation purchases, would increase with additional tourism. The

redevelopment of the Galveston Island State Park beach-side, and the subsequent increase in number of visitors, would serve to benefit the economy of TPWD, Galveston Island, and the county as a whole.



Figure 8-31. Map of trails within Galveston island State Park.

Only 33 camping facilities continue to function at the Galveston Island State Park beachside following the destruction by Hurricane Ike. These camping facilities are insufficient to meet public demand, which, prior to Hurricane Ike, numbered 150 multi-use campsites. Post-Ike public input has consistently shown an interest in greater capacity. In order to meet the objective of the TPWD for Galveston Island State Park, the Gulf beachside recreation facilities would have to provide “public access to the beach” in a way that is safe, convenient, and sufficient to accommodate the beach-going public.

There are no equestrian facilities located in the Park at this time though horses can access the beach from adjacent city-owned access areas on either end of the Park. Horses are allowed on the beach from November 1 through February 28. Equestrian corrals and facilities would be part of the new construction.

Environmental Consequences

During the construction period, recreational experience would be impacted from noise and visual disturbances associated with the use of heavy equipment. Access to certain areas could also be restricted or impacted to some degree during construction activities. During construction, it would be necessary to close portions of the Park to public access to ensure public safety. However, this would be limited to the amount of time necessary to complete the construction and would be reopened after completion. Day use parking lots would remain open to allow for public beach use during construction until the new parking areas are completed. The construction may have moderate impacts to public access and use of the beach. While these temporary inconveniences would result in moderate short-term impacts on tourism and recreational use during the construction and rehabilitation activities at the shoreline, over the long-term improved access and enhanced facilities would result in substantial benefits to tourism and recreational use. Opportunities for recreational activity at the shoreline would be enhanced over the long-term as a result of the construction of the campground, resulting in beneficial effects to tourism. Overall, the implementation of the proposed Galveston Island State Park Project would contribute positively to visitor experience and public access. Any adverse impacts to tourism and recreational use would be short-term and moderate.

Infrastructure

Affected Resources

Current facilities at Galveston Island State Park include 33 Gulf beach-side campsites with water and electricity for recreational vehicles or tents, 20 bay-side recreational vehicle sites with water and electricity and 10 bay-side tent sites with water only. There are two restroom buildings with showers located in the beach camping areas and one restroom building with showers in the bay tent camping loop. The Gulf beach-side day use area has parking for approximately 205 cars. Also included are 29 picnic tables with shade covers, 4 changing rooms, and 1 restroom building.

The new beach side entrance to the Park would be located 400 yards to the west of its current entrance on FM 3005. The new design allows for more space to cue RV's and vehicles entering the Park. Current conditions often allow for vehicles to back up to the highway during busy days. It is anticipated that new turn lanes and acceleration and deceleration lanes would be added to FM 3005. These improvements would not be funded through DWH Early Restoration funds.

The Park was initially planned to use utilities at a capacity that would not exceed pre-Ike demands. Stormwater would be directed to constructed wetlands. There are plans as part of a Texas Department of Transportation Project to redirect overflow from the wetlands to the ditches on the bay side of Galveston Island State Park. Proposed utilities would be replacing those lost from Hurricane Ike. Center Point Energy supplies electricity to the site and anticipates the redevelopment and would be providing power.

Utilities for the new developments would include water, sanitary sewer, and electrical. These utilities would be installed below ground. Current electrical lines running through the proposed construction areas would be relocated to the main highway by the power company at their expense. Park sewer lines are connected to City of Galveston via pressure lines. Although dump stations are planned as part

of the campground improvements, they would be paid for by a separate funding source. Storm water would be routed to in wetlands and/or ditches.

Environmental Consequences

The Galveston Island State Park Project would not impact any existing public infrastructure or road, but it may temporary impact Park facilities during the alteration of water and power lines, and staging of materials. Aside from improvements to basic sanitation facilities and the extension of electrical utility lines at the proposed campground, there would be no changes to infrastructure or additional public utility requirements under the proposed Project. Electrical demands would exceed what is currently being used but are not expected to exceed the capabilities of feeder lines that were used previously. Current electrical lines running through the proposed construction areas would be relocated to the main highway by the power company at their expense. Park sewer lines are connected to City of Galveston via pressure lines. No capacity upgrade to the utility connections (including water services) would be needed.

Construction waste would be removed by the contractor to an appropriate landfill using dump trucks and roll-off dumpsters or as specified by TPWD Infrastructure contracts. The current closest landfill is located in Santa Fe, Texas, 26 miles away. The landfill is utilized by Galveston County residents. The landfill capacity has not been reached. The impacts to parking, roads, and facilities would be localized and within the Park. Construction activities may temporarily alter the operational capacities of the Park. While there would be no impact to day-use visitation, overnight beach-side camping would be suspended during construction. These facilities would be torn down to make room for the new campsites.

The new design of the beachside Park entrance and modifications to FM 3005 would allow more space for cars to line up and remain off the highway. During the construction activities, there would be short-term disruptions of parking and public access to facilities within the Park, but over the long-term the Project would enhance public access and recreational opportunities. Any adverse impacts would be short-term and minor.

8.12.6.3.7 Public Health and Safety and Shoreline Protection

Affected Resources

The Galveston Island State Park Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All waste generated during the construction of the amenities would be disposed in the appropriate waste or recycle collection receptacles in the Park or hauled off to an approved waste disposal site. All occupational and safety regulations and laws would be followed to ensure safety of all workers and the public.

In order to protect the redeveloped Gulf beach site from future weather events, beach erosion or subsidence, the proposed Project would be set back from the shoreline, further inland than the original beachside camping facilities, which are now largely underwater due to Hurricane Ike and beach migration. According to the Galveston Island State Park Master Plan (TPWD 2011), site planning along the beach would respond to a 50 year time horizon with elevated structures and transitional elements

to respond to a changing coastal morphology. In response to subsidence, sea-level rise and beach migration anticipated at the Gulf beach over the coming decades, many of the beachside facilities would be elevated in order to protect these facilities from future flooding events and beach migration. Transitional facilities between elevated structures and at-grade recreation areas include: beach access boardwalks, tent campsites, and picnic shelters.

Environmental Consequences

No hazardous waste would be created during construction of the redevelopment. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. Best management practices in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. Soil and sediment stabilization measures would be incorporated into the Galveston Island State Park Project design as needed in areas where the potential exists for erosion to occur in order to protect resources and ensure public health and safety. No adverse effects to public health and safety and shoreline projection are expected as a result of this Project.

8.12.7 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), 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).

The proposed Galveston Island State Park Project would redevelop the beach side of Galveston Island State Park by building new facilities, including multi-use campsites, tent campsites, beach access boardwalks, equestrian facilities, a visitor check-in station, and restroom and shower facilities. The Project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories, moderate short-term impacts to tourism and recreational use, and no major adverse impacts are anticipated to result. This restoration project would enhance visitor use and enjoyment of Park resources. The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, National Historic Preservation Act, Coastal Zone Management Act, and other federal statutes, where appropriate. 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.

8.13 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 Texas. The projects are physically separate from each other and are distributed across the upper coast of Texas as well as within the Gulf of Mexico. The projects were therefore grouped based on the similarity of resources (artificial reefs and state parks) to analyze the potential for cumulative impacts at appropriate smaller regional scales.

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 Texas Phase III projects, two groupings were developed 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. To analyze the potential for cumulative impacts in the region, the projects which would be implemented by Texas have been grouped based on the similarity of resources:

- Group 1: artificial reef projects;
- Group 2: state park projects.

The proposed artificial reef projects (Matagorda Artificial Reef, Freeport Artificial Reef, Ship Reef, and Corpus Artificial Reef⁴⁶) would all be placed in similar nearshore habitats in the Gulf of Mexico off the coast of Texas. Additionally, all of the proposed reef projects would be or have been subject to the same decision-making process for selecting reefing sites and materials as well as for prioritizing sites. The proposed reef projects would also be subject to the same standard operating protocols and guidelines for construction, development, and assessment. Due to the similarity of construction guidelines and habitats where the artificial reefs would be located, all reef projects are combined for purposes of an analysis of cumulative effects.

The proposed state park projects (Sea Rim State Park Improvements Project and Galveston Island State Park Redevelopment Project) are located along the northern Texas coast on coastal lands managed by the Texas Parks and Wildlife Department. Both projects are under the purview of the same state park regulatory codes, management objectives, operating plans, and senior staff. Due to the similarity of habitat types affected, park operations and management, as well as construction methods, both state

⁴⁶ The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).

park projects are combined for purposes of an analysis of cumulative effects. Table 8-7 summarizes the impacts to resources associated with proposed Texas projects.

Table 8-7. Summary of Impacts of Proposed Phase III Early Restoration Projects in Texas.

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Habitats	Socioeconomics and Environmental Justice	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline Protection
Reefs													
Freeport Artificial Reef	s	s	s	-	s/+	s/+	s/+	+	NE	s	s/+	NE	NE
Matagorda Artificial Reef	s	s	s	-	s/+	s/+	s/+	+	NE	s	s/+	NE	NE
Ship Reef	-	s	s	-	-/+	s/+	-/+	+	NE	s	+	NE	NE
Corpus Artificial Reef	s	s	s	-	s/+	s/+	s/+	+	NE	s	s/+	NE	NE
State Parks													
Sea Rim State Park Improvements Project	-	-/+	s	-	-	s	-/+	+	NE	s	s/+	s/+	NE
Galveston Island State Park Beach Redevelopment Project	s/+	-	s	-	-	s	-/+	+	NE	s	-/+	s/+	NE

Table notes:

- Adverse effect
- + Beneficial effect
- s Short-term adverse effect
- NE No effect

Group 1: Artificial Reef Projects

All of the artificial reef projects proposed in Texas are being considered as part of this cumulative analysis.⁴⁷ A general description of the impacts and benefits that would result from the artificial reef projects are described below and should be considered for assessment of cumulative impacts.

- The artificial reef projects would cause sediment compaction in localized areas causing an adverse impact to geology and substrates.
- The deployment of materials would temporarily cause an increase in turbidity thereby adversely affecting water quality in the project area.
- There would be minor adverse impacts to air quality and greenhouse gases from equipment and vessels used during construction and recreational activities.

⁴⁷ The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding). However, for a conservative analysis of the cumulative impacts, the Corpus Artificial Reef Project was considered during the analysis.

- There would be a short-term increase in noise during project implementation and a long-term increase in noise from recreational-use of the reefs. Since the reefs are several miles offshore, the increase in noise generated by recreational users would be minimal and would not significantly impact any other users in the area.
- Although the artificial reef projects may temporarily impact living coastal and marine resources, the area of impact is small relative to the size of the Gulf of Mexico and impacts would be minor in severity. Following completion, the artificial reef would provide reef habitat which may benefit living coastal and marine resources in the long-term.
- The artificial reef projects may cause a minor short-term adverse impact to protected species as a result of species moving away from the project area during the deployment of materials. These impacts would be localized to the project area and short in duration (4 days or less). Following completion, the artificial reef would provide reef habitat which may benefit protected species in the long-term.
- The artificial reef projects would provide positive benefits to socioeconomics and environmental justice by increasing revenues to local economies through activities associated with increased fishing and diving opportunities.
- Implementation of the artificial reef projects would cause a temporary disruption in recreational boating or fishing in the project area. However, this disruption would be small in spatial scale and duration (4 days or less). The completion of these projects would result in a beneficial increase of recreational use and tourism from fishing and diving activities.

Cumulative impacts considered for analysis relating to Group 1 artificial reef projects encompasses the marine environment which ranges from 6 to 67 miles off of the Texas coast. This environment may be impacted by other restoration and environmental stewardship activities, marine transportation, energy activities, commercial fisheries, and tourism and recreation. Restoration activities in the area include creating and maintaining artificial reefs which have minor impacts to the environment during project implementation but would provide additional habitat for reef species.

Marine transportation activities include activities such as ship channel maintenance dredging and vessel transportation. These activities impact the environment by impairing water quality through an increase in turbidity and the release of ballast water, and produce greenhouse gases and other airborne pollutants. Marine transportation activities provide a benefit to socioeconomics by helping to create business opportunities (including tourism) and creating jobs.

Energy activities such as oil and gas exploration and production, impact geology and substrates, water quality, noise, and living coastal and marine resources through drilling, construction, and extraction activities. Energy activities also produce a positive benefit to socioeconomics by creating jobs and producing a product that other businesses need to do business.

Commercial fisheries impact the marine environment by producing noise and airborne pollutants from vessels and the harvesting living and marine resources. The commercial fisheries provide a benefit to socioeconomics and environmental justice by providing jobs and food for the public to consume.

Tourism and recreation activities including recreational fishing and charter fishing have positive benefits to tourism and recreation and socioeconomics and environmental justice while only having minor impacts to natural resources.

Overall, the Group 1 artificial reef projects would not have a substantial contribution to cumulative adverse effects in the nearby marine environment but they would provide an incremental contribution to beneficial effects.

List of past, present and reasonably foreseeable actions that have been considered as part of this analysis:

1. TPWD's Artificial Reef Program
2. Oil rigs as habitats
3. Ship channel maintenance dredging
4. Ongoing oil and gas exploration and production
5. Game fish production for commercial harvest
6. Recreational fishing
7. Charter fishing
8. Sea Rim State Park dune restoration
9. McFaddin National Wildlife Refuge terracing
10. JD Murphee Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge
11. West Bay restoration and habitat conservation
12. Beach nourishment
13. FM 3005 Improvements
14. Seismic exploration
15. State and Federal Wildlife Refuges
16. Texas Coastal Birding Trail

Group 2: State Park Projects

There are two state park projects proposed in Texas are being considered as part of this cumulative analysis. A general description of the impacts and benefits that would result from the state park projects are described below and should be considered for assessment of cumulative impacts.

- Impacts to geology and substrates would be localized to the footprint of the project area and would cause minor adverse impacts to geological processes in the surrounding areas.
- There would be localized, minor impacts on hydrology and water quality due to small increases in impervious surface area and runoff.
- Although motorized equipment would adversely affect air quality and greenhouse gas emissions, the level of impact would be minor.
- There would be an increase in noise during project implementation from the construction activities and an increase in noise following project completion due to the increase in recreational use. Since the recreational areas are within state parks and noise levels for

recreation are low, the increase in noise generated by recreational users would be minimal and would not significantly impact any other users in the area.

- Although the state park projects would impact living coastal resources, the area of impact is small relative to the size of coastal areas and impacts would be minor. The largest area of minor impact would be on Galveston Island State Park, which is the most urban area (City of Galveston). Therefore, the project would not impact living coastal or marine resources any more so than activities in the surrounding areas.
- The state park projects would provide overall positive benefits to socioeconomics by increasing revenues to local economies.
- The state park projects would potentially cause short-term, minor impacts to protected species during construction. The only impacts anticipated would be avoidance of the area due to construction noise and activity. These impacts would be localized to the project area and short in duration.
- Aesthetics and visual resources would be temporarily impacted due to construction activities. The completed projects would enhance user experiences and would not adversely attract attention or detract from other activities or experiences in the area.
- The state park projects would have short-term minor impacts to infrastructure during project implementation. Following project completion, a larger variety of facilities would be available, which would positively impact infrastructure, thus improving the quality of recreational experiences.
- Implementation of the state park projects would cause a temporary disruption in some recreational use activities in the parks. However, this disruption would be small in spatial scale and duration. The completion of these projects would result in a beneficial impact to recreational use and tourism.

Cumulative impacts considered for analysis relating to Group 2 state park projects encompasses the inland environment. Specifically, it includes the coastal portion of the Chenier plain and barrier islands ranging from the Texas/Louisiana border to the southern extent of Galveston Island. This environment may be impacted by other restoration and environmental stewardship activities, energy activities, and tourism and recreation.

Restoration and environmental stewardship activities such as the dune and beach ridge restoration, terracing, habitat conservation and restoration, hydrologic restoration and beach nourishment activities have short-term, minor impacts to the environment. These activities impact the environment during the construction process by covering the substrate with materials, producing noise and airborne pollutions from construction equipment, and disturbing wildlife. These restoration and environmental stewardship activities also have overall long-term positive benefits to living coastal and marine resources, socioeconomics and environmental justice, tourism and recreational use, and public health and safety and shoreline protection.

Although energy activities including seismic exploration have adverse impacts to most environmental resources analyzed, they do have positive impacts to socioeconomics and environmental justice by producing jobs, expanding economic development, and increasing production of refined products.

Tourism and recreational activities including birding, fishing, and hunting would have minor, short and long-term impacts to most environmental resources due to the construction of infrastructure to support the recreational activities. However, these activities would contribute positively to socioeconomics and environmental justice and tourism and recreational use. Additionally, in some instances these activities would have a long-term positive benefit to protected species and living coastal and marine resources.

Overall, the state park projects would not have a substantial contribution to cumulative adverse effects in the nearby inland environment but they would provide an incremental contribution to beneficial effects to tourism and recreational use, socioeconomics and environmental justice, and infrastructure.

List of past, present and reasonably foreseeable actions that have been considered as part of this analysis:

1. TPWD's Artificial Reef Program
2. Oil rigs as habitats
3. Ship channel maintenance dredging
4. Ongoing oil and gas exploration and production
5. Game fish production for commercial harvest
6. Recreational fishing
7. Charter fishing
8. Sea Rim State Park dune restoration
9. McFaddin National Wildlife Refuge terracing
10. JD Murphee Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge
11. West Bay restoration and habitat conservation
12. Beach nourishment
13. FM 3005 Improvements
14. Seismic exploration
15. State and Federal Wildlife Refuges
16. Texas Coastal Birding Trail

In addition to foreseeable actions identified in the table above, in November 2013, the National Fish and Wildlife Foundation (NFWF) announced initial projects to receive funding from the Gulf Environmental Benefit Fund (<http://www.nfwf.org/gulf/pages/gulf-projects.aspx>). More than \$112 million was obligated for 22 projects designed to protect, restore and enhance natural and living resources across the Gulf Coast. Five of these projects are in Texas:

1. Sea Rim State Park Coastal Dune Restoration
2. Galveston Island State Park Marsh Restoration & Protection
3. West Galveston Bay Conservation Corridor Habitat Preservation
4. Oyster Reef Restoration in East Bay
5. Gulf Coast Migratory Waterfowl Habitat Enhancement

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 Texas. As part of the comments on this Draft Phase III ERP/PEIS, the public is invited to comment on how the proposed projects may contribute to cumulative impacts.

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CHAPTER 9: PROPOSED PHASE III EARLY RESTORATION PROJECTS: LOUISIANA

9.1 Introduction

For many years, public input regarding the types of restoration projects that could best compensate the public for natural resource damages caused by oil spills in Louisiana has been actively solicited and integrated into planning activities through Louisiana's Regional Restoration Planning (RRP) Program.¹ Following the Spill, the Trustees engaged coastal stakeholders in Louisiana through a variety of public outreach and coordination efforts to discuss the NRDA, the restoration planning process, and potential restoration projects specifically related to the Spill. In addition to the meetings discussed in Chapter 2 of this document, additional meetings with stakeholders have been held to convey information and solicit suggestions. For example, the Coastal Protection and Restoration Authority of Louisiana and the Governor's Oyster Advisory Committee have held public meetings in which restoration planning issues have been, and continue to be, discussed.

From these outreach efforts, and the State's existing RRP Program, the Trustees compiled a list of potential projects for restoration of natural resources in Louisiana injured as a result of the Spill. Project ideas received were, and will continue to be, considered for this and future phases of Early Restoration, as well as for comprehensive NRDA restoration planning. The Trustees continue to accept restoration project ideas.

Based on project evaluation standards and criteria set forth in the OPA regulations, the Framework Agreement, additional RRP Program-specific criteria (below), and additional screening considerations applied by NOAA and DOI (see Chapter 2), the Trustees propose two projects for Phase III of Early Restoration that would be implemented in Louisiana: 1) the Louisiana Outer Coast Restoration; and 2) the Louisiana Marine Fisheries Enhancement, Research, and Science Center. These projects satisfy evaluation criteria outlined in the OPA regulations, the Framework Agreement, and the RRP Program, and are consistent with the goal of compensating the public for natural resource injuries resulting from the Spill.

¹ Louisiana's RRP Program identifies the statewide Program structure, defines those trust resources and services in Louisiana that are likely to be or are anticipated to be injured (*i.e.*, at risk) by oil spill incidents, establishes a decision-making process, and sets forth criteria that are used to select restoration project(s) that may be implemented to restore the trust resources and services injured by a given spill. The RRP Program's Final Programmatic Environmental Impact Statement (FPEIS), which may be viewed in its entirety at <http://www.losco.state.la.us/LOSCOUploads/RRPAR/la2395.pdf>, is hereby incorporated by reference into this document.

Additional Louisiana RRP Program criteria include:

- Ability to Implement Project with Minimal Delay;
- Degree to Which Project Supports Existing Strategies/Plans;²
- Project Urgency; and
- Other Factors as Appropriate.

The remainder of this chapter contains a subsection for each proposed Phase III project in Louisiana. 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 and is consistent with the Trustees' preferred Programmatic Alternative (Alternative 4) identified and evaluated in previous sections of this document (Chapters 5 and 6), the Trustees also have undertaken project-specific environmental reviews to help ensure proposed project locations, methods, timing and other factors reasonably maximize project benefits, minimize potential adverse consequences, and otherwise address environmental compliance needs.

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

² *E.g.*, Louisiana's 2012 Comprehensive Master Plan for a Sustainable Coast ("Master Plan").

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9.2 Louisiana Outer Coast Restoration: Project Description

9.2.1 Project Summary

The Trustees propose to restore beach, dune, and back-barrier marsh habitats at four barrier island locations in Louisiana. From west to east, the four locations are Caillou Lake Headlands (also known as Whiskey Island), Chenier Ronquille, Shell Island (West Lobe and portions of East Lobe), and North Breton Island (Figure 9-1). The total estimated cost to implement Louisiana Outer Coast Restoration is \$318,363,000.

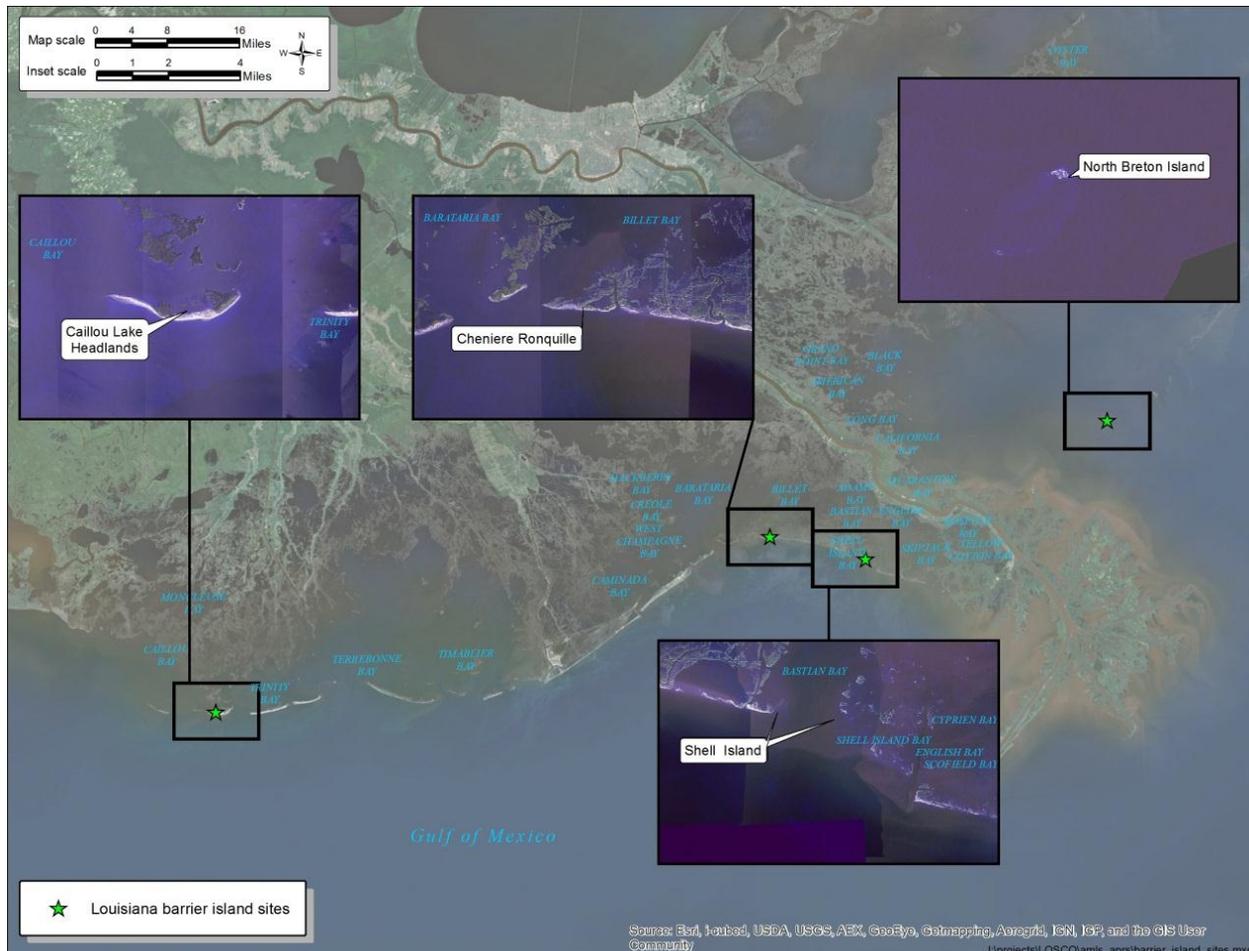


Figure 9-1. Louisiana Outer Coast Restoration locations. From west to east: Caillou Lake Headlands (also known as Whiskey Island), Chenier Ronquille, the West Lobe and portions of the East Lobe of Shell Island, and North Breton Island.

9.2.2 Background and Project Description

The goal of Louisiana Outer Coast Restoration is to restore beach, dune, and back-barrier marsh habitats in Louisiana, as well as brown pelicans, terns, skimmers, and gulls to help compensate the public for Spill-related injuries to these habitats and species. The restoration work proposed at each island involves placement of appropriately sized sediments to create beach, dune, and back-barrier marsh areas; installation of sand fencing to trap and retain wind-blown sediments and foster dune

development; and revegetation of appropriate native species in dune and back-barrier marsh habitat. Sediment will be pumped from appropriate borrow area locations specific to each island and conveyed to the restoration sites through temporary pipeline corridors. The restoration methods proposed here are established methods for this type of restoration activity.

Restoration at Louisiana Outer Coast Restoration locations has a history of support and project development; NRDA funding is necessary, however, for construction at these locations to move forward. Construction of the Caillou Lake Headlands was the selected restoration alternative for that location in the Terrebonne Basin Barrier Shoreline Restoration (TBBSR) Integrated Feasibility Study and Final Environmental Impact Statement (USACE 2010). The Chenier Ronquille barrier island restoration was authorized in 2010 as a candidate project under the 1990 Coastal Wetland Planning, Protection and Restoration Act (CWPPRA) and received design phase funding under CWPPRA. Plans and proposals to restore Shell Island have been developed in multiple documents since 1998 (LCWCRTF and WCRA 1998), including the Barataria Basin Barrier Shoreline Restoration Project (Thomson et al. 2008). Caillou Lake Headlands, Chenier Ronquille, and Shell Island are included in Louisiana's Master Plan (CPRA 2012). North Breton Island, part of the Breton National Wildlife Refuge (Breton NWR), is recognized as an important bird area due to the resources it provides to birds. However, erosion from storms constitutes a major and ongoing threat to the island, its habitats, and the breeding bird colonies it supports (Barrier Island Comprehensive Monitoring Program 2006; Lavoie 2009). Several alternatives to restore North Breton Island have been discussed, including those evaluated as part of the Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Plan Final Feasibility Report (USFWS 2012).

More detailed descriptions of proposed restoration activities at each of the four island locations, including the anticipated spatial extent of the different habitat types, are provided below:

Caillou Lake Headlands Barrier Island Restoration

Restoration of beach, dune, and back-barrier marsh habitats at the Caillou Lake Headlands location would occur on Whiskey Island, a barrier island in the Isle Dernieres reach of the Terrebonne Basin barrier system. Louisiana would be the lead Trustee for the design and construction of this project, working cooperatively with NOAA and DOI. The project was federally authorized under the Water Resources Development Act of 2007 and selected as a preferred alternative in the TBBSR Integrated Feasibility Study and Final Environmental Impact Statement (USACE 2010), and included in the state's Master Plan (CPRA 2012).

The Isle Dernieres chain of barrier islands has undergone significant fragmentation and reduction in size because of natural processes and human activities. Based on data from historical maps, satellite imagery, and aerial photography, long-term shoreline retreat rates at Whiskey Island have been estimated to be about 57 feet/year (Martinez et al. 2009). To slow these loss rates, portions of Whiskey Island have been restored over the past 15 years using funds received through CWPPRA (LCWCRTF 2002, 2010). This NRDA-funded project would continue restoration work on Whiskey Island and include the reestablishment of a beach and dune platform along the length of the shoreline and the construction of a marsh platform along the western end of the island on the landward side of the dune.

Restoration at this location would require approximately 8.9 million cubic yards (CY) of beach/dune fill (i.e., sand-sized sediments) that would be pumped through temporary pipeline corridors to the project site from an offshore borrow area at Ship Shoal (Figure 9-2). The dune would be constructed to an elevation of approximately +6.4 feet NAVD 88. The slopes of the beach and dune would be set at 60:1 and 30:1 (horizontal to vertical), respectively. Sand fencing would be installed to trap and retain wind-blown sediments and help foster dune development.



Figure 9-2. Conceptual design for Caillou Lake Headlands Barrier Island Restoration. Marsh and beach/dune fill areas are approximate. Imagery of Whiskey Island is from 2010.

Restoration at this location would also require approximately 1 million CY of marsh fill (i.e., mixed sand-, silt-, and clay-sized sediments) that would be pumped through temporary pipeline corridors from a nearshore borrow area to the project site (Figure 9-2). This marsh fill is proposed for the landward side of the dune at an elevation of +2.4 feet NAVD88. The dune platform and other supratidal areas as well as the back-barrier marsh would be planted with the appropriate native species by seeding and/or installing approved nursery stock. The containment dikes, which help retain hydraulically dredged sediments while the platform undergoes compaction and dewatering, would be breached and/or degraded within the first few years to allow for tidal exchange with the created marsh and to prevent ponding of water within the containment area.

Approximately 1,000 acres of barrier island habitat, including beaches, dunes, and back-barrier marsh, would be constructed. The project was designed to avoid disturbing approximately 286 acres of existing mangroves on the island to minimize the ecological impact during construction. The estimated cost for the restoration work at the Caillou Lake Headlands location is approximately \$110 million.

Chenier Ronquille Barrier Island Restoration

Chenier Ronquille is located along the Plaquemines/Barataria Bay barrier shoreline, eight miles east of Grand Isle. Chenier Ronquille serves as the western anchor of the Plaquemines/Barataria shoreline and forms the eastern boundary of Quatre Bayou Pass (Figure 9-3). NOAA would be the lead Trustee for the design and construction of this project, working cooperatively with Louisiana and DOI. The Chenier Ronquille barrier island restoration was authorized in 2010 as a candidate project under CWPPRA. Although it received design phase funding, it did not receive construction funding under CWPPRA. Chenier Ronquille barrier island restoration is also included in the state's Master Plan (CPRA 2012).

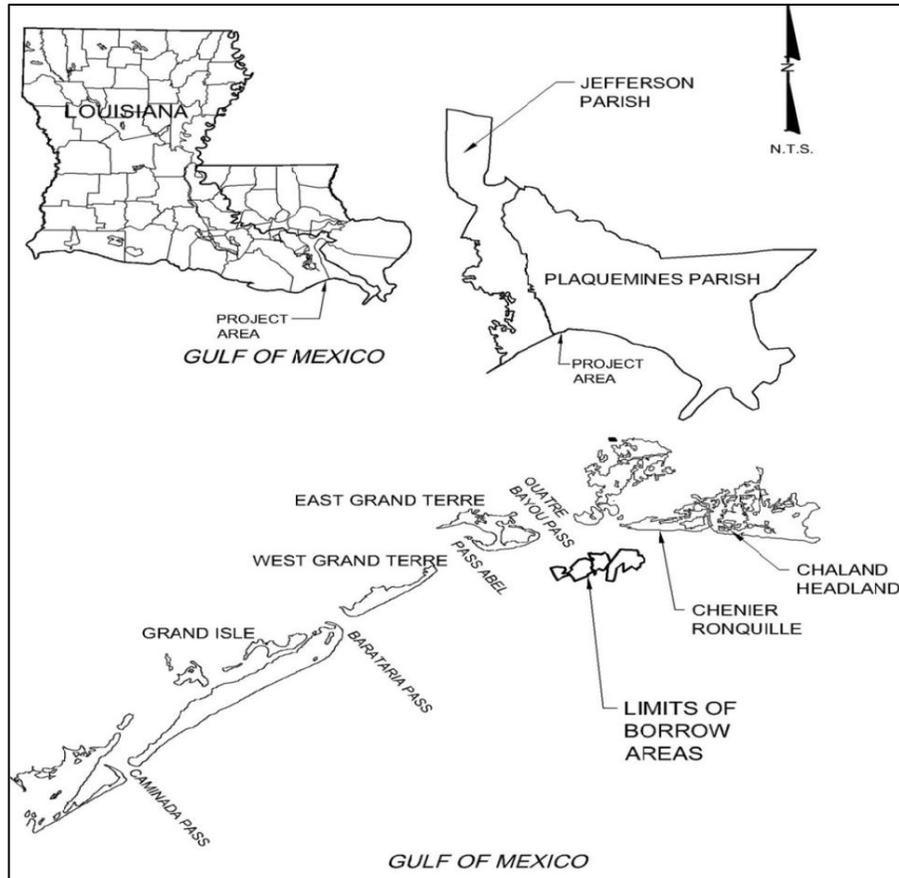


Figure 9-3. Location of Chenier Ronquille Barrier Island and proposed borrow areas. Source: Thomson et al. 2011.

Chenier Ronquille Island suffers some of the highest shoreline retreat rates in the nation. Recent shoreline change measurements suggest an average shoreline retreat rate of approximately 44 feet/year, although retreat rates of 108 feet/year have been measured. The barrier island has been breached, which is increasing the shoreline retreat rate of the island (Thomson et al. 2011). This project aims to increase island longevity by restoring beach, dune, and back-barrier marsh habitats. Restoration work would repair the breaches in the shoreline and prevent the creation of new breaches over the project life, while reestablishing dune and marsh platforms. The Chenier Ronquille restoration would tie

into two recently constructed projects to the east and restore one of the remaining reaches of the Plaquemines/Barataria shoreline.

Restoration at this location would require the excavation of approximately 2.0 million CY of beach/dune fill. The dune would be constructed with a dune crest at +8 feet NAVD88. Sand fencing would be installed to trap and retain wind-blown sediments and help foster dune development. Restoration at this location would also require excavation of approximately 2.4 million CY of marsh fill for the back-barrier marsh (using a design elevation of +2.5 feet NAVD88 and 240,000 CY of fill for the primary dikes and access channels. The beach and marsh fill borrow areas are located approximately 1.7 to 2.8 miles southwest of the project area and were initially developed for the now-completed East Grand Terre Island and Chaland Headland Restoration Projects.

Sediment for this project would be pumped through temporary pipeline corridors from the borrow areas to the restoration site. Dune and back-barrier marsh areas would be planted with the appropriate native species by seeding and/or installing approved nursery stock. The containment dikes, which help retain hydraulically dredged sediments while the platform undergoes compaction and dewatering, would be breached and/or degraded within the first few years to allow for tidal exchange with the created marsh and to prevent ponding of water within the containment area. The conceptual design for Chenier Ronquille Barrier Island Restoration is shown in Figure 9-4.

Approximately 500 acres of barrier island habitat, including beaches, dunes, and back-barrier marsh, would be constructed. The estimated cost for the restoration work at the Chenier Ronquille location is approximately \$35 million.

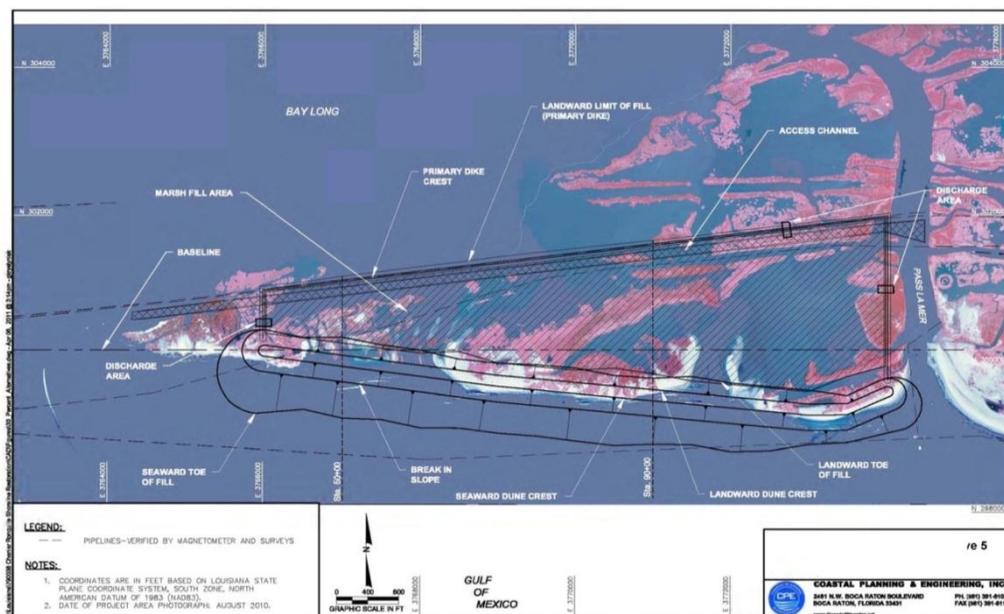
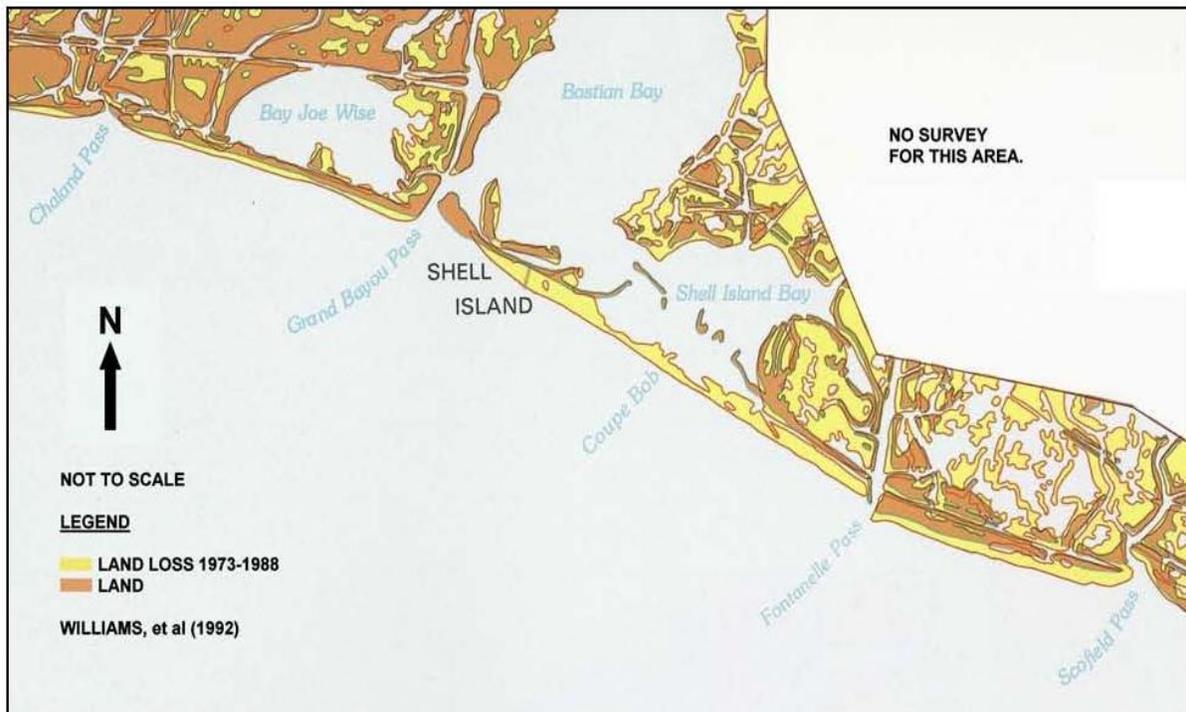


Figure 9-4. Conceptual design for Chenier Ronquille Barrier Island Restoration. Source: Thomson et al. 2011.

Shell Island (East and West Lobes) Barrier Island Restoration

Shell Island (East and West Lobes) is located approximately 49 miles south-southeast of New Orleans, along the southern margin of the Barataria Basin in Plaquemines Parish. It comprises a portion of the Plaquemines barrier shoreline (Figure 9-5). Plans and proposals to restore Shell Island have been developed in multiple documents, including Coast 2050: Toward a Sustainable Coastal Louisiana (LCWCRTF and WCRA 1998), the Barataria Basin Barrier Shoreline Restoration Project (USACE 2012), and the state's Master Plan (CPRA 2012). Louisiana would be the lead Trustee for the design and construction of this project, working cooperatively with NOAA and DOI.



Source: Thomson et al., 2008.

Figure 9-5. Shoreline change of Shell Island between 1973 and 1988.

Shell Island was originally a single barrier island spit, but the passage of Hurricane Bob in 1979 breached the center of the island, resulting in its fragmentation into a series of smaller islands, referred to as Shell Island East and Shell Island West (Thomson et al. 2008; Figure 9-5). Shell Island East has continued to disintegrate and includes several smaller islands. Shell Island West has continued to undergo shoreline retreat and migration to the west (Thomson et al. 2008).

Based on shoreline change analysis, the short-term shoreline retreat rates of Shell Island have been estimated at approximately 157 feet/year (Martinez et al. 2009). This project aims to increase island longevity by restoring beach, dune, and back-barrier marsh habitats on Shell Island West and the western portion of Shell Island East. Restoration work would repair breaches in the shoreline, reestablish a primary dune along the length of the shoreline, and construct a back-barrier marsh

platform. In addition to this proposed NRDA Early Restoration work, another restoration project, the “Shell Island East Berm Barrier Island Restoration Project (BA-110)” (Figure 9-6), was constructed in 2013 using other sources of funding.

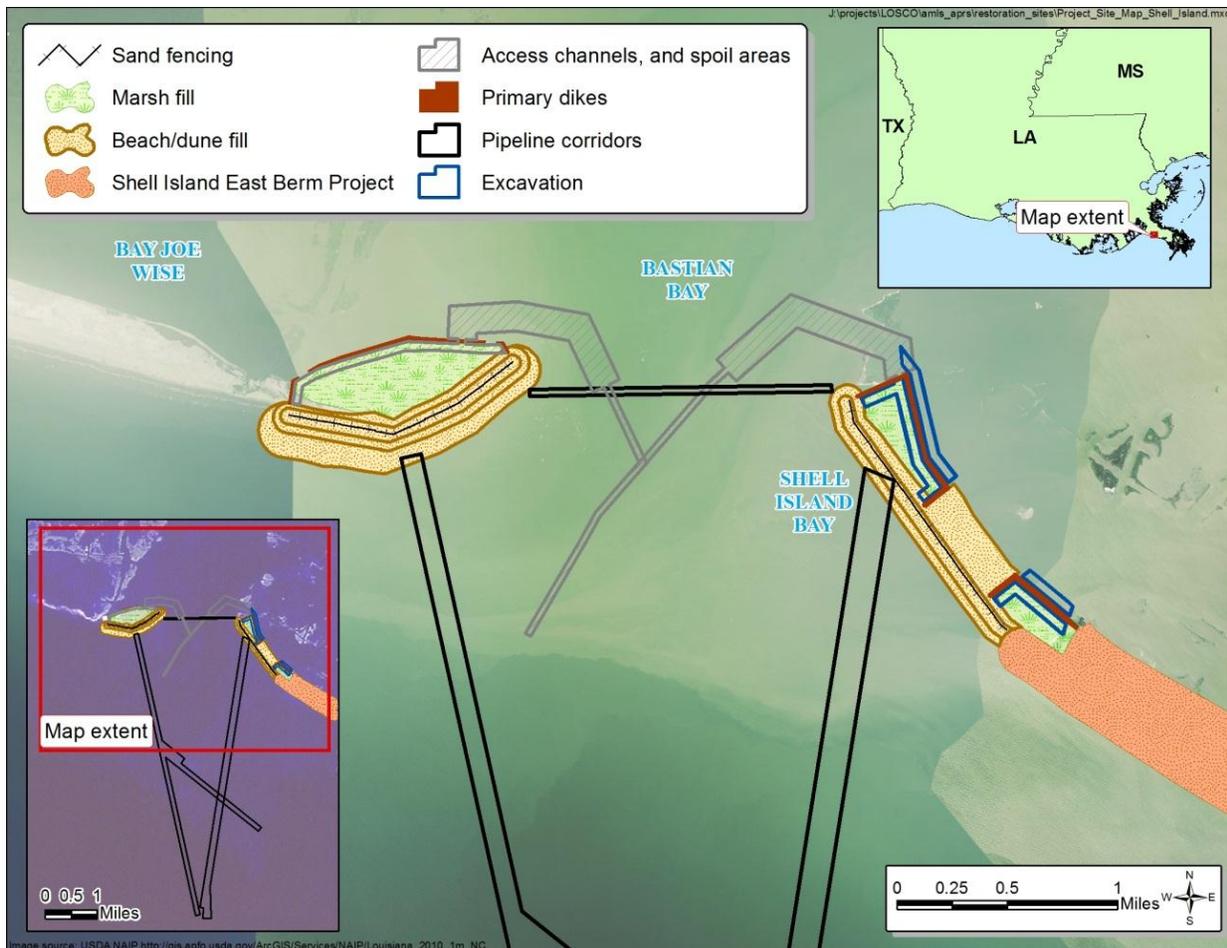


Figure 9-6. Conceptual design for Shell Island (East and West Lobes) Barrier Island Restoration. Access channel and spoil areas include excavation and disposal areas. The Shell Island East Berm Barrier Island Restoration Project (BA-110) is constructed.

The proposed NRDA restoration at this location would require approximately 4.5 million CY of beach/dune fill, including approximately 2.2 million CY for Shell Island East Lobe and approximately 2.3 million CY of beach/dune fill for Shell Island West Lobe. The beach/dune fill borrow site options in the Mississippi River have been identified and the sediment would be pumped through a pipeline along a conveyance corridor on the Empire waterway permitted for the Scofield Island Restoration Project (BA-40; LCWCRTF 2012). The dune would be constructed to an elevation of approximately +8.0 feet NAVD 88. Sand fencing would be installed to trap and retain wind-blown sediments and help foster dune development. Restoration at this location would also require approximately 1.9 million CY of marsh fill, including approximately 1.1 million CY of marsh fill for Shell Island East and approximately 0.8 million CY of marsh fill for Shell Island West. The marsh fill borrow site has been identified south of the project site in Louisiana state waters of the Gulf of Mexico, and sediment would be pumped through the temporary

conveyance pipeline within permitted corridors to the restoration site. The marsh would be located on the landward side of the dune and would be constructed to +2.5 feet NAVD 88. Beach/dune and back-barrier marsh areas would be planted with the appropriate native species by installing approved nursery stock. The containment dikes, which help retain hydraulically dredged sediments while the platform undergoes compaction and dewatering, would be breached and/or degraded within the first few years to allow for tidal exchange with the created marsh and to prevent ponding of water within the containment area. The conceptual design for Shell Island (East and West Lobes) Barrier Island Restoration is shown in Figure 9-6.

Approximately 680 acres of barrier island habitat, including beaches, dunes, and back-barrier marsh, would be constructed. The estimated cost for the restoration work at the Shell Island (East and West Lobes) location is approximately \$101 million.

North Breton Island Barrier Island Restoration

North Breton Island, located at the southern end of the Chandeleur Island chain in Louisiana, is part of the Breton NWR established in 1904 by Theodore Roosevelt. Breton NWR is recognized by the National Audubon Society as a globally important bird area because of the resources it provides to birds. North Breton Island hosts one of Louisiana's largest historical brown pelican nesting colonies. However, surveys by Breton NWR staff indicate that this colony has declined from over 15,000 pairs before 1998 to fewer than several thousand pairs in 2012, including a reduction of approximately 50% of breeding pelicans between 2008 and 2012. Erosion from tides and storms constitutes a major and ongoing threat to North Breton Island, its habitats, and the breeding bird colonies it supports (Lavoie 2009; Martinez *et al.* 2009; Kindinger *et al.* 2013). Without actions to restore sand into the North Breton Island system, the island is expected to be completely submerged sometime between 2013 and 2037, depending on the frequency and magnitude of future storms (Lavoie 2009). This project aims to increase island longevity by restoring beach, dune, and back-barrier marsh habitats on the island, providing nesting and foraging habitat for brown pelicans, terns, skimmers and gulls injured by the Spill. Restoration work would reestablish a dune platform along the length of the shoreline and construct a marsh platform on the landward side of the dune.

North Breton Island restoration will be guided by the data analyses presented in Lavoie (2009), Visser *et al.* (2005), Hingtgen *et al.* (1985), and other related documents. Commissioned by the USFWS, Lavoie (2009) represents the latest and most comprehensive investigation of sand resources, physical and environmental factors, and feasibility of restoration of the Chandeleur Islands. As recommended by Lavoie (2009), restoration would be designed to mimic the natural processes of barrier island evolution, including erosion and longshore transport of sand. Work would reestablish a dune platform along the length of the shoreline and construct a marsh platform on the landward side of the dune. The conceptual design for the placement of sand and back-barrier marsh sediment (Figure 9-7) mimics the pre-Hurricane Katrina island coverage and expected island evolution pattern. DOI would be the lead Trustee for the design and construction of this project, working cooperatively with Louisiana and NOAA.



Figure 9-7. Conceptual design for North Breton Island Restoration.

Restoration at this location would use approximately 3.7 million CY of sand, silt, and clay sized material dredged from one or more borrow sites within a nearby source area and placed on the existing island platform to create the desired island configuration. Preliminary review of oil and gas pipeline infrastructure and available geotechnical data suggests that a nearby shoal complex (Figure 9-8) has the potential for providing an appropriate and cost efficient sediment source for the proposed restoration. Geophysical and geotechnical surveys conducted as part of project engineering and design will help delineate specific borrow sites within the shoal complex for acquiring sand-sized sediments for dune and beach restoration and finer mixed sand-silt-clay sized sediments for back-barrier marsh restoration.

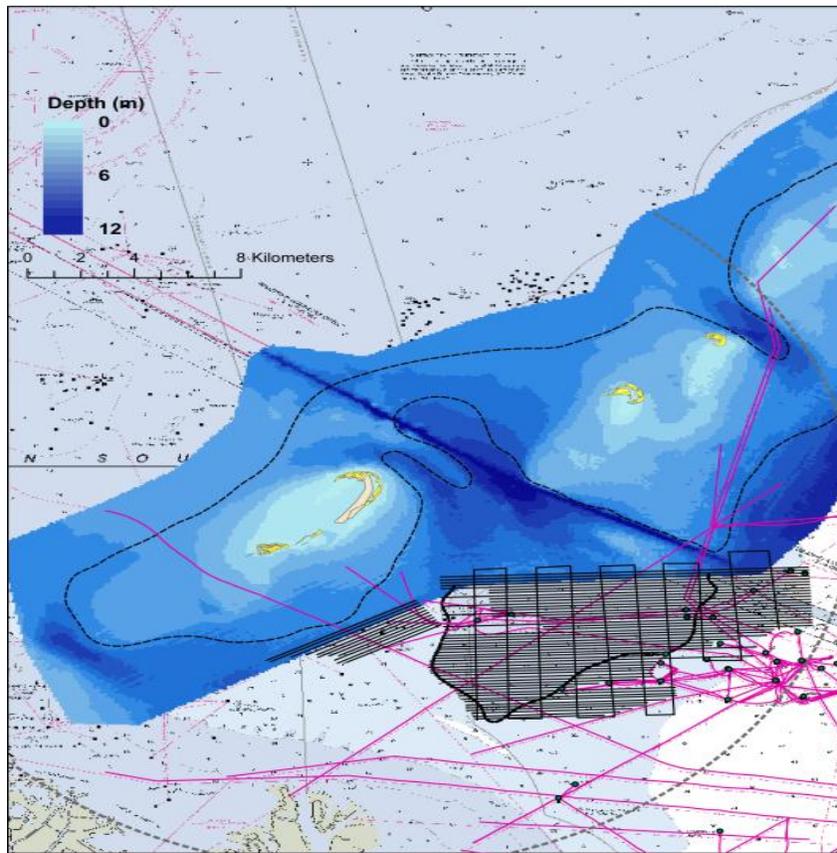


Figure 9-8. Proposed North Breton Island restoration borrow area (black hatch lines). Pipeline infrastructure designated with pink lines.

The restoration design is expected to include: a dune platform with a crest elevation of approximately 8–10 feet above mean sea level (optimum elevation to be determined); a gulf side beach that is approximately 200-foot wide and constructed to an elevation of approximately 3 feet above mean sea level; and a sound side back-barrier marsh platform that is approximately 500-foot wide and constructed to an elevation of approximately 3 feet above mean sea level. Sand fencing would be installed to trap and retain wind-blown sediments and build dune habitats. Sediment would be pumped through temporary pipeline corridors from the borrow site(s) to the restoration site. Dune and back-barrier marsh areas would be planted with the appropriate native species by seeding and/or installing approved nursery stock. The containment dikes, which help retain hydraulically dredged sediments while the platform undergoes compaction and dewatering, would be breached and/or degraded within the first few years to allow for tidal exchange with the created marsh and to prevent ponding of water within the containment area.

Initial designs for the island suggest that more than 300 acres of barrier island habitat, including beaches, dunes, and back-barrier marsh, would be constructed. The estimated cost for the restoration work at the Breton Island location is approximately \$72 million.

9.2.3 Evaluation Criteria

The Trustees evaluated the Louisiana Outer Coast Restoration project based on the evaluation criteria described in Chapter 2 and the additional RRP Program-specific criteria described in the introduction to this chapter. First, the proposed restoration has a clear nexus to resources injured by the Spill. See 15 C.F.R. § 990.54 (a)(2); and 6(a)-(c) of the Framework Agreement. Louisiana's barrier islands, especially the islands located in the Barataria Hydrologic Basin, were heavily impacted by the Spill. Numerous dead and oiled brown pelicans, terns, skimmers, and gulls were collected during and following the Spill. The ecological resources and services that would be gained by this restoration are anticipated to help compensate the public for Spill-related injuries to beach/dune and back-barrier marsh in Louisiana, as well as for injuries to brown pelicans, terns, skimmers, and gulls. The project, thus, also benefits more than one resource and/or service. See 15 C.F.R. § 990.54 (a)(5).

Project restoration designs are technically feasible and based on proven techniques and established methods used in other Louisiana barrier island restoration projects. See 15 C.F.R. § 990.54 (a)(3); and 6(e) of the Framework Agreement. The proposed restoration has a high likelihood of success given the use of established methods and construction techniques designed to facilitate natural processes supporting barrier island habitats. USGS (2013) noted that renourishment is a cost-effective method for increasing the longevity of Louisiana's barrier islands. Also, restoration would be conducted at a reasonable cost for this type of action, and could be expected to be implemented with minimal delay given the previous planning already completed. See 15 C.F.R. § 990.54 (a)(1); RRP Program FPEIS (NOAA et al. 2007b, p. 104); and 6(e) of the Framework Agreement. In addition, several of the components of Louisiana Outer Coast Restoration have already been publicly vetted through CWPPRA, Louisiana Coastal Area – Ecosystem Restoration (LCA), and/or Louisiana's Master Plan development processes. Proposed restoration supports existing restoration strategies and is consistent with anticipated long-term restoration needs and the Gulf Coast Ecosystem Restoration Task Force recommendations (GCERTF 2011). See RRP Program FPEIS (NOAA et al. 2007b, p.104); and 6(d) of the Framework Agreement. Finally, the high rates of shoreline retreat and land loss on these islands indicate that there is an urgency to complete these projects. See RRP Program FPEIS (NOAA et al. 2007b, p.104). Proposals to conduct restoration activities at these islands were submitted to the Trustees as part of the Trustees' Early Restoration project solicitation process.

9.2.4 Performance Criteria, Monitoring, and Maintenance

Construction monitoring would be done before, during, and in a subsequent period following construction to ensure that project designs are correctly implemented. The performance of Louisiana Outer Coast Restoration would be assessed using both qualitative and quantitative performance standards related to the project goals and objectives that would facilitate evaluation of project performance over time and the potential need for corrective actions. Successful implementation of this project would be measured by the performance of restored barrier island habitat, as well as the presence of various species of nesting birds (e.g., brown pelicans, terns, skimmers, and gulls) within restored habitat areas. Examples of potential performance monitoring activities for this project include, but are not necessarily limited to, nest and/or bird surveys, vegetation and ground surveys, and periodic collection of remote sensing data (e.g., color-infrared aerial photography and Light Detection and

Ranging (LIDAR)). Additional details concerning the performance measures and monitoring for this project would be developed before implementation in accordance with the OPA regulations (15 C.F.R. § 990.55 (b)(3)).

9.2.5 Offsets

For purposes of negotiating Offsets with BP in accordance with the Framework Agreement, the Trustees used a Habitat Equivalency Analysis and Resource Equivalency Analysis to estimate habitat and bird Offsets, respectively. Habitat Offsets (expressed in DSAYs) were estimated for a portion of the back-barrier marsh and beach/dune acreage that would be created by this restoration, based on the expected extent and function of the newly created barrier island habitats. Bird Offsets were estimated for a separate portion of the created area by calculating additional pelican, tern/skimmer and gull productivity expected in certain areas over time compared to a no-action scenario.



Photo credit: Brian Spears, USFWS.

Figure 9-9. Nesting brown pelicans, North Breton Island.

The Trustees and BP agreed that if this restoration is selected for implementation, BP would receive Offsets of 2,576 DSAYs of back-barrier marsh habitat and 3,820 DSAYs of beach/dune habitat, applicable to back-barrier marsh and beach/dune habitat injuries in Louisiana, as determined by the Trustees' total assessment of injury for the Spill.

The Trustees and BP further agreed that if this restoration is selected for implementation, BP would receive Offsets of 11,000 discounted pelican fledglings, 28,000 discounted tern and skimmer fledglings, and 20,000 discounted gull fledglings. The unit of "discounted fledglings" uses a discounting rate to convert the number of fledglings expected to be produced each year to a common base year for comparison. Discounted pelican, tern/skimmer and gull fledgling Offsets were estimated because these species, in particular, are expected to benefit from the proposed restoration actions. Several life history, project, and local stochastic factors were used to develop bird Offsets, including nest densities, fledglings per nest, longevity of the project, influence of storms on nesting success, and the spatial

extent expected to be utilized for nesting. If Louisiana Outer Coast Restoration is selected for implementation, these Offsets will be used against BP's liability for injuries to these bird species, as determined by the Trustees' total assessment of injury for the Spill.

The Trustees further recognize that barrier islands provide important habitat for fish, shellfish, and other aquatic species that utilize estuaries during their lifecycles, including fish and shellfish that use back-barrier marsh as nurseries as juveniles before they migrate out to open water (Condrey et al. 1996; O'Connell et al. 2005). The Trustees have agreed with BP that additional Offsets for aquatic biomass will be provided to BP for this restoration *only* if back-barrier marsh habitat Offsets provided in exchange for funding this restoration exceed the calculated injury to Louisiana back-barrier marsh habitat, as determined by the Trustees' total assessment of injury for the Spill. Because the Trustees have not yet completed their assessment of injury, neither the Trustees nor BP know whether the proposed habitat Offsets will exceed this injury. If the Offsets do exceed the injury, the "excess" Offsets would be applied to offset injuries to aquatic organisms that were injured in offshore waters of the Gulf of Mexico but are estuarine-dependent at some point in their lifecycle. Offsets for estuarine-dependent aquatic biomass injuries would be applied at a rate of 1,000 discounted kilogram years per DSAY. This value was negotiated with BP for purposes of advancing this project in Early Restoration based on the Trustees' review of published literature on the productivity of marsh (primary, secondary and tertiary) and the trophic transfer of estuarine-dependent aquatic biomass per acre of marsh, and then standardized in units of "secondary productivity." The Trustees have further specified that this Offset – if utilized – would apply only to estuarine-dependent aquatic biomass injuries in Louisiana and federal waters of the Continental Shelf; it would not apply to aquatic biomass injuries in waters of Texas, Mississippi, Alabama, or Florida.

9.2.6 Cost

The total estimated cost to implement Louisiana Outer Coast Restoration is \$318,363,000. This cost reflects current cost estimates developed from the most current designs for each island 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.

9.2.7 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 Louisiana Outer Coast Restoration implements restoration techniques within Alternatives 2 and 4.

The proposed Louisiana Outer Coast Restoration would restore beach, dune, and back-barrier marsh habitats at four barrier island locations in Louisiana. From west to east, the four locations are Caillou Lake Headlands (also known as Whiskey Island), Chenier Ronquille, Shell Island (West Lobe and portions of East Lobe), and North Breton Island. Approximately 2,480 acres of barrier island habitat, including beaches, dunes, and back-barrier marsh, would be constructed. The project is consistent with

Alternative 2 (Contribute to Restoring Habitats and Living Coastal and Marine Resources) and Alternative 4 (Preferred Alternative).

Sections 9.3 – 9.6 provide the environmental review for the 4 barrier island locations.

9.2.8 References

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9.3 Louisiana Outer Coast Restoration: Environmental Review A (Caillou Lake Headlands)

DOI has independently evaluated the Louisiana Coastal Area (LCA) Integrated Feasibility Study and Final Environmental Impact Statement (EIS) for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010) and finds that it complies with CEQ and DOI requirements for adopting NEPA analyses prepared by other agencies (See Section 7.8 for information on DOI NEPA adoption regulations and criteria). This document can be found in its entirety at (<http://losco-dwh.com>).

Accordingly, DOI intends to adopt the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration to fulfill DOI's NEPA requirements for analysis of the Caillou Lake Headlands restoration location of the Louisiana Outer Coast Restoration project. Below is a brief summary of the portions of the LCA EIS that are relevant to this proposed project.

9.3.1 Proposed Action

Restoration at the Caillou Lake Headlands location would occur on Whiskey Island, a barrier island in the Isle Dernieres reach of the Terrebonne Basin barrier shoreline (Figure 9-10). Construction of Whiskey Island would utilize hydraulically dredged sediments to create beach, dune, and back-barrier marsh habitats. The back-barrier marsh platform would be constructed to an elevation of +2.4 ft. NAVD88. Construction of containment dikes using in-situ material would be required for the back-barrier marsh platform to retain hydraulically dredged sediments while the platform undergoes compaction and dewatering. Containment dikes are expected to degrade naturally over time. If necessary, dikes would be gapped after a period of time to allow hydrologic connection to the bay and to prevent ponding of water within the containment area. The dune platform would be constructed to an elevation of approximately +6.4 ft. NAVD88, and sand fencing would be erected to capture windblown sand and foster dune development. The dune platform and other supratidal areas would be planted with native vegetation shortly after construction. The back-barrier marsh platform would be planted after a period of compaction and dewatering has occurred and the platform is stable enough for planting activities.

9.3.2 Background

Plans and proposals to restore Whiskey Island have been developed over time in multiple documents, including Coast 2050: Toward a Sustainable Coastal Louisiana (LCWCRTF and WCRA 1998), the LCA Ecosystem Restoration Study (USACE 2004a), and the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010).

The LCA Ecosystem Restoration Study (USACE 2004a) recommended the Terrebonne Basin Barrier Shoreline Restoration as a near-term critical restoration feature for further study. The restoration of the Timbalier and Isles Dernieres barrier island chains (including Whiskey Island) was specifically proposed as part of the Terrebonne Basin Barrier Shoreline Restoration plan. General information on the need for this project type, the affected environment, and the environmental consequences were presented in the Final Programmatic EIS for the Louisiana Coastal Area (LCA) Ecosystem Restoration Study (USACE 2004b).

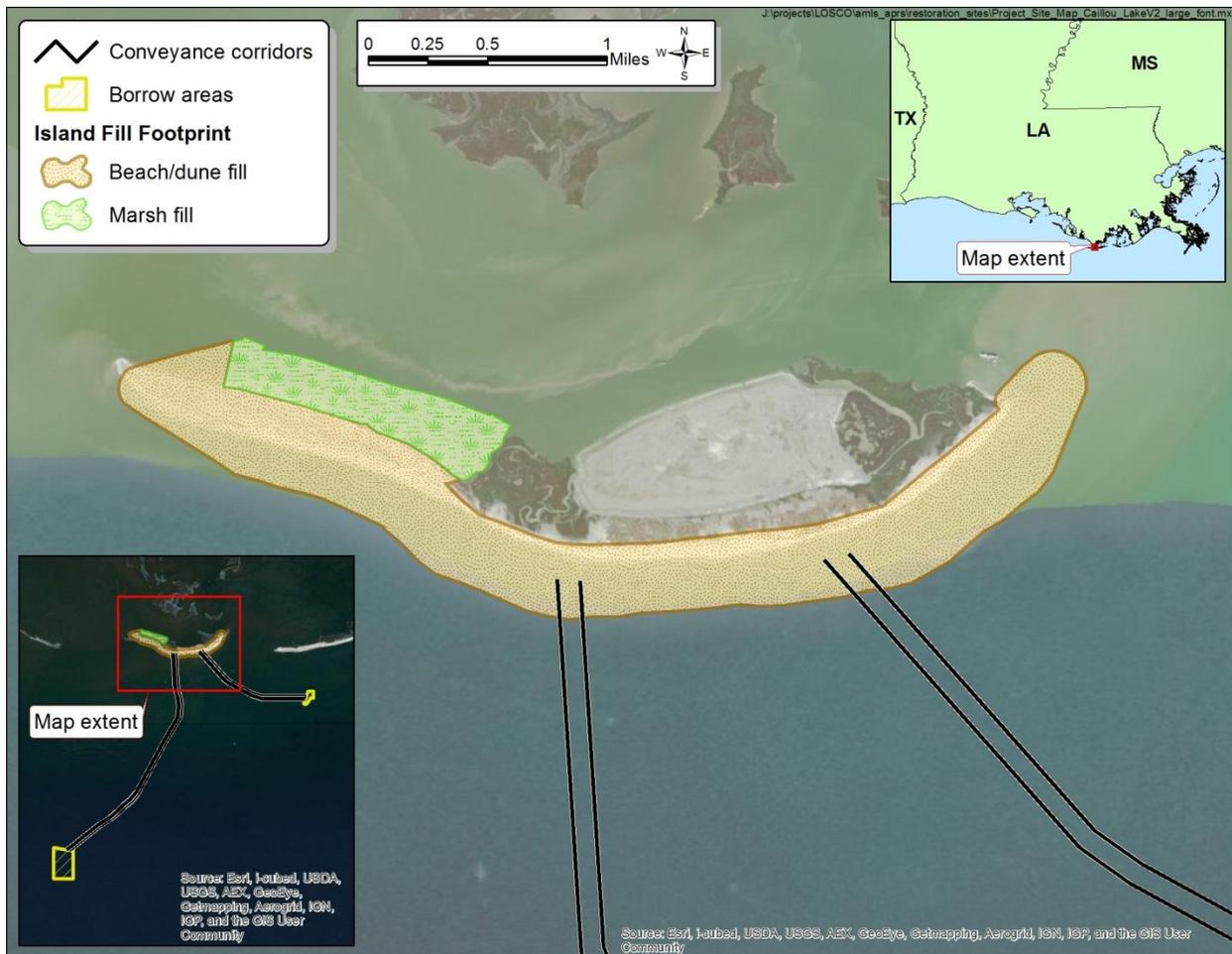


Figure 9-10. Conceptual design for Caillou Lake Headlands Barrier Island Restoration. Back-barrier marsh and beach/dune fill areas are approximate. High-resolution imagery of Whiskey Island is from 2010.

A more detailed evaluation of the alternatives and environmental consequences for the Terrebonne Basin Barrier Shoreline Restoration project was presented in the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010). The potential environmental consequences for implementing five alternatives, compared to the no action alternative, were considered (USACE 2010). The five alternatives that were evaluated include: Alternative 2 (Timbalier Island Plan E); Alternative 3 (Whiskey Island Plan C and Timbalier Island Plan E); Alternative 4 (Whiskey Island Plan C, Trinity Island Plan C, and Timbalier Island Plan E); Alternative 5 (Whiskey Plan C, Raccoon Island Plan E with a terminal groin, Trinity Island Plan C, and Timbalier Plan E); and Alternative Plan 11 (Whiskey Plan C). The impact analysis was based on a combination of scientific and engineering analyses, professional judgment, and previously compiled information (USACE 2010).

Under the proposed National Ecosystem Restoration (NER) Plan (Alternative 5), short-term impacts are anticipated as a result of the dredging and placement of borrow material during the construction activities, and include impacts to the existing vegetated and non-vegetated habitat, impacts to water

quality (e.g., turbidity), the disruption or displacement of wildlife and fisheries, and injury to sessile or slow moving organisms. Short-term increases in the noise level and impacts to air quality (e.g., emissions), navigation, commercial fisheries, and recreational activities are also anticipated as a result of the construction activities. In addition, the Gulf of Mexico water bottoms would be impacted from the removal of sand resources from the borrow site. Over the long-term, project implementation would result in the restoration of beach, dune, and back-barrier marsh habitat, and would provide important and essential habitats used by fish and wildlife for spawning, nursery, nesting, feeding, and cover. Indirect benefits to commercial and recreational activities are expected by protecting, creating, and restoring important and essential fish and wildlife habitats. This Final EIS also provides information on measures that should be taken to avoid and minimize potential adverse impacts to existing resources, such as threatened and endangered species.

The Caillou Lake Headlands proposed action is based on the preferred alternative for the restoration of Whiskey Island (Whiskey Island Plan C) within the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration. The proposed action is expected to have either no effect or short-term adverse impacts on most of the features and resources evaluated. Temporary impacts to existing habitats, water quality (e.g., turbidity), air quality, wildlife, and fisheries, and increases in noise levels, are anticipated as a result of the construction activities. Benthic resources present within the borrow areas, in the conveyance channels that will contain dredge pipe, and at the restoration site will be disturbed during construction by excavation, fill, or the physical impact of pipe placement. Over the mid- to long-term, positive effects are anticipated as the created habitats mature and reach equilibrium. The project would provide additional beach, dune, and back-barrier marsh habitat for marine and estuarine fisheries and avian communities. Benefits to commercial and recreational resources are expected from the enhancement of fish habitat.

The Trustees propose to construct the Caillou Lake Headlands Restoration Project (TE-100; Figure 9-10). This proposed project would continue restoration work on Whiskey Island, as portions of Whiskey Island have been restored during the past 15 years using funds received through the 1990 Coastal Wetland Planning, Protection and Restoration Act (CWPPRA) (LCWCRTF 2002; LCWCRTF 2010).

9.3.3 Alternatives Analysis

In the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010), a total of fourteen alternatives, including the no action alternative, were considered for evaluation. These alternatives consisted of different restoration scenarios for the Terrebonne Basin barrier island chain. Only five of these alternatives, in addition to the no action alternative, were carried forward for a detailed evaluation of environmental consequences. Based on an analysis of habitat benefits and cost-effectiveness, Alternative 5 (including Whiskey Island Plan C, Raccoon Island Plan E with a terminal groin, Trinity Island Plan C, and Timbalier Island Plan E), was selected as the NER Plan. Under Whiskey Island Plan C, Whiskey Island would be restored to its minimal design plan with 5 years of advanced fill. The project layout for Whiskey Island Plan C was designed to avoid disturbing approximately 286 acres of existing mangroves on the island to minimize the ecological impact during construction (USACE 2010).

The proposed Caillou Lake Headlands restoration location of the Louisiana Outer Coast Restoration project is based on the Whiskey Island Plan C.

9.3.4 Findings

9.3.4.1 Summary

The LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010) provides the supporting analysis to determine whether the Caillou Lake Headlands Restoration is likely to result in significant impacts to the quality of the human environment. As stated in these documents, the restoration of Caillou Lake Headlands is expected to provide long-term benefits to Louisiana coastal resources without significant long-term adverse environmental impacts. Construction-related adverse impacts, such as noise, increased turbidity, increased air emissions, the placement of borrow material on existing habitat, and the displacement of wildlife and fisheries, are considered short-term and temporary. Over the long-term, project implementation would result in the restoration of beach, dune, and back-barrier marsh habitat, and would provide important and essential habitats used by fish and wildlife. Indirect benefits to commercial and recreational fisheries are expected by increasing the quantity and quality of fish habitat.

9.3.4.2 Public Input

As part of the LCA Terrebonne Basin Barrier Shoreline Restoration Feasibility Study, a Notice of “Intent To Prepare a Draft Supplemental Environmental Impact Statement” was published in the Federal Register (volume 73, number 246) on December 22, 2008. A public scoping meeting was held on February 10, 2009 in Houma, Louisiana. A total of 45 participants signed in for the scoping meeting (USACE 2010). The Supplemental EIS was released to the public in June 2010, and included a 45-day public review period. A public meeting was held during this time to solicit comments on the proposed action. Comments from the review period were incorporated into the EIS, and the Final EIS was released for a 30-day public review in October 2010 (USACE 2010).

9.3.4.3 Potential Adverse Impacts to Infrastructure

Some oil and gas pipelines are present in the vicinity of the proposed action. To minimize the potential damage to these features, the pipeline locations have been identified so they may be avoided in the implementation of the proposed action. The construction contractor would also verify the location of these features. The restoration work to create the project features on Whiskey Island will not cross pipeline infrastructure. The temporary sediment pipeline in the conveyance corridors from Ship Shoal Block 88 and Whiskey 3A borrow areas will cross existing pipelines, however impacts are not anticipated. For these reasons, adverse impacts to oil and gas infrastructure are not anticipated.

9.3.5 Additional Considerations

9.3.5.1 Cultural Resources

The analysis of cultural resources in the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010) is adequate for purposes of adoption. In addition, a complete review of this project under Section 106 of the National Historic Preservation Act 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.

9.3.5.2 Miscellaneous Environmental Protection Measures/Best Practices

The Trustees intend to implement a number of best practices at the Caillou Lake Headlands location to reduce the potential for adverse impacts on sensitive resources. For example, a bird monitoring and abatement plan would be implemented by the construction contractor during the project. The Contractor would be responsible for surveillance, management, and control of their construction activities to minimize interference with, disturbance to, and damage of water, fish, and wildlife resources. The Contractor shall be aware of threatened and endangered species and migratory birds, and implement practices and follow all conditions set forth by NOAA, USFWS, and the Louisiana Department of Wildlife and Fisheries (“LDWF”) to protect these resources. Additionally, section 7 consultation with USFWS will be reinitiated if necessary, to evaluate any potential impacts to the proposed red knot.

The USFWS issued a final biological opinion in 2010 for the LCA Terrebonne Basin Barrier Shoreline Restoration Project (USFWS 2010) and its effects on threatened piping plover (*Charadrius melodus*) and its designated critical habitat. The USFWS determined that the level of anticipated take is not likely to result in jeopardy to the piping plover species or destruction or adverse modification of its critical habitat. Following implementation, the available habitat for wintering piping plover sheltering and foraging will be increased significantly, to the direct benefit of the species. Recent research has reinforced the importance of long-term maintenance of overwash features to support the piping plover population (Schupp *et al.* 2012).

Currently, no Bald eagles are known to nest near the project area. However, all conservation measures to avoid disturbance to Bald eagles would be implemented, if any nests were observed.

Migratory birds are known to nest in the project area. Virtual buffers would be established as follows: (1) rookeries containing brown pelicans shall have a 2,000 foot buffer; (2) rookeries containing wading birds (*e.g.*, herons, egrets, ibis) shall have a 1,000 foot buffer; and (3) rookeries containing shorebirds (*e.g.*, gulls, terns, skimmers) shall have a 650 foot buffer. When rookeries are mixed (*e.g.*, gulls and pelicans), buffers for the most sensitive species shall be observed.

In addition, the Trustees intend to implement NOAA’s Measures for Reducing Entrapment Risk to Protected Species, revised on May 22, 2012 (NOAA 2012). These measures are included below:

Pre-construction Planning

During project design, the project proponents will incorporate at least one escape route into the proposed retention structure(s) to allow any protected species to exit the area(s) to be enclosed. Escape routes must lead directly to open water outside the construction site and must have a minimum width of 100 feet. Escape routes should also have a depth as deep as the deepest natural entrance into the enclosure site and must remain open until a thorough survey of the area, conducted immediately prior to complete enclosure, determines no protected species are present within the confines of the structure.

Pre-construction Compliance Meeting

Prior to construction, project proponents, the contracting officer representative, and construction personnel should conduct a site visit and meeting to develop a project-specific approach to implementing these preventative measures.

Responsible Parties

The project proponents will instruct all personnel associated with the project of the potential presence of protected species in the area and the need to prevent entrapment of these animals. All construction personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing protected species. Construction personnel will be held responsible for any protected species harassed or killed as a result of construction activities. All costs associated with monitoring and final clearance surveys will be the responsibility of project proponents and will be incorporated in the construction plan.

Monitoring During Retention Structure Construction

It is the responsibility of construction personnel to monitor the area for protected species during dike or levee construction. If protected species are regularly sighted over a 2 or 3 day period within the enclosure area during retention structure assembly, construction personnel must notify the project proponent. It is the responsibility of the project proponent to then coordinate with the National Marine Fisheries Service ("NMFS") Marine Mammal Health and Stranding Response team (1-877-WHALE HELP [1-877-942-5343]) or the appropriate State Coordinator for the Sea Turtle Stranding and Salvage Network (see http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm) to determine what further actions may be required. Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area.

Pre-closure Final Clearance

Prior to completing any retention structure by closing the escape route, the project proponent will ensure that the area to be enclosed is observed for protected species. Surveys must be conducted by experienced marine observers during daylight hours beginning the day prior to closure and continuing during closure. This is best accomplished by small vessel or aerial surveys with 2-3 experienced marine observers per vehicle (vessel/helicopter) scanning for protected species. Large areas (e.g. >300 acres) will likely require the use of more than one vessel or aerial survey to ensure full coverage of the area. These surveys will occur in a Beaufort sea state (BSS) of 3 feet or less (measured within the area being closed by the containment), as protected species are difficult to sight in choppy water. Escape routes may not be closed until the final clearance determines the absence of protected species within the enclosure sight.

Post closure Sightings

If protected species become entrapped in an enclosed area, the project proponent and NMFS must be immediately notified. If observers note entrapped animals are visually disturbed, stressed, or their health is compromised then the project proponent may require any pumping activity to cease and the breaching of retention structures so that the animals can either leave on their own or be moved under the direction of NMFS.

In coordination with the local stranding networks and other experts, NMFS will conduct an initial assessment to determine the number of animals, their size, age (in the case of dolphins), body condition, behavior, habitat, environmental parameters, prey availability and overall risk.

If the animal(s) is/are not in imminent danger they will need to be monitored by the Stranding Network for any significant changes in the above variables.

Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area. Coordination by the project proponent with the NMFS SER Stranding Coordinator may result in authorization for these actions.

NMFS may intervene (catch and release and/or rehabilitate) if the protected species are in a situation that is life threatening and evidence suggests the animal is unlikely to survive in its immediate surroundings.

Surveys will be conducted throughout the area at least twice or more in calm surface conditions (BSS 3 feet or less - measured within the area being closed by the containment)), with experienced marine observers, to determine whether protected species are no longer present in the area.

9.3.6 Summary and Next Steps

As discussed above, DOI intends to adopt the LCA Integrated Feasibility Study and Final EIS for the Terrebonne Basin Barrier Shoreline Restoration to fulfill DOI's NEPA requirements for analysis of the Caillou Lake Headlands restoration location of the Louisiana Outer Coast Restoration project. 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 (Louisiana Outer Coast Restoration) will be included in the final Phase III ERP/PEIS and Record of Decision. This project would be implemented in accordance with all applicable laws and regulations.

9.3.7 References

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9.4 Louisiana Outer Coast Restoration Project: Environmental Review B (Chenier Ronquille Barrier Island)

DOI has independently evaluated the 2013 Environmental Assessment for the Chenier Ronquille Barrier Island Restoration Project (Chenier Ronquille EA), BA-76, prepared by NOAA (2013), and finds that it complies with CEQ and DOI requirements for adopting NEPA analyses prepared by other agencies (See Section 7.8 for information on DOI NEPA adoption regulations and criteria). The Chenier Ronquille EA and Finding of No Significant Impact can be found in their entirety at (<http://losco-dwh.com>).

This project is consistent with coastal protection programs and activities in Louisiana, including the CWPPRA program and activities pursuant to the Louisiana Coastal Area Ecosystem Restoration Study (USACE 2004). These programs and activities have undergone programmatic NEPA analysis³.

Accordingly, DOI intends to adopt the Chenier Ronquille EA to fulfill DOI's NEPA requirements for analysis of the Chenier Ronquille restoration location of the Louisiana Outer Coast Restoration project. Below is a brief summary of the portions of the Chenier Ronquille EA that are relevant to this proposed project.

9.4.1 Proposed Action

The proposed restoration on Chenier Ronquille Island would repair the breaches in the shoreline and prevent creation of new breaches over the 20-year project life, while reestablishing and increasing the island's longevity via dune and marsh creation. Additionally, the project would restore the shoreline, dune, and back-barrier marsh to increase island habitat utilized by essential fish and wildlife species both on the barrier headland and in quiescent bays.

Construction would utilize dredged sediment to create a beach, dune and marsh platform. Marsh construction would be to +2.5 ft NAVD88, because soil settlement analysis indicated this would provide the optimum number of years above mean high water (accounting for settlement of fill material, subsidence, and eustatic sea level rise) and is similar to the marsh elevation used for similar successful projects. Containment dikes would be constructed to retain delivered dredged sediment until the platform has dewatered. Containment dikes are expected to degrade through natural erosion from waves. Dikes would be gapped after settlement of marsh fill materials, if necessary, to allow hydrologic connection should the expected erosion or settlement not occur.

The dune has a constructed elevation of +8 feet, NAVD and a width of 150 feet. Dune cross-sections are designed to maintain a minimum of +5 ft NAVD88 dune height after a 10-year storm event (Thompson and others 2011). Sand fencing would be erected on the constructed dune to capture naturally windblown sand and passively build or maintain the dune feature.

After a period of settlement and salinity stabilization of placed materials, native intertidal and dune habitat species would be planted in phased events over the first 3 years. Plantings would help establish the plant community, and foster retention of placed sediments.

³ Final Programmatic Impact Statement, Louisiana Coastal Wetlands Restoration Plan (USACE 1993) and Final Programmatic Environmental Impact Statement, Louisiana Coastal Area (LCA), Louisiana, Ecosystem Restoration Study (USACE 2004).

9.4.2 The Need for the Proposed Action

This action meets the purpose and need of the Draft Phase III ERP/PEIS because it will accelerate meaningful restoration of injured natural resources and their services resulting from the Spill.

9.4.3 The Environmental Impacts of the Proposed Action

For background, note that the CWPPRA Task Force and LCWCRTF prepared a Programmatic Environmental Impact Statement (PEIS) (1993) that included information on this type of project (barrier islands). In addition, a Final Programmatic EIS prepared by the USACE as part of the Louisiana Coastal Area Ecosystem Restoration Study (USACE 2004) also includes barrier islands in their evaluation of restoration actions. This document includes background information on the goals of the CWPPRA program and coastal protection and restoration in Louisiana. The project proposed here is consistent with those CWPPRA goals. The EA specifically evaluates the significance of impacts on the quality of the human environment associated with the proposed action and design alternatives.

The Trustees intend to construct alternative 5 (hereafter: the preferred alternative) as evaluated in the Chenier Ronquille EA. The preferred alternative fulfills the project goal and objectives, while providing the lowest cost per constructed acre of the evaluated alternatives. Furthermore, no pipelines have to be crossed to construct the primary dike. It provides the largest marsh of the evaluated design alternatives, which would minimize the potential for breaching.

As discussed in the Chenier Ronquille EA, the preferred alternative is expected to provide long-term benefits to Louisiana coastal resources without significant long-term adverse environmental impacts. Construction-related adverse impacts, such as noise, increased water turbidity, and increased air emissions are considered short-term, minor and not significant because they are temporary or reversible. The EA provides information on measures that would be taken to avoid and minimize potential adverse impacts to existing resources, such as threatened and endangered species. The natural resource benefits anticipated from implementing the preferred alternative would include creation and restoration of saline marsh, dune, and associated barrier island habitats within the proposed project area. The increase in quality and acreage of fisheries habitat would be expected to have long-term beneficial impacts. This conclusion is based on a review of relevant literature; site-specific data; project-specific engineering reports related to biological, physical, and cultural resources; and experience gained through many similar barrier island restoration projects in Louisiana over the past decade.

9.4.4 The Environmental Impacts of the Alternatives Considered

During the design phase, six design alternatives were assessed for short and long term attainment of the project objectives. To meet project goals and objectives, all design alternatives involve creation of a beach and dune and were designed based on results of geotechnical studies, coastal process assessments, and topographic, bathymetric, and magnetometer surveys (Thomson *et al.* 2011). All design alternatives include the same marsh elevation, borrow areas, access areas, plantings, and containment dike construction. Through various engineering assessments and computer-aided modeling, it was determined that Alternatives 2, 3 and 4 did not meet one or more of the critical project objectives (Thompson *et al.* 2011). Consequently, Alternatives 2, 3 and 4 were eliminated from detailed

evaluation. The No-Action Alternative, Alternative 1, Alternative 5, and Alternative 6 were compared in the EA. Because it is practical and feasible from a technical and economic standpoint, and had minimal environmental impacts, Alternative 5 was identified as the preferred build alternative.

The Chenier Ronquille EA provides the supporting analysis to determine whether the proposed action and design alternatives are likely to result in significant impacts to the quality of the human environment. Only short-term adverse impacts are anticipated related to construction and are considered minor and reversible. This conclusion is based on a review of relevant literature, site-specific data, and project-specific engineering reports related to biological, physical, and cultural resources. The area has numerous oil and gas pipelines in the vicinity of the proposed action. To minimize the potential damage to these features, multiple surveys have identified their locations so they may be avoided in the course of the proposed action. The construction contractor would also verify the location of these features. The preferred alternative obviates the need to cross pipeline infrastructure during the construction of the primary dike. For these reasons, adverse impacts to oil and gas infrastructure are not anticipated.

9.4.5 A List of Agencies and Persons Consulted

The project was authorized for engineering and design (Phase 1) on the 19th CWPPRA annual Priority Project List. The CWPPRA project selection process includes extensive public involvement and review by federal and state agencies. The project selection process begins around February of each year, when a series of Regional Planning Teams convene across the coast to solicit project nominations from the public, State and federal agencies, as well as members of industry and academia. The meetings are publicized via public notices and all members of the public are invited to attend. The nominated projects are screened and pared down to 20 nominees. Each federal agency represented in the CWPPRA program, the State, and each coastal parish participates in voting at the public meeting.

Interagency and academic working groups then evaluate the conceptual project. The 20 nominee projects are then voted on at a public meeting by the program's federal agencies and the State to obtain a list of the 10 top-ranking projects to continue through the process. These candidate projects undergo several months of further design and interagency evaluation. In the first months of each calendar year, the candidate projects are presented at a public meeting and voted on by the program agencies to be funded for Phase 1 analysis, which includes the activities necessary to complete engineering and design, permitting, land rights, and environmental compliance before the project moves to construction. All public meetings provide an opportunity for comment by interested parties. The Draft Chenier Ronquille EA was released for public comment on December 1, 2011. No comments were received.

9.4.6 Summary and Next Steps

As discussed above, DOI intends to adopt the 2013 Environmental Assessment for the Chenier Ronquille Barrier Island Restoration Project (Chenier Ronquille EA), BA-76, prepared by NOAA (2013) to fulfill DOI's NEPA requirements for analysis of the Chenier Ronquille restoration location of the Louisiana Outer Coast Restoration project. 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 (Louisiana Outer Coast Restoration) will be included in the final Phase III ERP/PEIS and Record of Decision. This project would be implemented in accordance with all applicable laws and regulations.

9.4.7 References

Council on Environmental Quality (CEQ). 1992. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, Reprint, 40 C.F.R. Parts 1500-1508, Executive Office of the President, Council on Environmental Quality, 1992.

LCWCRTF. 2009. 19th Priority Project List Report (Appendices). Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 305 pp.

Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF). 1993. Louisiana Coastal Wetlands Restoration Plan: Main Report and Environmental Impact Statement. 163 pp.

NOAA. 2013. Chenier Ronquille Barrier Island Restoration Project Environmental Assessment, Fed No. BA-76, Plaquemines Parish, Louisiana.

Thompson, G, W. Thompson, A. Wycklendt, and D. Swigler. 2011. Chenier Ronquille Barrier Island Restoration Project (BA-76)- 95% Design Report. Boca Raton, FL: Coastal Planning and Engineering, Inc 135pgs

U.S. Army Corps of Engineers (USACE). 2004. Final Programmatic Environmental Impact Statement. Volume 2 of the Louisiana Coastal Area Ecosystem Restoration Study. November 2004.

9.5 Louisiana Outer Coast Restoration: Environmental Review C (Shell Island)

For the Shell Island (East and West Lobes) location of the Louisiana Outer Coast Restoration project, DOI has independently evaluated two relevant NEPA documents: (1) the Louisiana Coastal Area (LCA) Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement (EIS) (USACE 2012a), which considers a wide range of alternatives for restoration of Shell Island; and (2) the Shell Island Barrier Island Restoration Project Environmental Assessment (EA) (USACE 2012b), which describes the currently proposed project.

The LCA EIS includes an in-depth discussion of the environmental consequences of barrier island restoration at the Shell Island location and DOI finds that it complies with CEQ and DOI requirements for adopting NEPA analyses prepared by other agencies (See Section 7.8 for information on DOI NEPA adoption regulations and criteria). This document can be found in its entirety at (<http://losco-dwh.com>). Accordingly, DOI intends to adopt the LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS to fulfill DOI's NEPA requirements for analysis of the Shell Island (East and West Lobes) location of the Louisiana Outer Coast Restoration project. The USACE EA has relevant information but does not meet all of DOI's criteria for adoption. Below is a brief summary of the portions of the documents that are relevant to this proposed project.

9.5.1 Proposed Action

Restoration at the Shell Island (East and West Lobes) location would occur on Shell Island West and the western portion of Shell Island East, two barrier islands located along the southern margin of the Barataria Basin in Plaquemines Parish (Figure 9-11). Construction of Shell Island would utilize hydraulically dredged sediments to create beach, dune, and back-barrier marsh habitats. The back-barrier marsh platform would be constructed to an elevation of +2.5 ft. NAVD88. This elevation was also used on the Shell Island East Berm Barrier Island Restoration Project adjacent to the east. Construction of containment dikes using in-situ material would be required for the back-barrier marsh platform to retain hydraulically dredged sediments while the platform undergoes compaction and dewatering. Containment dikes are expected to degrade naturally over time. If necessary, dikes would be gapped after a period of time to allow hydrologic connection to the bay and to prevent ponding of water within the containment area. The dune platform would be constructed to an elevation of +8.0 ft. NAVD88, and sand fencing will be erected to capture windblown sand and foster dune development. The dune platform and portions of the supratidal areas would be planted with native vegetation shortly after construction. The back-barrier marsh platform would be planted after a period of compaction and dewatering has occurred and the platform is stable enough for planting activities.

This design includes the restoration of Shell Island West and the western portion of Shell Island East. Access channel and spoil areas include excavation and disposal areas. The Shell Island East Berm Barrier Island Restoration Project (BA-110), which includes the restoration of the eastern portion of Shell Island East, was constructed in 2013.

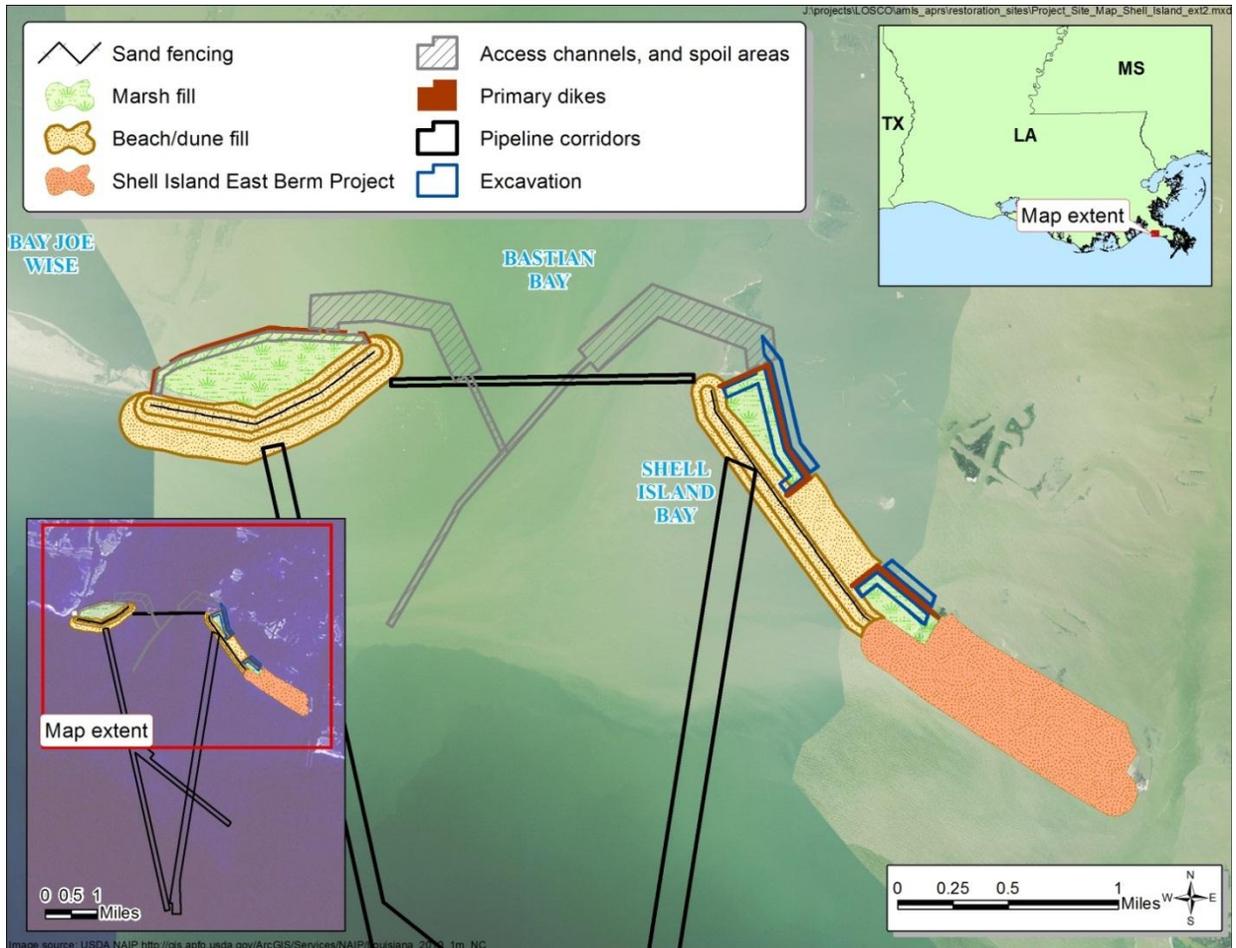


Figure 9-11. Conceptual design for Shell Island (East and West Lobes) location, [also referred to as the Shell Island West NRDA (East and West Lobes) Barrier Island Restoration (BA-111)].

9.5.2 Background

Plans and proposals to restore Shell Island have been developed in multiple documents, including Coast 2050: Toward a Sustainable Coastal Louisiana (LCWCRTF and WCRA 1998), the LCA Ecosystem Restoration Study (USACE 2004a), the Barataria Basin Barrier Shoreline Restoration Feasibility Report (Thomson et al. 2008), the LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS (USACE 2012a), and the Shell Island Barrier Island Restoration Project Environmental Assessment (EA) (USACE 2012b).

The LCA Ecosystem Restoration Study (USACE 2004a) included the Barataria Basin Barrier Shoreline Restoration as a near-term critical restoration feature under the LCA Plan. Caminada Headland and Shell Island reaches were specific features proposed as part of the near-term Barataria Basin Barrier Island Restoration plan. General information on the need for the Barataria Basin Barrier Shoreline Restoration project, the affected environment, and the environmental consequences were presented in the Final Programmatic EIS for the Louisiana Coastal Area (LCA) Ecosystem Restoration Study (USACE 2004b).

A more detailed evaluation of the alternatives and environmental consequences for the Barataria Basin Barrier Shoreline Restoration project was presented in the LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS (USACE 2012a). The potential environmental consequences for implementing the Recommended Plan / National Ecosystem Restoration (NER) Plan (Caminada Headland Alternative 5 and Shell Island Restoration Alternative 5), compared to the no action alternative, were considered (USACE 2012a). The impact analysis was based on a combination of scientific and engineering analyses, professional judgment, and previously compiled information (USACE 2012a). Under the proposed Recommended Plan/NER Plan, short-term impacts are anticipated as a result of the dredging and placement of borrow material during the construction activities, including covering of existing vegetation, increasing the level of turbidity in the water (water quality), the displacement of wildlife and fisheries, and injury to sessile or slow moving organisms. Short-term increases in the noise level and impacts to air quality (e.g., emissions), navigation, commercial fisheries, and recreational activities are also anticipated as a result of the construction activities. In addition, the Gulf of Mexico and Mississippi River water bottoms would be impacted from the removal of sand resources from the borrow site. Over the long-term, project implementation would result in the restoration of beach, dune, and back-barrier marsh habitat, and would provide important and essential habitats used by fish and wildlife for spawning, nursery, nesting, feeding, and cover. Indirect benefits to commercial and recreational fisheries are expected by increasing the quantity and quality of essential fish habitat. This Final EIS also provides information on measures that should be taken to avoid and minimize potential adverse impacts to existing resources, such as threatened and endangered species.

An EA and Statement of Findings was completed for the Shell Island Barrier Island Restoration Project by the USACE in 2012 (USACE 2012b). The Shell Island Barrier Island Restoration Project EA provides information on the excavation and deposit of fill for constructing the Shell Island East Berm Barrier Island Restoration Project (BA-110) and the Shell Island West NRDA (East and West Lobes) Restoration Project (BA-111). The proposed action described here only includes the Shell Island West NRDA (East and West Lobes) Restoration Project (BA-111); the Shell Island East Berm Barrier Island Restoration Project (BA-110) was constructed in 2013.

9.5.3 Alternatives Analysis

In the LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS (USACE 2012a), a total of 8 action alternatives for Shell Island, in addition to the No Action Alternative, were evaluated. All of the action alternatives involved the creation of barrier island back-barrier marsh, beach, and dune habitat, and were based on a feasibility study by Thomson et al. (2008). Alternative 1 would restore two islands, with no renourishment. Alternative 2 would restore two islands, with 10 years of renourishment. Alternatives 3 – 8 would restore a single island, under different renourishment scenarios. Based on an analysis of ecosystem benefits and cost-effectiveness, Shell Island Alternative 5, combined with Caminada Headland Alternative 5, was selected as the NER Plan and the Recommended Plan. Under Shell Island Alternative 5, Shell Island would be restored as a single island with 10 years of advanced fill, and re-nourished 20 years and 40 years after initial construction.

In developing specific engineering plans to implement restoration on Shell Island, CPRA developed a design that includes the construction of two separate lobes, Shell Island West and Shell Island East

(Figure 9-6). No practicable, less damaging on-site or off-site alternatives were found feasible to the proposed restoration project (USACE 2012b). The proposed action described here is for the Shell Island West NRDA (East and West Lobes) Restoration Project (BA-111), which includes construction of the West Lobe and a portion of the East Lobe (Figure 9-6). As discussed above, the Shell Island East Berm Barrier Island Restoration Project (BA-110) was constructed in 2013.

9.5.4 Findings

9.5.4.1 Summary

The LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS (USACE 2012a) provides the supporting analysis to determine whether the Shell Island Restoration is likely to result in significant impacts to the quality of the human environment. As stated in this document, the restoration of Shell Island is expected to provide long-term benefits to Louisiana coastal resources without significant long-term adverse environmental impacts. Construction-related adverse impacts, such as noise, increased water turbidity, increased air emissions, the placement of borrow material on existing habitat, and the displacement of wildlife and fisheries, are considered short-term and temporary. Over the long-term, project implementation would result in the restoration of beach, dune, and back-barrier marsh habitat, and would provide important and essential habitats used by fish and wildlife. Indirect benefits to commercial and recreational fisheries are expected by increasing the quantity and quality of essential fish habitat.

9.5.4.2 Public Input

A Notice of Intent to prepare a Final EIS for the LCA Caminada Headland and Shell Island Restoration Feasibility Study was published in the *Federal Register* (volume 70, number 96) on May 19, 2005. Scoping meetings were held on June 8, 2000; June 20, 2000; June 14, 2005; and June 16, 2005. Public meetings were held on July 26, 2011 in Plaquemines Parish and July 28, 2011 in Lafourche Parish, Louisiana. Meetings were held with stakeholders throughout the planning process.

For the Shell Island Barrier Island Restoration Project EA (USACE 2012b), a 20 day Joint Public Notice with the LA Department of Environmental Quality and the LA Department of Natural Resources was issued on May 8, 2012. All comments received during the 20 day public notice along with any observations by the USACE office and departments of the USACE district were forwarded to CPRA on June 8, 2012 for their concurrence or response. Engineering comments from the USACE district were forwarded to the applicant on June 28, 2012 for their concurrence or reply.

9.5.4.3 Potential Adverse Impacts to Infrastructure

Numerous oil and gas pipelines are present in the vicinity of the proposed action. To minimize the potential damage to these features, the pipeline locations have been identified so they may be avoided in the implementation of the proposed action. The construction contractor would also verify the location of these features prior to any construction activities. The proposed action obviates the need for any construction activities near pipeline infrastructure during the construction of the primary dike. For these reasons, adverse impacts to oil and gas infrastructure are not anticipated.

9.5.5 Additional Considerations

9.5.5.1 Cultural Resources

The LCA Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final EIS (USACE 2012a) analysis of cultural resources is adequate for purposes of adoption. In addition, a complete review of this project under Section 106 of the National Historic Preservation Act 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.

9.5.5.2 Miscellaneous Environmental Protection Measures/Best Practices

The Trustees intend to implement a number of best practices at the Shell Island West NRDA (East and West Lobes) location to reduce the potential for adverse impacts on sensitive resources. For example, to reduce potential impacts to the Pallid sturgeon, the cutterhead will remain completely buried in the sediment during dredging operations. The Contractor will be responsible for surveillance, management, and control of their construction activities to minimize interference with, disturbance to, and damage of water, fish, and wildlife resources. The Contractor shall be aware of threatened and endangered species and migratory birds, and implement practices and follow all conditions set forth by NOAA, USFWS, and LDWF to protect these resources. No critical habitat is designated within the action area. No bald eagles are present within the action area. In addition, the Guidelines for Activities in Proximity to Manatee and Their Habitat will be followed during all phases of in-water work.

Consultation under the ESA will be reinitiated with the U.S. Fish and Wildlife Service, if necessary, to evaluate any potential impacts to the newly proposed species, red knot. The Trustees intend to implement best practices as described in the Final EIS, and would consider any additional practices that may emerge from additional regulatory consultations and summarize those in the final Phase III ERP/PEIS.

In addition, the Trustees intend to implement NOAA's Measures for Reducing Entrapment Risk to Protected Species, revised on May 22, 2012 (NOAA 2012). These measures are included below:

Pre-construction planning

During project design, the project proponents will incorporate at least one escape route into the proposed retention structure(s) to allow any protected species to exit the area(s) to be enclosed. Escape routes must lead directly to open water outside the construction site and must have a minimum width of 100 feet. Escape routes should also have a depth as deep as the deepest natural entrance into the enclosure site and must remain open until a thorough survey of the area, conducted immediately prior to complete enclosure, determines no protected species are present within the confines of the structure.

Pre-construction compliance meeting

Prior to construction, project proponents, the contracting officer representative, and construction personnel should conduct a site visit and meeting to develop a project-specific approach to implementing these preventative measures.

Responsible parties

The project proponents will instruct all personnel associated with the project of the potential presence of protected species in the area and the need to prevent entrapment of these animals. All construction personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing protected species. Construction personnel will be held responsible for any protected species harassed or killed as a result of construction activities. All costs associated with monitoring and final clearance surveys will be the responsibility of project proponents and will be incorporated in the construction plan.

Monitoring during retention structure construction

It is the responsibility of construction personnel to monitor the area for protected species during dike or levee construction. If protected species are regularly sighted over a 2 or 3 day period within the enclosure area during retention structure assembly, construction personnel must notify the project proponent. It is the responsibility of the project proponent to then coordinate with the NMFS Marine Mammal Health and Stranding Response team (1-877-WHALE HELP [1-877-942-5343]) or the appropriate State Coordinator for the Sea Turtle Stranding and Salvage Network (see http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm) to determine what further actions may be required. Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area.

Pre-closure final clearance

Prior to completing any retention structure by closing the escape route, the project proponent will ensure that the area to be enclosed is observed for protected species. Surveys must be conducted by experienced marine observers during daylight hours beginning the day prior to closure and continuing during closure. This is best accomplished by small vessel or aerial surveys with 2-3 experienced marine observers per vehicle (vessel/helicopter) scanning for protected species. Large areas (e.g. >300 acres) will likely require the use of more than one vessel or aerial survey to ensure full coverage of the area. These surveys will occur in a Beaufort sea state (BSS) of 3 feet or less (measured within the area being closed by the containment), as protected species are difficult to sight in choppy water. Escape routes may not be closed until the final clearance determines the absence of protected species within the enclosure sight.

Post closure sightings

If protected species become entrapped in an enclosed area, the project proponent and NMFS must be immediately notified. If observers note entrapped animals are visually disturbed, stressed, or their health is compromised then the project proponent may require any pumping activity to cease and the breaching of retention structures so that the animals can either leave on their own or be moved under the direction of NMFS.

In coordination with the local stranding networks and other experts, NMFS will conduct an initial assessment to determine the number of animals, their size, age (in the case of dolphins), body condition, behavior, habitat, environmental parameters, prey availability and overall risk.

If the animal(s) is/are not in imminent danger they will need to be monitored by the Stranding Network for any significant changes in the above variables.

Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area. Coordination by the project proponent with the NMFS SER Stranding Coordinator may result in authorization for these actions.

NMFS may intervene (catch and release and/or rehabilitate) if the protected species are in a situation that is life threatening and evidence suggests the animal is unlikely to survive in its immediate surroundings.

Surveys will be conducted throughout the area at least twice or more in calm surface conditions (BSS 3 feet or less - (measured within the area being closed by the containment)), with experienced marine observers, to determine whether protected species are no longer present in the area.

9.5.6 Summary and Next Steps

As discussed above, DOI intends to adopt the Louisiana Coastal Area (LCA) Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement (EIS) (USACE 2012a) to fulfill DOI's NEPA requirements for analysis of the Shell Island (East and West Lobes) location of the Louisiana Outer Coast Restoration project. 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 (Louisiana Outer Coast Restoration) will be included in the final Phase III ERP/PEIS and Record of Decision. This project would be implemented in accordance with all applicable laws and regulations.

9.5.7 References

- Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF) and Wetlands Conservation and Restoration Authority (WCRA). 1998. Coast 2050: Toward a Sustainable Coastal Louisiana. Louisiana Department of Natural Resources. Baton Rouge, LA.
- Thomson, G.G., T.J. Campbell, V. Grabowski, and B. Kendrick. 2008. Barataria Basin Barrier Shoreline Restoration Feasibility Report. Appendix C, Shell Island, Plaquemines Parish, Louisiana. Prepared for Louisiana Department of Natural Resources. Coastal Planning & Engineering, Boca Raton, FL. Available: <http://www.lca.gov/Library/FileDownload.aspx?ProdType=4&id=3142> (Appendix A Annex 2 of the Louisiana Coastal Area Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement, pp. 428-598). Accessed August 20, 2013.
- USACE. 2004a. Louisiana Coastal Area (LCA) Louisiana Ecosystem Restoration Study. Final Volume 1: LCA Study - Main Report. U.S. Army Corps of Engineers, New Orleans District, New Orleans, LA. November. Available: www.lca.gov/Library/FileDownload.aspx?ProdType=0&id=1137. Accessed August 14, 2013.
- USACE. 2004b. Louisiana Coastal Area (LCA) Louisiana Ecosystem Restoration Study. Final Volume 2: Programmatic Environmental Impact Statement. U.S. Army Corps of Engineers, New Orleans

District, New Orleans, LA. November. Available:

<http://www.lca.gov/Library/FileDownload.aspx?ProdType=0&id=1147>. Accessed August 14, 2013.

USACE. 2012a. Louisiana Coastal Area Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement. U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District. March. Available:

<http://www.lca.gov/Library/FileDownload.aspx?ProdType=4&id=3138>. Accessed April 23, 2013.

USACE. 2012b. Memorandum for Record Subject: Department of the Army Environmental Assessment and Statement of Finding for Above-Numbered Permit Application. APPLICATION: MVN-2012-0922-EFF (Shell Island Barrier Island Restoration Project). July 19.

9.6 Louisiana Outer Coast Restoration Project: Environmental Review D (North Breton Island)

The proposed project—located at the southern end of the Chandeleur Island chain in Louisiana—would rebuild and re-establish portions of North Breton Island by restoring sand and sediment into the North Breton Island system. This project is intended to restore the island’s physical and ecological functions by creating beach, dune and marsh habitats to support nesting brown pelicans, terns, skimmers and gulls—four bird groups injured by the Spill.

9.6.1 Introduction and Background

Breton National Wildlife Refuge (NWR) is recognized by the National Audubon Society as a globally important bird area due to the resources it provides birds. North Breton Island (part of Breton NWR) hosts one of Louisiana’s largest historic brown pelican nesting colonies. However, surveys by Breton NWR staff indicate that this colony has declined from over 15,000 pairs prior to 1998 to less than several thousand, including a reduction of approximately 50% of breeding pelicans between 2008 and 2012. Without actions to restore sand into the North Breton Island system, the island is expected to completely submerge sometime between 2013 and 2037 and evolve into a re-emerging sand bar (Lavoie 2009), rendering the island unusable by nesting brown pelicans and other seabirds. North Breton Island Restoration is designed to increase the longevity of beach, dune and back barrier marsh habitats, providing nesting habitat for brown pelicans, terns, skimmers and gulls.

Restoration of North Breton Island would be designed to mimic the natural processes of barrier island evolution, including the lateral transport of sand. The conceptual design for placement of sand and back barrier marsh sediment mimics the pre-Hurricane Katrina island coverage and expected island evolution pattern. Approximately 3.7 million cubic yards of sand, silt and clay material would be dredged from borrow site(s) located within an offshore shoals borrow area southeast of Breton Island. This sand, silt, and clay material would then be placed on the existing submerged island to create the desired island configuration. Planting of the dune and back-barrier marsh area with native vegetation is planned to take place following construction. Sand fencing would be utilized to trap and retain deposited sediments and help build dune habitats. The proposed project design utilizes proven techniques and established methods used in other Louisiana barrier island restoration projects, such as those constructed through the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) program.

Consistency with Delta and Breton National Wildlife Refuges Comprehensive Conservation Plan

Breton Island NWR was established in 1904 and is the second oldest national wildlife refuge in the National Wildlife Refuge System. The objectives of the refuge are to (1) provide sanctuary for nesting and wintering seabirds, (2) protect and preserve the wilderness character of the islands, and (3) provide sandy beach habitat for a variety of wildlife species. These actions are consistent with the mandates of the National Wildlife Refuge System. In 2008, the refuge developed a comprehensive conservation plan to describe refuge management— the Delta and Breton National Wildlife Refuges Comprehensive Conservation Plan (CCP)(USFWS 2008).

The proposed North Breton project is consistent with the goals, objectives, and strategies of the Delta and Breton National Wildlife Refuges CCP (USFWS 2008). In addition, it explicitly meets the objectives of

the refuge and supports the mission of the Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997:

“...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” 16 U.S.C. §668 dd(a)(2).

9.6.2 Project Location

The project would have impacts at two locations: the restoration site at North Breton Island and the borrow area and dredge pipeline corridor located to the southeast of the island.

North Breton Island Restoration Site

The proposed restoration is located in the Breton NWR on North Breton Island at the southern end of the Chandeleur Island chain in the State of Louisiana, Plaquemines Parish in Breton Sound, part of the Gulf of Mexico (Figure 9-12). The approximate coordinates for the island are Latitude 29°29'22.91"N and Longitude 89°10'16.91"W. The proposed project location is managed by USFWS (Southeast Region).

Borrow Source

The borrow area to be used for the proposed restoration project is located approximately 2.5 miles southeast of Breton Island (Figure 9-13). Specific borrow sites would be identified within this area based on geotechnical analyses and testing of potential dredge material. The approximate center coordinates for the borrow site are Latitude 29°44'83.98"N and Longitude 89°07'84.26"W. A corridor would be established between the borrow site(s) and the restoration site to facilitate the placement of a temporary pipeline for transport of hydraulically dredged fill material.

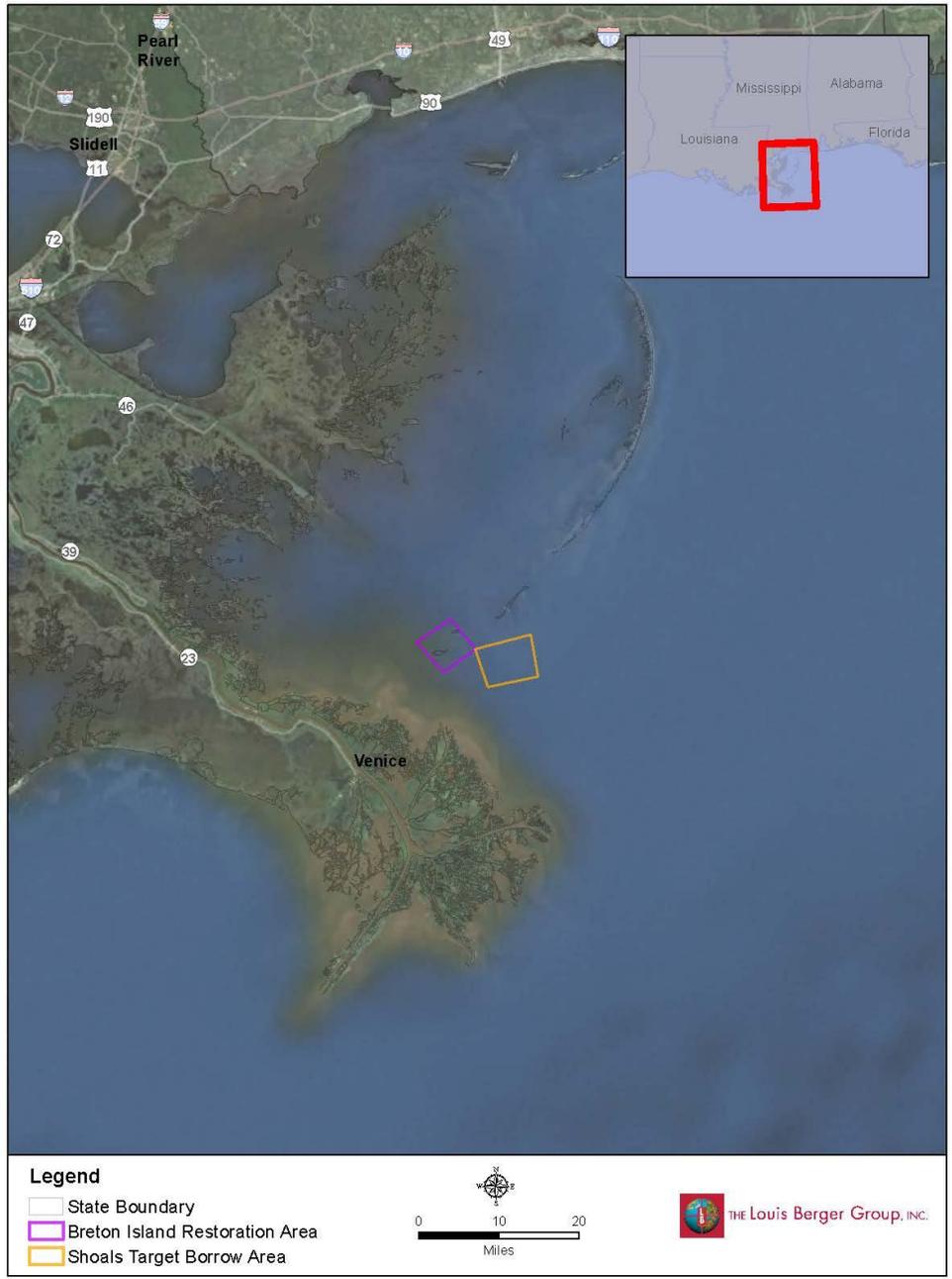


Figure 9-12. Project location.

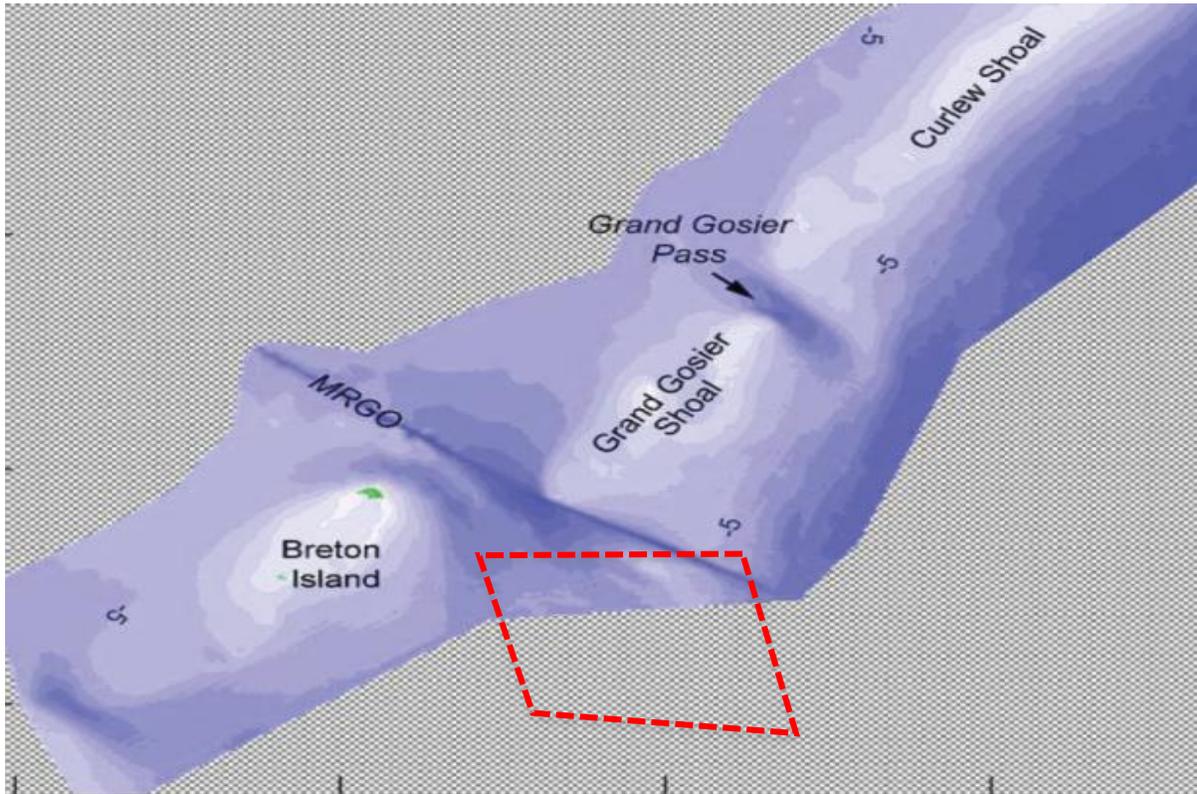


Figure 9-13. Proposed Offshore Shoals Borrow Areas.

9.6.3 Construction and Installation

Island and Back-barrier Marsh

The project is expected to restore approximately 3.0 miles (16,000 linear feet) of beach (76.2 acres), dune (138.7 acres), and back-barrier marsh (137.3 acres) habitat on North Breton Island for a total of 352 acres of barrier island habitat. The dune would be approximately 9 feet-high by 100 feet-wide at the top and 400 feet-wide at the base. The beach would be 3 feet-high by 200 feet-wide, and the back barrier marsh would be 500 feet-wide by 3 feet-high (above existing water depths) for a total expected project width of 1,100 feet. Earthen containment dikes would be necessary to retain placed sediments. The typical containment dike profile would include a +5 ft. NAVD elevation, a crest width of 10 ft., and side slopes 1 vertical: 4 horizontal. The containment dikes would be expected to degrade through natural erosion from waves. Dikes would be gapped after settlement of marsh fill materials, if necessary, to allow hydrologic connection should the expected erosion or settlement not occur. Sand fencing (fencing to capture sand that is naturally transported by wind) would be erected on the constructed dune to capture naturally windblown sand to passively build or maintain the dune feature. Sand fencing would be inspected annually and replaced as necessary over the project life.

After a period of settlement and salinity stabilization of placed materials, native intertidal and dune habitat species would be planted in dune and marsh areas. Plantings would help establish the plant

community, and foster retention of placed sediments. Marsh plantings would include smooth cordgrass (*Spartina alterniflora*) and possibly black mangrove (*Avicennia germinans*). Dune species would likely include bitter panicum (*Panicum amarum*). Other possible dune species include seaoats (*Uniola paniculata*), roseau cane (*Phragmites australis*), marshhay cordgrass (*Spartina patens*), gulf cordgrass (*Spartina alterniflora*), matrimony vine (*Lycium barbarum*), or wax myrtle (*Morella cerifera*).

Borrow Area

The borrow area would be located in an offshore shoal area southeast of North Breton Island. Selection of specific borrow site(s) within in the borrow area would be based on geotechnical and sediment (American Society for Testing and Materials (ASTM) standard particle size analysis of soils) analyses of potential dredge material. Dredged material would be transported to the island via a hydraulic dredge pipeline. A small portion (3,000 feet) of the dredge pipeline—called a pontoon line—may be floating behind the dredge, but the majority would be on the sea floor.

Approximately 3.7 million cubic yards of sand, silt and clay material would be dredged from the borrow area with a hydraulic dredge with a cutterhead. The cutterhead mechanism loosens the bed material and transports it to the suction mouth. The material would be transported via pipeline from the borrow sites to the Breton Island restoration site. Containment dikes would be constructed on the island and in shallow water to contain the dredged material for marsh restoration then degraded after construction. Bulldozers would shape the sand for the dune and beach portions of the project.

Construction Equipment and Logistics

A barge mounted hydraulic dredge with a cutterhead, and a barge mounted booster pump (self-contained barge possibly 90 feet long X 30 feet wide with a crew), and up to 10 miles of dredge pipeline would be used to dredge material and transport it from the borrow site to the island for use in the restoration project. Marsh buggy track hoes (approximately 2 to 5) would be used to construct containment dikes and move dredge pipe. A barge mounted dragline may also be used for construction of the containment dikes. Two or more bulldozers would shape the sand for the dune and beach. Equipment and personnel would be transported to the site via barges, tugboats, and crew boats. In addition, there may be a living quarters barge on site for the crew. Sampling vessels would be used for surveying, sediment borings, and geotechnical work needed for engineering and design.

Construction of the project is expected to take between 6 and 12 months to complete. Construction time would be 10 to 12 hours a day (depending on season and light availability). The project would require approximately 30-40 workers during the 6 to 12 month construction period. Sanitary waste disposal would be provided for the workers during construction. Louisiana Hwy 23 would likely be used to transport workers and some lighter equipment. It is unknown at this time exactly where barges would deploy from, but they would likely come from the Mississippi River to the project site by way of Breton Sound. Personnel shift changes would likely be transported from Venice, LA via crew boats. The bulk of the equipment would be transported via barges through the Mississippi River, Gulf Intracoastal Waterway and other channels.

9.6.4 Operations and Maintenance

North Breton Island is considered a barrier island. Barrier islands are dynamic systems in constant flux formed by the interaction of wave, wind, and tidal energies that erode, transport, and deposit sediments (Leatherman 1982). Because of these processes, islands like North Breton Island are constantly in transition and moving landward (Lavoie 2009).

The performance of the North Breton Island restoration would be assessed using both qualitative and quantitative monitoring protocols. The monitoring program would use performance standards related to the objectives of the project (increased nesting pelicans, terns/skimers and gulls) that would facilitate evaluation of project performance over time and the potential need for corrective actions. Monitoring would be conducted during and following construction to ensure that project designs and necessary corrective actions are correctly implemented. Post construction performance monitoring would also be conducted to evaluate the project's performance over time with respect to project objectives and to inform adaptive management potentials.

Post-construction monitoring would track the performance of restored beach, dune, and back-barrier marsh habitats, as well as the presence of various species of nesting birds (e.g., brown pelicans, terns, skimmers, and gulls) within restored habitat areas. Proposed performance monitoring at each component could include:

- Annual nest count surveys to estimate additional breeding pairs of brown pelicans, terns/skimers, and gulls supported by restoration activities;
- Spatial analysis of color-infrared aerial photography collections to monitor changes in habitat; and
- Light Detection and Ranging (LIDAR) and bathymetric surveys to monitor changes in post-construction habitat elevations and island platform bathymetry.

Additional details concerning performance monitoring will be developed prior to project implementation.

9.6.5 Affected Environment and Environmental Consequences

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

9.6.5.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project location, the No Action alternative assumes that the Trustees would not pursue the North Breton Island location of the Louisiana Outer Coast Restoration project as part of Phase III Early Restoration.

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

9.6.5.2 Physical Environment

Geology and Substrates

Affected Resources

The project area is located in Breton Sound which is part of the Gulf of Mexico. The seafloor within the general project area is somewhat uneven and slopes toward the south. The geology of the region is a complex assemblage of Pleistocene and Holocene and deltaic, nearshore marine, and coastal sedimentary deposits (Pearson 2001). The Holocene deposits overlay older Pleistocene fluvial and deltaic sediments. The surficial seafloor deposits in the project area are identified as "reworked Mississippi Delta" sediments. These sediments typically consist of greater than 80 percent sand and lack clay altogether.

The land that forms Breton NWR is located in a delta lobe created 3,000-4,000 years ago in the St. Bernard deltaic plain of the Mississippi River. Approximately 2,000 years ago, the Mississippi River abandoned the St. Bernard delta complex and moved to the west, forming the LaFourche delta complex. As the cycle of land loss changes progressed in the abandoned delta, the Chandeleur Islands started to form. This land loss continues today and threatens the existence of the Chandeleur Islands and other lands located in the relic deltaic plain not presently receiving sediment input. The natural processes of land formation, subsidence, and sea level rise have been accelerated and altered by human activities, such as building levees, digging canals, and use of fossil fuels.

The Chandeleur Islands are dynamic and are constantly altered and worn down by hurricanes, tropical storms, wind, and tidal action. Early literature on Breton and the Chandeleur Islands mentions trees and a generally higher elevation than exists today. Present elevations of the existing islands are not much higher than sea level.

The soils in the study area have been identified and mapped by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS 2013). The NRCS data identifies Felicity loamy fine sand, frequently flooded soil as the only soil unit mapped within the project area. The Felicity loamy fine sand is a very gently sloping, somewhat poorly drained, saline, sandy soil with elevations ranging from about 1 foot to 3 feet above sea level. The soil is subject to flooding by saltwater during high storm tides.

Environmental Consequences

The restoration would create marsh, dunes, and beach and increase elevations on the island platform (base). In addition, it would increase the width of the island creating greater resistance to tidal energies. The dredged material proposed for island and marsh construction consists of naturally occurring material deposited in the Gulf over time by geologic processes. Vegetative plantings and sand fences would stabilize soil, reduce re-suspension of recently deposited sediment, reduce wind transport of dune material off the island, and encourage sediment deposition. Over the long-term, dredged materials

removed from the borrow sites are expected to be rearranged by natural processes, creating pre-project bathymetric contours in the borrow areas.

Sediment analyses for the restoration site and potential borrow sites would be completed and analyzed prior to project implementation. Overall, the project's impacts related to soil compaction, erosion, and loss during construction at both the island and borrow site(s) would be minor and in the long term, the project would not be expected to adversely impact geology or substrates.

Hydrology and Water Quality

Affected Resources

Currents in the Gulf are characterized by an "offshore," or open Gulf, and an "inshore," or shelf energy, regime. The open Gulf is influenced by the Loop Current. The shelf circulation shows strong influence from secondary flows of the Loop Current. Currents along the southeastern Louisiana coast flow in a predominantly eastward direction. Longshore currents in the project area are generally light to moderate. Winds in the project area are dominated by easterly trades that flow from the southwest in the summer and from the northeast in winter.

The Breton Sound estuary is about 20 miles wide at the gulf coastline and extends 50 miles inland to Caernarvon, Louisiana. Breton Sound receives inflow and runoff from the Mississippi River. The Caernarvon Freshwater Diversion project diverts fresh water and its accompanying nutrients and sediments from the Mississippi River to coastal bays and marshes in Breton Sound.

Breton Island and the Chandeleur Islands are surrounded by shallow sea water and contain interior ponds that can be somewhat fresher from rainfall. The marshes and ponds of Breton Sound range from fresh where influenced by the Mississippi River to brackish closer to the shoreline with the Gulf of Mexico and Breton Sound. The system is open and not managed by any control structures on the refuge.

According to the Louisiana Department of Environmental Quality (Louisiana DEQ 2012), the waters of Breton Sound do not fully support the designated uses of primary contact recreation (e.g., swimming), fish and wildlife propagation, and oyster propagation. Breton Sound is listed on the US EPA's 303(d) list of impaired waters, with fecal coliform cited as the cause of impairment.

Environmental Consequences

The proposed project would create a localized and temporary increase in turbidity as sediments are dredged from the borrow sites and discharged and placed in the project area. If the disturbed sediments are anoxic, the biological oxygen demand in the water column would increase. No known toxic or hazardous conditions exist in the borrow sites. Dredging could exhume buried debris. It is not expected that such debris would cause water quality concerns. Incidental discharges of fuel and oil from construction equipment could occur. However, a Spill Prevention, Control, and Countermeasure Plan would be developed and implemented to reduce this risk. Any changes in hydrology would be reflective of past island conditions as the island is rebuilt.

Overall, potential impacts to water resources are expected to be short term and minor as a result of increases in turbidity during active dredging activities.

9.6.5.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The Clean Air Act ("CAA") requires the State of Louisiana to adopt ambient air quality standards to protect the public from potentially harmful amounts of pollutants. Six common air pollutants (also known as "criteria pollutants") are regulated by EPA. They are particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. The Louisiana Department of Environmental Quality has designated areas meeting the state's ambient air quality standards by their monitoring and modeling program efforts, (i.e., attainment areas). Louisiana has no carbon monoxide, nitrogen oxides, sulfur oxides, particulate or lead nonattainment areas.

Currently, Plaquemines Parish is classified by EPA as an attainment area in accordance with the National Ambient Air Quality Standards (NAAQS). The EPA's GHG Reporting Rule establishes mandatory GHG reporting requirements for sources that emit 25,000 metric tons or more of carbon dioxide equivalent (CO₂e) per year (EPA 2013a). Many sources of man-made air pollution affect Breton NWR including onshore industry, power plants, car emissions, and offshore oil and gas development (DRI 2013; USFWS 2013c).

Environmental Consequences

Project implementation would require the use of boats as well as barge-mounted and land-based heavy equipment for up to 10 or more hours per day over a 6-12 month construction period. This would temporarily affect air quality and elevate greenhouse gas emissions in the project vicinity due to emissions and increased dust from operation of construction vehicles and equipment. Any air quality impacts that would occur would be localized, limited to the construction phase of the project, and limited by the size of the project. Therefore, short-term, minor impacts to air quality would occur. The project would have no long term impacts on air quality.

Engine exhaust from hydraulic cutterhead dredge, booster pumps, front-end loaders, cranes, boats, and trucks would contribute to an increase in greenhouse gas emissions. The following tables describe the likely greenhouse gas emission scenario for the implementation of this project.

Based on the assumptions described in Table 9-1 below, GHG emissions would not exceed 25,000 metric tons per year. Given the projected construction-phase GHG emissions, along with the small scale and short duration of the project, predicted impacts from greenhouse gas emissions would be short-term and minor.

Table 9-1. Greenhouse Gas Impacts of the Proposed Project.

VESSEL/CONSTRUCTION EQUIPMENT	NO. OF HOURS OPERATED ¹	CO ₂ (METRIC TONS) ²	CH ₄ (CO ₂ E) (METRIC TONS) ³	N ₂ O (CO ₂ E) (METRIC TONS)	TOTAL CO ₂ E (METRIC TONS)
Crane	2,400	87	0.03	0.3	87.33
Grader	2,400	117	0.09	9	126.09
Bulldozer (2)	4,800	228	0.12	1.2	229.32
Trackhoe (2)	4,800	210	0.12	1.2	211.32
Dumptruck ⁴	2,400	102	0.06	0.6	102.66
Tugboat ⁵	2,400	4,800	9	36	4,845
Boat ⁶	2,400	1,350	3	12	1,365
Dredge Pump ⁷	2,400	911	1.1	0.5	912.6
TOTAL					7,879.32

¹ Emissions assumptions for all equipment based on 240 10-hour days of operation per piece of equipment over a 12-month construction period.

² CO₂ emissions assumptions for diesel and gasoline engines based on EPA 2009.

³ CH₄ and N₂O emissions assumptions and CO₂e calculations based on EPA 2011.

⁴ Construction equipment emission factors based on USEPA NONROAD emission factors for 250hp pieces of equipment. Data was accessed through the California Environmental Quality Act Roadway Construction Emissions Model.

⁵ Fuel economy assumptions for a 3000hp marine diesel tug based on Walsh 2008.

⁶ Fuel economy assumptions for a 300hp marine diesel powerboat and 1000hp marine diesel passenger ferry based on Becker, no date.

⁷ Fuel economy assumptions for a dredge pump based on Johnson 2013.

9.6.5.4 Noise

Affected Resources

Noise can be defined as unwanted sound and noise levels, and its impacts are interpreted in relationship to effects on nearby visitors to the NWR and wildlife. The Noise Control Act of 1972 (42 U.S.C. § 4901 to 4918) was enacted to establish noise control standards and to regulate noise emissions from commercial products such as transportation and construction equipment. The standard measurement unit of noise is the decibel (dB), which represents the acoustical energy present. Noise levels are measured in A-weighted decibels (dBA), a logarithmic scale which approaches the sensitivity of the human ear across the frequency spectrum. A 3-dB increase is equivalent to doubling the sound pressure level, but is barely perceptible to the human ear. Table 9-2 shows typical noise levels for common sources expressed in dBA. Noise exposure depends on how much time an individual spends in different locations.

Noise levels in the project area vary depending on the season, time of day, number and types of noise sources, and distance from noise sources. Existing sources of noise in the project area are from offshore oil production, commercial vessels, recreational boating, overhead aircraft and ambient natural sounds such as wind, waves, and wildlife.

Table 9-2. Common noise levels.

NOISE SOURCE OR EFFECT	SOUND LEVEL (DBA)
Rock-and-roll band	110
Truck at 50 feet	80
Gas lawnmower at 100 feet	70
Normal conversation indoors	60
Moderate rainfall on foliage	50
Refrigerator	40
Bedroom at night	25

Source: Adapted from BPA 1986, 1996

Noise-sensitive receptors include sensitive land uses and those individuals and/or wildlife that could be affected by changes in noise sources or levels due to the project. Noise-sensitive receptors in the project area include beach recreational use and wildlife.

Environmental Consequences

Instances of increased noise are expected during the construction phases associated with the restoration project. The proposed project would generate construction noise associated with equipment during placement of the fill material, grading, and dredging. Construction equipment noise is known to disturb fish, marine mammals and nesting shorebirds (discussed below). Construction noise would also create a potential nuisance to visitors to the Breton NWR in areas adjacent to project construction activities. Construction noise would be temporary and the construction period is not anticipated to last more than 12 months. Because construction noise would be temporary, negative impacts to the human environment during construction activities would be short-term and minor, as they would likely attract attention but would not result in visitors changing their activities.

After completion of the project, noise sources would be expected to include the existing sources described above, and noise levels would return to pre-project levels. Overall, long-term noise effects from boating and other recreational activities would remain minor. Likewise, noise effects from commercial vessels, offshore oil production and ambient natural sounds would be minor.

9.6.5.5 Living Coastal and Marine Resources

Vegetation

Affected Resources

Vegetation on the island consists of black mangrove (*Avicennia germinans*), smooth cordgrass (*Spartina alterniflora*) associated with the emergent salt marsh. The other vegetation habitats found on the island are dune zones of saltmeadow cordgrass (*Spartina patens*) or sea oats (*Uniola paniculata*), barrier island shrub/scrub zone of Southern wax myrtle (*Myrica cerifera*), Eastern baccharis (*Baccharis halimifolia*), and yellow rattlebox (*Sesbania drummondii*), and high marsh or upland-grassland dominated by saltmeadow cordgrass (Penland *et al.* 1997).

Wetlands are essential breeding, rearing, and feeding grounds for many species of fish and wildlife. Barrier island wetlands, flats, and subtidal habitat provide unique nursery, foraging, and spawning habitat for numerous marine and estuarine species of commercial and recreational importance. Review of the USFWS National Wetlands Inventory (NWI 2013) identified wetlands within the project area as estuarine intertidal emergent and unconsolidated shore under Cowardin classification system (Cowardin 1979).

Environmental Consequences

The project would result in conditions substantially more conducive to healthy barrier island vegetative communities than currently exists. The project proposal includes approximately 137 acres of back-barrier marsh wetland restoration, which would have an overall major beneficial effect on the wetland system on the island. Installation of native vegetative plantings will encourage colonization of native dune vegetation and the development of emergent vegetated wetlands. Dune plantings would occur post construction to stabilize newly placed sediments, and installation of native wetland vegetation on the marsh platform would occur as the material consolidates and dewateres. Project construction would result in a net benefit of an estimated 352 acres of dune (139 acres), beach (76 acres) and wetland (137 acres) habitat. The implementation of the proposed restoration activities would not be expected to disturb or adversely impact waters of the U.S. or adversely modify wetlands. While construction-related activities may temporarily disturb wetland habitat, in the longterm the proposed project would improve wetland habitat and protect it from further erosion and loss. Overall, the proposed project would provide long-term beneficial impacts on wetlands and upland habitats.

Wildlife

Affected Resources

Breton NWR provides nesting resources for twenty-three species of birds. Birds that use the project area include waterbirds, sea birds, waders, shore birds, birds of prey, and passerines. Species of concern and/or significance for management purposes that are known to occur on Breton NWR and may use the project area include: piping plover (*Charadrius melodus*), brown pelican (*Pelecanus occidentalis*), redhead (*Aythya americana*), laughing gull (*Leucophaeus atricilla*), royal tern (*Thalasseus maximus*), Caspian tern (*Hydroprogne caspia*), sandwich tern (*Thalasseus sandvicensis*), black skimmer (*Rynchops niger*), sooty tern (*Onychoprion fuscatus*), common tern (*Sterna hirundo*), least tern (*Sternula antillarum*), Forster's tern (*Sterna forsteri*), gullbilled tern (*Gelochelidon nilotica*), magnificent frigate bird (*Fregata magnificens*), great egret (*Ardea alba*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), clapper rail (*Rallus longirostris*), white ibis (*Eudocimus albus*), tricolored heron (*Egretta tricolor*), black-crowned night heron (*Nycticorax nycticorax*), little blue heron (*Egretta caerulea*), herring gull (*Larus argentatus*), and kelp gull (*Larus dominicanus*) (U.S. Department of the Interior 2008). The more common nesting species include royal, Caspian, and sandwich terns, laughing gulls, brown pelicans, and black skimmers.

In the past, Breton NWR has supported large colonies of colonial nesting seabirds and still provides some nesting habitat, although limited in comparison to previous years. Historically, large nesting colonies of brown pelicans; laughing gulls; and royal, Caspian and sandwich terns used the islands. Less

abundant were nesting black skimmers, with occasional common, least, Forster's, and gull-billed terns. To avoid visitor disturbance to nesting seabird colonies, each colony is posted as a closed area during the nesting season; approximately five percent of the island is used by nesting birds.

Prior to Hurricane Katrina, terns nests numbered 35,000 to 50,000; brown pelican nests averaged 6,000 to 8,000 and peaked at approximately 12,000 nests; and black skimmers nests averaged 3,000. In the nesting seasons following Katrina, these numbers fell by approximately 80%, potentially due to loss of supporting habitat. In 2007, terns numbered 7,000 nests; brown pelicans produced 2,500 nests; and black skimmers numbered 450-500 nests.

During the winter, large numbers of waterfowl such as redheads, canvasback (*Aythya valisineria*), and scaup (*Aythya sp.*) frequent the numerous islands. Wintering waterfowl populations begin building in the fall and peak in mid-December and January. The most common species observed are mottled duck, (*Anas fulvigula*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), American wigeon (*Anas americana*), green-winged teal (*Anas crecca*), and snow geese (*Chen coerulescens*). The most common resident marsh and waterbirds are great blue heron, little blue heron, white ibis, glossy /white-faced ibis, great egrets, snowy egrets, tricolored herons, yellow-crowned night-herons (*Nyctanassa violacea*), and black-crowned night-herons. The refuge serves as a staging area for many passerine birds during migration, and large concentrations of shorebirds are sometimes observed feeding in the mudflats. Frigatebirds are regularly observed flying over the refuge. Endangered piping plover inhabit Breton NWR islands during winter periods. Bald eagles (*Haliaeetus leucocephalus*) are known to nest in southern Louisiana (Wright and Hess 2002); however, they are not known to nest within Breton NWR.

No terrestrial wildlife surveys have been conducted in the project area; however, based on the types of habitat present, and because of its size, elevation, location and overwashes, it is expected that there are no resident mammals, amphibians, or non-marine reptiles on North Breton Island. Historically there were raccoons and occasional nutria present (personal communication from Brian Spears, USFWS September 2013).

Environmental Consequences

Restoration activities at North Breton Island would be relatively short term (up to 12 months). Birds would be expected to avoid the area as desired while construction is occurring. Impacts to birds would be avoided via management guidelines and techniques developed on a species-specific basis (such as timing restriction and buffers during nesting and when species is present). No bald eagles are known to nest in Breton NWR. Thus, no adverse impacts to bald eagles are anticipated. The Trustees intend to implement best practices that are requested by USFW, NOAA and the LDWF, and would consider any additional practices that may emerge from additional regulatory consultations and summarize those in the Final ERP/PEIS.

The proposed project would create an estimated 352 acres of barrier island habitat through the restoration of about 215 acres of dune, berm and swale habitats and the protection and creation of approximately 137 acres of back-barrier marsh. The project would restore bird nesting habitat and

would have long-term major beneficial impacts for bird populations. Given the likely lack of mammals, non-marine reptiles, and amphibians, the project would have no impacts to area populations.

Marine and Estuarine Fauna (fish, shell beds, benthic organisms)

Affected Resources

There are a number of aquatic species found in the project area. Fish species include sand seatrout, spotted or speckled seatrout, searobins, red drum, tonguefish, flounders, Atlantic bumper, and porgys. Benthic organisms include bivalves, gastropods and other mollusks, anemones, amphipods, annelids, brown and white shrimp, and echinoderms.

Environmental Consequences

This project would likely result in short term minor adverse impacts due to construction and dredging-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. Short-term, localized minor impacts to fisheries resources would occur during the construction phase of the project. Mobile aquatic animals would be expected to move away from the fill and borrow sites during construction and return following completion of construction. Isolated, short-term effects on pelagic fish eggs and larvae in the immediate area may occur. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the dredging activity and the placement of the fill material at the island. However, these types of species are typically numerous in the Gulf and recolonize quickly.

The island and backwater marsh restoration would provide overall long term benefits to marine species by providing additional habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans. Restoration of the tidal marsh habitat would benefit numerous aquatic species and enhance resident fish populations.

The direct effect of dredging is the removal of sediment along with the organisms living in the sediment. Impacts could include entrapment and likely death of slow-moving organisms (such as crabs) and benthic organisms (such as polychaetes) during dredging in the borrow sites and smothering of benthic organisms and more sessile fish species in the deposition sites.

Dredging would change substrate topography, indirectly impacting benthic and other aquatic organisms using this habitat. Depending on the depth-of-cut, dredging in the Gulf could result in low dissolved oxygen in bottom waters. Low dissolved oxygen already occurs in the nearshore Gulf, especially during the summer months, so the site and dimensions of the proposed borrow sites could contribute to localized low dissolved oxygen which may pose a risk to some fish and crustaceans with low mobility.

The project would provide overall long term benefits to marine species by providing additional fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans. Restoration of the tidal marsh habitat would benefit numerous aquatic species such as blue crab, red drum and speckled sea trout. Over the life of the project, the quality of fish habitat would increase.

Any adverse impacts to marine and estuarine fauna (fish, shell beds, benthic organisms) are expected to be short in duration and minor as those species that would be affected are likely numerous in the area.

Protected Species

Affected Resources

Protected species and their habitats include Endangered Species Act-listed species and designated critical habitat that are regulated by either USFWS or NMFS. Protected species also include marine mammals protected under the Marine Mammal Protection Act and essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act. The piping plover and red knot (proposed) are the only bird species protected under the Endangered Species Act that utilizes the island for wintering habitat (personal communication from Brian Spears, USFWS, September 2013). Critical habitat for piping plover is designated within the project area.

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles (Fuller et al. 1987). Sea turtles forage in the waters of coastal Louisiana and likely occur within the project area.

There are 22 different species of marine mammals, including baleen whales, toothed whales, dolphins, and manatees, known to occur in the Gulf of Mexico. The project area is located within the NOAA-defined nearshore estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's).

The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (NOAA 2010).

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth in the project area, the sperm whale, or any other endangered whale, is not likely to be present during construction.

The West Indian Manatee has been observed in Louisiana waters; however, sightings are very rare and almost always occur in coastal bays and estuaries (USFWS 2013b). Manatees, which are an inshore and nearshore species, are not expected to be encountered in the project area, which is 16 miles offshore to the northeast of Venice, Louisiana.

Essential fish habitat consists of waters and substrate that are necessary to Federally-managed fish species for spawning, breeding, feeding, or growth to maturity. Aquatic and tidally influenced wetland

habitats in portions of the Gulf of Mexico surrounding the project area are designated as essential fish habitat (“EFH”) for a variety of federally managed species, including shrimp, red drum, reef fish, stone crab, spiny lobster and coral (NMFS 2013). In addition, several species of shark are known to occur in the proposed project footprint including the following species: scalloped hammerhead shark, finetooth shark, blacktip shark, bull shark, spinner shark, Atlantic sharpnose shark, and blacknose shark. The smooth dogfish, silky shark, yellowfin tuna, and whale shark all have EFH found near the borrow area as well. Detailed information on federally managed fisheries and the EFH is provided in the 2005 generic amendment of the Fisheries Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council (GMFMC 2005). The generic amendment was prepared as required by the Magnuson-Stephens Fishery Management Conservation and Management Act.

Environmental Consequences

The proposed restoration activities would restore dune, shoreline, and interior marsh habitats, thus creating foraging and nesting habitat for birds.

This project would likely result in short term moderate adverse impacts to piping plovers and red knot due to construction and dredging related disturbances. Some birds may leave the area during deployment activities, but would likely return after activities cease. The proposed project would ultimately restore and increase the longevity of the piping plover critical habitat by restoring dune and beach habitat. Best management practices to protect piping plover, red knot, and piping plover critical habitat will be developed during ESA section 7 consultation with USFWS and will be followed during construction.

Whale species in the Gulf are typically found in deeper waters on the outer continental shelf or along the shelf break; therefore, they would not be impacted during the construction activities on the island or the activity at the dredge site. Best management practices regarding sea turtles and other marine mammals developed through consultation with NMFS will be followed during construction. Overall, the rebuilding and restoration of the island should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp’s ridley, which could utilize the area. Long-term adverse impacts to marine mammals or sea turtles would not be anticipated as a result of the proposed project.

This project would likely result in short term minor adverse impacts to EFH due to construction and dredging related disturbances. Some species may leave the area during deployment activities, but would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate, could be injured or killed by the dredging activity and the placement of the fill material at the island. However, these types of species are typically numerous in these areas. Restoring the island and backwater marsh can enhance resident fish populations. In the long term, project implementation would be beneficial to protecting EFH from erosion and to maintaining the productivity of marine fishery resources. The proposed restoration activities would restore unique and important barrier island habitat, including marsh and wetland habitat, and help maintain a diversity of different categories of EFH throughout the proposed project area and Breton Sound. Although short-term impacts would be anticipated from construction activities, best management practices such as

containment dikes and erosion control measures would be required to lessen short-term construction impacts. The proposed restoration activities would not be expected to cause long-term adverse impacts to diverse categories of EFH. In the long term, project implementation would be beneficial to protecting EFH from erosion and to maintaining the productivity of marine fishery resources.

A list of potential mitigation and Best Management Practices that could be implemented follows.

For example, to reduce potential impacts to the Gulf sturgeon, the cutterhead would remain completely buried in the sediment during dredging operations. The Contractor would be responsible for surveillance, management, and control of their construction activities to minimize interference with, disturbance to, and damage of water, fish, and wildlife resources. The Contractor shall be aware of threatened and endangered species and migratory birds, and implement practices and follow all conditions set forth by NOAA, USFWS, and LDWF to protect these resources. In addition, as appropriate, the "Guidelines for Activities in Proximity to Manatee and Their Habitat" would be followed during all phases of in-water work.

Consultation under the ESA will be initiated with the U.S. Fish and Wildlife Service to evaluate any potential impacts to the federally threatened piping plover and the newly proposed species, red knot.

In addition, the Trustees intend to implement NOAA's "Measures for Reducing Entrapment Risk to Protected Species," revised on May 22, 2012 (NOAA 2012). These measures are included below:

Pre-construction planning

During project design, the project proponents will incorporate at least one escape route into the proposed retention structure(s) to allow any protected species to exit the area(s) to be enclosed. Escape routes must lead directly to open water outside the construction site and must have a minimum width of 100 feet. Escape routes should also have a depth as deep as the deepest natural entrance into the enclosure site and must remain open until a thorough survey of the area, conducted immediately prior to complete enclosure, determines no protected species are present within the confines of the structure.

Pre-construction compliance meeting

Prior to construction, project proponents, the contracting officer representative, and construction personnel should conduct a site visit and meeting to develop a project-specific approach to implementing these preventative measures.

Responsible parties

The project proponents will instruct all personnel associated with the project of the potential presence of protected species in the area and the need to prevent entrapment of these animals. All construction personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing protected species. Construction personnel will be held responsible for any protected species harassed or killed as a result of construction activities. All costs associated with monitoring and final clearance surveys will be the responsibility of project proponents and will be incorporated in the construction plan.

Monitoring during retention structure construction

It is the responsibility of construction personnel to monitor the area for protected species during dike or levee construction. If protected species are regularly sighted over a 2 or 3 day period within the enclosure area during retention structure assembly, construction personnel must notify the project proponent. It is the responsibility of the project proponent to then coordinate with the NMFS Marine Mammal Health and Stranding Response team (1-877-WHALE HELP [1-877-942-5343]) or the appropriate State Coordinator for the Sea Turtle Stranding and Salvage Network (see http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm) to determine what further actions may be required. Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area.

Pre-closure final clearance

Prior to completing any retention structure by closing the escape route, the project proponent will ensure that the area to be enclosed is observed for protected species. Surveys must be conducted by experienced marine observers during daylight hours beginning the day prior to closure and continuing during closure. This is best accomplished by small vessel or aerial surveys with 2-3 experienced marine observers per vehicle (vessel/helicopter) scanning for protected species. Large areas (e.g. >300 acres) will likely require the use of more than one vessel or aerial survey to ensure full coverage of the area. These surveys will occur in a Beaufort sea state (BSS) of 3 feet or less (measured within the area being closed by the containment), as protected species are difficult to sight in choppy water. Escape routes may not be closed until the final clearance determines the absence of protected species within the enclosure sight.

Post closure sightings

If protected species become entrapped in an enclosed area, the project proponent and NMFS must be immediately notified. If observers note entrapped animals are visually disturbed, stressed, or their health is compromised then the project proponent may require any pumping activity to cease and the breaching of retention structures so that the animals can either leave on their own or be moved under the direction of NMFS.

In coordination with the local stranding networks and other experts, NMFS will conduct an initial assessment to determine the number of animals, their size, age (in the case of dolphins), body condition, behavior, habitat, environmental parameters, prey availability and overall risk.

If the animal(s) is/are not in imminent danger they will need to be monitored by the Stranding Network for any significant changes in the above variables.

Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area. Coordination by the project proponent with the NMFS SER Stranding Coordinator may result in authorization for these actions.

NMFS may intervene (catch and release and/or rehabilitate) if the protected species are in a situation that is life threatening and evidence suggests the animal is unlikely to survive in its immediate surroundings.

Surveys will be conducted throughout the area at least twice or more in calm surface conditions (BSS 3 feet or less - (measured within the area being closed by the containment)), with experienced marine observers, to determine whether protected species are no longer present in the area.

9.6.6 Human Uses and Socioeconomics

9.6.6.1 Socioeconomics and Environmental Justice

Affected Resources

There are no Environmental Justice areas of concern near the project area. Breton Island is part of Plaquemines Parish, Louisiana's most southern parish, where the Mississippi River meets the Gulf of

Mexico. The project area is not located near any urban centers; the closest town is Venice, approximately 18 miles to the southwest, on the west bank of the Mississippi River. There are no incorporated communities anywhere within the Parish. Most of the Parish's population is distributed along a narrow band of land on each bank of the Mississippi River. In 2012, the estimated Parish population was 23,921 and the 2007-2011 median household income was \$55,301 (US Census, 2012). Major sources of employment and income are the seafood industry, off-shore oil industry, shipping, and citrus farming (GNO Inc. 2013). The unemployment rate in Plaquemines Parish in 2012 was 6.5% (LWC 2012). According to the U.S. Census Bureau, approximately 30% of the population of Plaquemines Parish is considered to be minority.

Millions of pounds of shrimp, oysters, crab, and fish are produced annually by the commercial fishing industry in Louisiana. Louisiana's commercial fishing industry catches about 25 percent of all the seafood landed in America and is the largest producer of shrimp and oysters in the United States (Louisiana 2013). In Plaquemines Parish over 5 percent of the population is directly employed in the fishing industry (US Census 2013). Plaquemines Parish is also considered a "sportsman's paradise" for sport fishing (GNO Inc. 2013). Encompassing seventy miles of the Mississippi River, Plaquemines Parish is the eighth largest port in the United States and is noted for exporting coal, petro-chemicals, and grain. The Parish is a major operational center for the offshore oil and gas industry. The oil industry, including production, support, storage, transportation, refining, and petrochemicals is estimated to be a \$1.2 billion industry in Plaquemines Parish. In 2006, employment associated with the oil industry accounted for over 8,000 direct, indirect, and induced employment opportunities, or over 30% of total jobs in the parish (LSU 2006).

In August 2005, the entire Parish was devastated by Hurricane Katrina, which caused extensive structural damages and flooding, major losses to the commercial fishing industry, and a substantial decrease in population primarily due to people not returning to the area after evacuating. Residents are trickling back as housing and other infrastructure are repaired or replaced, but major questions remain about levee protection and the viability of local communities.

Environmental Consequences

Because this project is located offshore, it would have no adverse impacts on the socioeconomic status of the communities and counties adjacent to the project. Minor, short-term beneficial effects could occur from increased employment during project construction. Engineering and design work could employ a number of Federal, State, and/or consultant employees for up to 2 years. The construction crew could consist of 30 to 40 people, who would be employed for a period of 6 to 12 months. These economic benefits would be concentrated in the service and retail industry sectors. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers.

Environmental Justice Analysis

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

In this analysis, a Parish 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 parishes 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – North Breton Island is uninhabited and Plaquemines Parish as a whole also does not meet these criteria. Furthermore, there is no high and adverse impact anticipated from the proposed project.

9.6.6.2 Cultural Resources

Affected Resources

There are no known historic or cultural resources within the Delta or Breton NWRs (USFWS 2008). In addition, no evidence of archaeological sites has been reported on North Breton Island (Goodwin 1993). The earliest accounts of Breton Island are from French explorations of the area in 1698-1699. It is assumed that any visits to the island were probably brief to collect desired resources because of the harsh living conditions compared to other barrier islands. The island is located near historically documented shipping routes used by the French leading to settlements along the Gulf coast. Because of the shallow waters of Breton Sound, the majority of historic boat use was limited to smaller vessels such as sloops, luggers, and longboats. The navigation history indicates that watercraft of various types have sailed the waters of Breton sound since the arrival of Europeans to the area. There is a potential for historical shipwrecks within the area due to natural and manmade hazards. However, past studies found no evidence of known shipwrecks within the project area (Goodwin 1993).

In 1915, several families and a school were located on Breton Island. Prior to the hurricane of that year, the island was evacuated. The hurricane destroyed the settlement, and it was never rebuilt (USFWS 2013). In addition, there was an oil facility just off of North Breton Island operated by Kerr McGee. The building was destroyed during hurricane Katrina in 2005. Part of a bulk head, well heads, valves and flowlines still remain at the site.

Environmental Consequences

Currently, there are no historic or cultural resources known to exist within the project area (USDOI 2008). It is anticipated that cultural resources would be unaffected by the proposed project. A complete review of this project under Section 106 of the National Historic Preservation Act 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.

9.6.6.3 Land and Marine Management

Affected Resources

Breton NWR includes North Breton Island and all of the Chandeleur Islands in St. Bernard and Plaquemines Parishes, Louisiana. As federal lands, these islands are not subject to local planning and zoning regulations, but are managed according to the Delta and Breton NWR CCP. As discussed above, management objectives set forth by the CCP are to provide sanctuary for nesting and wintering birds; protect and preserve the wilderness character of the islands; and, provide sandy barrier beach habitat for a variety of wildlife species.

Public use at Breton NWR centers on wildlife viewing and fishing from the beaches and in the shallow water surrounding the islands. Camping on the islands is no longer permitted due to the large amount of land lost to Hurricane Katrina and possible impacts to nesting birds on the remaining habitat. To avoid visitor disturbance to nesting bird colonies, each colony is posted as a closed area during the nesting season; approximately five percent of the islands is used by nesting birds.

Environmental Consequences

Under the proposed project, no changes would occur to the current land use at Breton NWR. Land use and management authority at the refuge would remain under the purview of the US Fish and Wildlife Service, and no development at the site would occur. The proposed project would be consistent with and support the Breton NWR CCP, as it would provide sanctuary for several species of nesting and wintering seabirds and would restore sandy barrier beach habitat.

Pursuant to the Coastal Zone Management Act of 1972, federal activities must be consistent to the maximum extent practicable with the federally-approved coastal management programs for states where the activities would affect a coastal use or resource. Federal Trustees are submitting consistency determinations for state review coincident with public review of this document. Although this project occurs on federal land, which is not part of any state's coastal zone, if it is determined that it can affect a state(s)' coastal use or resource, such a consistency determination will be submitted for this project and activities will take place consistent with the program's requirements.

Therefore, the proposed project would have no impacts to Land and Marine Management.

9.6.6.4 Aesthetics and Visual Resources

Affected Resources

The refuge consists of an island chain starting 16 miles offshore to the northeast of Venice, Louisiana and extending northward toward the Mississippi Gulf Coast for a distance of 70 miles. The general visual character of the area surrounding the refuge can be described as undeveloped. The topography is flat to gently sloping with low-lying marshlands, and land elevations range from 0 to less than 6 feet above sea level. The landscape in the vicinity of the proposed project area is characterized by a mosaic of marsh wetlands, dunes and beaches. There are no designated protected viewsheds in the vicinity of the

proposed restoration activities. Unobstructed views of open water exist from dunes and at higher elevations of the island.

Environmental Consequences

Temporary impacts to visual resources would result from implementation of the proposed restoration activities. Construction equipment would be temporarily visible to visitors and recreational users. These construction-related impacts to visual resources would be minor, since the island is not visible from mainland Louisiana and construction activities and equipment would only be visible to visitors arriving by boat. Because the dune and marsh restoration would consist of the placement of natural sand, silt and clay material, no impacts to visual resources are anticipated as a result of restoration activities. Dune restoration and revegetation is anticipated to result in a long-term minor visual enhancement to the refuge, as the project is intended to mimic the natural processes associated with barrier island formation.

9.6.6.5 Tourism and Recreational Use

Affected Resources

North Breton Island is located within Breton NWR and accessible by boat only. There is no regular commercial boat transport to the island, but charters are available to visitors. Small craft vessels generally reach the southern islands from launches in Venice, Louisiana. Public use includes wildlife viewing and fishing from the beaches and shallow waters surrounding the island. Camping is no longer permitted due to the large amount of land lost to Hurricane Katrina and possible impacts to nesting birds on the remaining habitat. To avoid visitor disturbance to nesting seabird colonies, each colony is posted as a closed area during the nesting season; approximately five percent of the islands is used by nesting birds. Visitor use at Breton NWR is confined mainly to the spring, summer and early fall months, with approximately 2,500 visits per year (USFWS 2013a). North Breton Island is a small portion of Breton NWR; visitor use to North Breton Island is likely lower than for the rest of the refuge.

Environmental Consequences

During the construction period, the visitor recreational experience would be adversely impacted by noise and visual disturbances associated with the use of construction equipment. Access to waters surrounding the island would potentially also be restricted during dredging activities. While these temporary inconveniences would result in minor adverse impacts on tourism and recreational use, over the long term the project would result in minor beneficial impacts to tourism and recreational use. Opportunities for recreational activity at the shoreline would be enhanced as a result of improved fishing and bird watching opportunities accruing from improved habitat conditions. The implementation of the proposed project would not be expected to result in an increase in the number of visitors, due to the island's small size and its distance from shore; however, the project would contribute positively to improvements in the quality of the visitor experience. Overall, adverse impacts to tourism and recreational use would be short term and minor. Over the long term the project would result in minor beneficial impacts to tourism and recreational uses.

9.6.6.6 Infrastructure

Affected Resources

Breton Island is a remote barrier island with no services or infrastructure. It is not located near any urban centers; the closest town is Venice, approximately 18 miles away and across the Mississippi River. Pipelines and other infrastructure associated with offshore oil production are present throughout Breton Sound and the Gulf of Mexico. While no pipelines are known to lie within the anticipated restoration footprint, several known, existing pipelines and facility infrastructure cross the area of the proposed borrow sites as shown in Figure 9-14. Magnetometer surveying within the target borrow area and associated conveyance corridors, access channels, and project fill areas will be conducted as part of project engineering and design before construction activities begin to better delineate these structures.

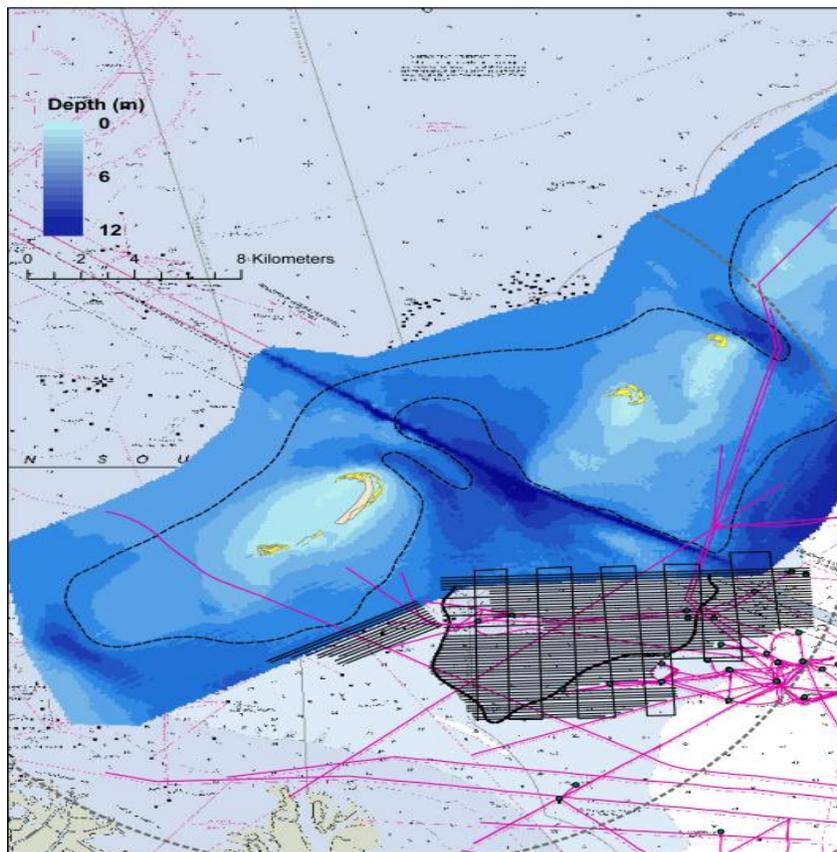


Figure 9-14. Project area, showing known pipeline infrastructure.

Environmental Consequences

The project would not impact utility, transportation, or other infrastructure associated with urban development, as no such infrastructure exists on North Breton Island and no development is proposed. Existing oil production facilities and pipelines would not be impacted, as these would be identified and avoided during construction. Therefore, the proposed project would have no impacts to infrastructure.

9.6.6.7 Public Health and Safety

Affected Resources

The management of hazardous materials is regulated under various federal and state environmental and transportation laws and regulations, including the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Emergency Planning and Community Right-to-Know Act, the Hazardous Materials Transportation Act, and the Louisiana Voluntary Investigation and Remedial Action statute. The purpose of the regulatory requirements set forth under these laws is to ensure the protection of human health and the environment through proper management (identification, use, storage, treatment, transport, and disposal) of these materials. Some of these laws provide for the investigation and cleanup of sites that have already been contaminated by releases of hazardous materials, wastes, or substances.

A review of the US Environmental Protection Agency EnviroMapper revealed no known sources of contamination or hazardous materials located on or immediately adjacent to North Breton Island (EPA 2013b). However, numerous oil and gas facilities exist within Breton Sound. Oil and gas facilities are subject to chemical releases that may have the potential to affect the site.

Environmental Consequences

Project deployment would use mechanical equipment, boats, and barges that use oil, lubricants and fuels. The contractor would be required to take appropriate actions to prevent, minimize, and control the spill of construction related petroleum or hazardous materials such as vehicle fuels, oil, hydraulic fluid, and other vehicle maintenance fluids, and to avoid releases and spills. If a release should occur such releases would be contained and cleaned up promptly in accordance with all applicable regulations. As a result, no impacts associated with construction-related petroleum or hazardous materials would be anticipated.

Although numerous oil and gas pipelines and wellheads are present in the area, the probability of impacts related to petroleum or hazardous materials is low provided that care is taken not to disturb these pipelines. The principal impacts of the proposed project on public health and safety would be related to the potential mobilization of hazardous waste from excavation and handling of sediments containing oil, heavy metals, or other materials, which could result in exposure to the environment and workers. Sediment analysis would be completed prior to project implementation. If hazardous materials are encountered in the project area during construction activities, appropriate measures for the proper assessment, remediation, management, and disposal of the contamination would be required in accordance with applicable federal, state, and local regulations.

Because of the nature and location on the project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of construction and dredging activities to rebuild and re-establish dunes and wetlands. The project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. In the event of a fuel or oil spill from the vessels or equipment, all procedures, regulations and laws pertaining to Oil Spill Prevention and Response would be adhered to and the incident would be reported to appropriate agencies. All occupational and marine

safety regulations and laws would be followed to ensure safety of all workers and monitors. Therefore, public health and safety would be unaffected by the proposed project.

9.6.7 Summary and Next Steps

Draft NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. Based on initial designs, the project would provide long-term benefits by restoring more than 300 acres of beach, dune, and back-barrier marsh habitats at the North Breton Island barrier island location in Louisiana. 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. As described in Section 9.2.7, the North Breton island barrier location is part of the Louisiana Outer Coast Restoration project which is consistent with Alternative 2 (Contribute to Restoring Habitats and Living Coastal and Marine Resources) and Alternative 4 (Preferred Alternative). Final determination on this project (Louisiana Outer Coast Restoration) will be included in the final Phase III ERP/PEIS and Record of Decision.

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Personal Communications

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9.7 Louisiana Marine Fisheries Enhancement, Research, and Science Center: Project Description

9.7.1 Project Summary

The Louisiana Marine Fisheries Enhancement, Research, and Science Center (“the Center”) would establish state of the art facilities to responsibly develop aquaculture-based techniques for marine fishery management. The proposed project would include two sites (Calcasieu Parish and Plaquemines Parish) with the shared goals of fostering collaborative multi-dimensional research on marine sport fish and bait fish species; enhancing stakeholder involvement; and providing fisheries extension, outreach, and education to the public. The estimated cost for this project is \$22,000,000.

9.7.2 Background and Project Description

Development of the Center would support the State of Louisiana’s ongoing efforts to manage recreational fishery resources by establishing the state’s first marine fish hatchery facility, and developing public venues for marine fishery educational activities. Fish produced at the Center would be utilized for a variety of research projects, including the targeted release of small numbers of marked sport fish species to study Louisiana’s recreational fishery. The Center would allow the Louisiana Department of Wildlife and Fisheries (“LDWF”) to incorporate aquaculture technology and outreach venues as tools for marine fisheries management, and involve stakeholders through educational opportunities.

9.7.2.1 Calcasieu Parish Facility

The primary location for the Center would be at a site near the north end of Lake Calcasieu, and south of the city of Lake Charles (Figure 9-15). The proposed facility includes construction of a multi-purpose building and pond complex to be used for marine fisheries research, production, education, and outreach. The building will house multiple components including a visitor center, support space for staff and collaborating researchers, and a hatchery complex.

The public visitation and outreach components of the facility would provide dedicated space for public education on fisheries management activities and restoration programs, and would include a reception area, educational exhibits, display aquaria, marine animal touch tank, visitor restrooms, and a youth fishing pond. The support areas of the building would include administrative and staff offices, meeting rooms, dormitory, crew support areas, two laboratories, feed storage and preparation, maintenance shop, and equipment storage rooms.

The hatchery complex would be focused on the production of spotted seatrout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellatus*), and southern flounder (*Paralichthys lethostigma*). The indoor hatchery components would employ the use of modern recirculating aquaculture systems (“RAS”) technology to provide the required controlled systems needed for year round production capability. The production pond complex would consist of three 0.5-acre multi-purpose rearing ponds. To support these systems, the facility would include a salt water intake, pump station and pipeline, a water reservoir pond and storage tanks, a freshwater well, and effluent treatment ponds.

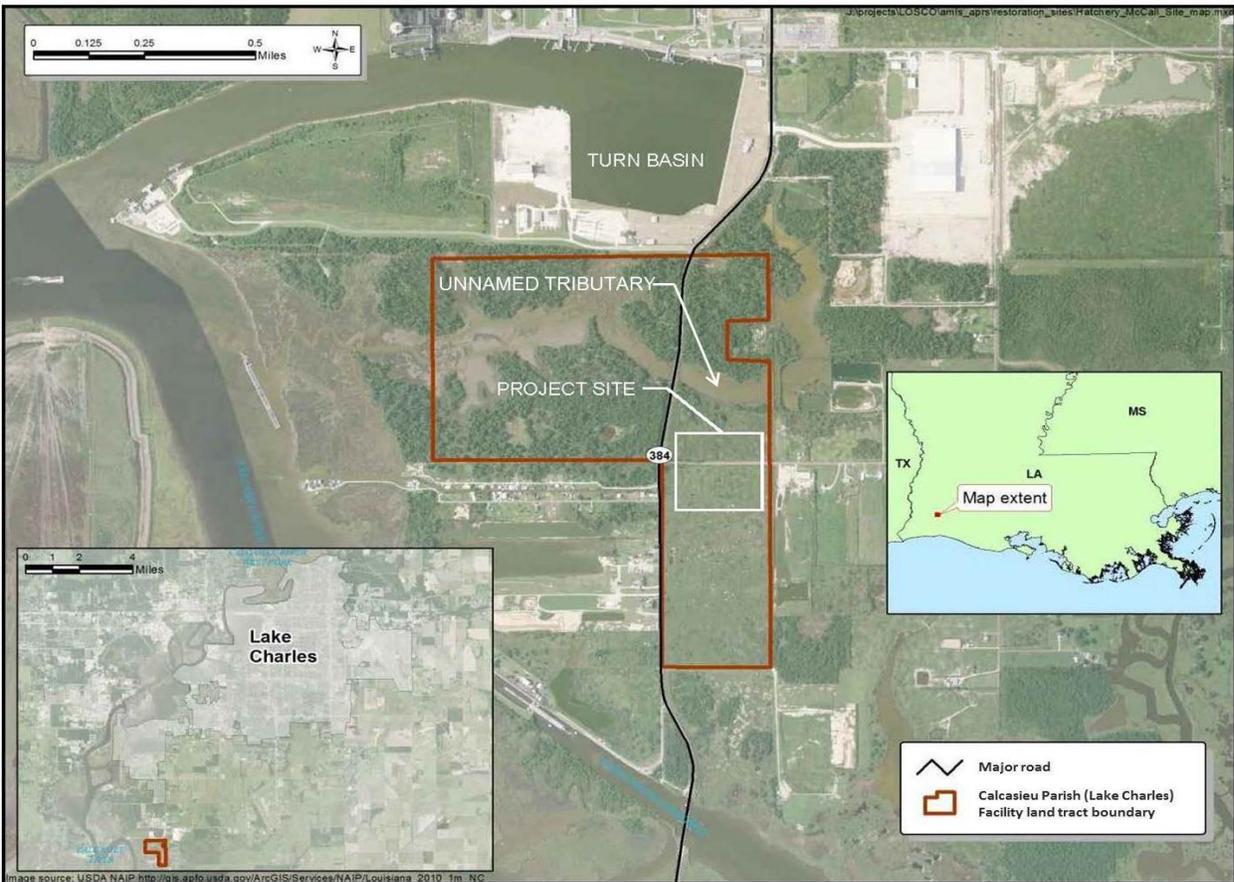


Figure 9-15. Location of the Calcasieu Parish site.

9.7.2.2 Plaquemines Parish Facility

A second facility would be located in Plaquemines Parish, northwest of West Pointe à la Hache (Figure 9-16). This facility would serve as a research and demonstration facility for marine baitfish in support of recreational sport fishing. The species of fish proposed are the Gulf killifish (*Fundulus grandis*) and the Atlantic croaker (*Micropogonias undulatus*). At this site, the project would involve constructing a multi-purpose building and renovating/reconditioning existing onsite facilities. As currently proposed, the constructed building would house a staff office, crew support and baitfish culture area with small-scale RAS to support research and demonstration of technology for marine baitfish husbandry. Existing onsite facilities that were previously used for plant propagation would be renovated or reconditioned, including a Mississippi River water intake structure and pumping station, infrastructure components (e.g., water pipelines, access roads), and ponds for research, effluent treatment, and water storage. The facility would help develop and improve techniques for marine baitfish holding and production systems, which would be demonstrated and disseminated to improve access to live bait for recreational fishing in Louisiana.

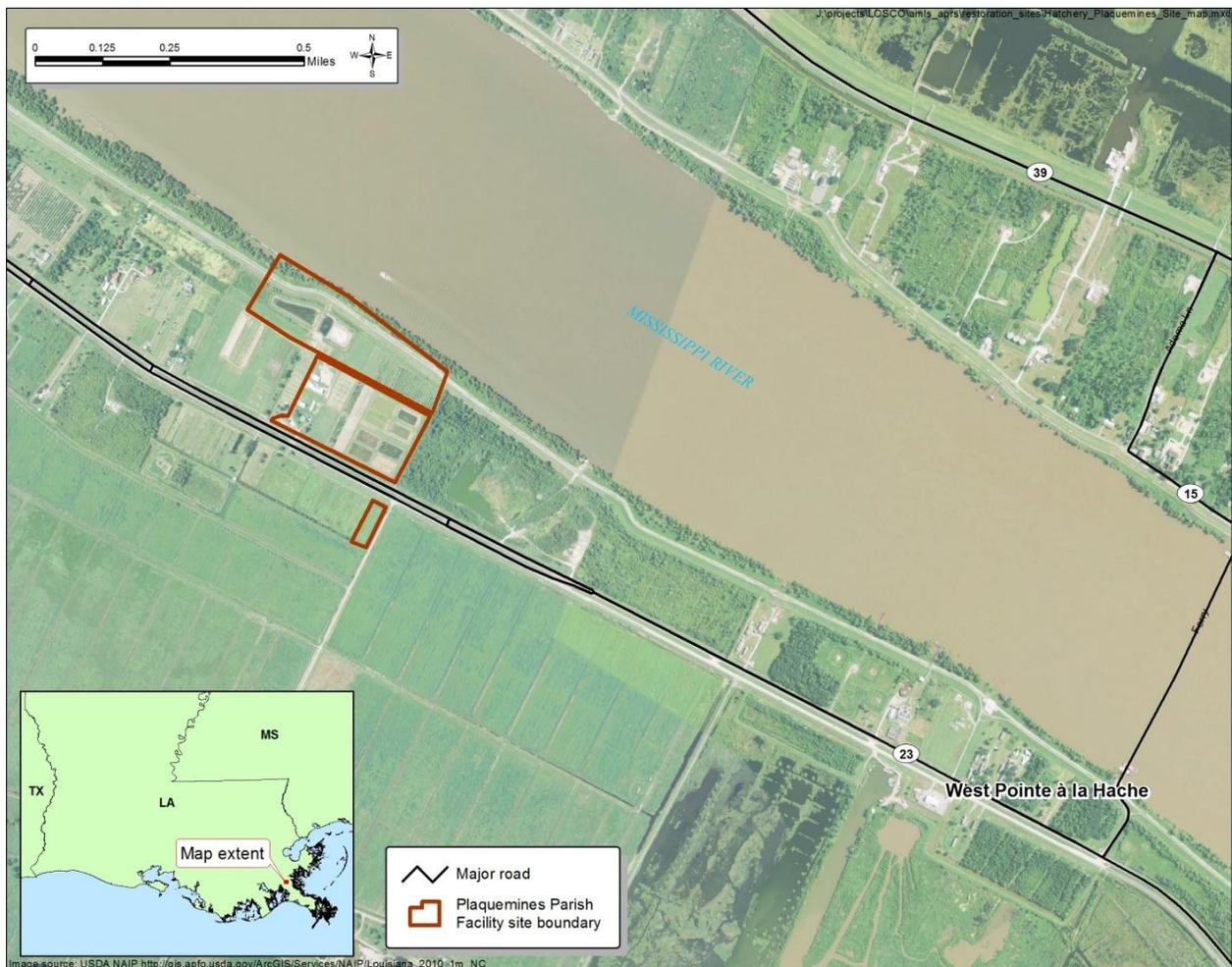


Figure 9-16. Location of the Plaquemines Parish satellite facility.

Hatchery Operations

The operating plans at both locations would be guided by species-specific best management practices (“BMPs”) addressing fish husbandry and spawning, live food production and larval rearing, as well as production systems for growing fish to desired sizes. Fish grown at the hatchery facilities would be used for a variety of research projects.

Wild caught brood fish would be collected, acclimated, and conditioned to spawn using temperature and photoperiod manipulation of holding systems. Fertilized eggs would be collected, enumerated, and incubated in dedicated tanks. The resulting larvae would either be fed live foods (e.g., rotifers, artemia) in larval-rearing systems, or stocked in outdoor systems which provide a natural source of zooplankton for forage. Juvenile fish would be reared in a combination of tank and/or pond systems utilizing natural and artificial diets (e.g., zooplankton, forage fish, commercially available feeds, and research diets).

Sport fish produced at the Center would be used for the long-term monitoring of Louisiana’s fishery resources and the habitats that support them. The production and release of marked hatchery fish will be carried out in conjunction with LDWF’s statewide fishery monitoring program. Initial releases of

marked, hatchery-produced sport fish will be targeted experimental stockings to investigate ecological hypotheses and evaluate release strategies (spatial and temporal variation, fish size, marking techniques).

9.7.3 Evaluation Criteria

The Trustees evaluated the project based on the evaluation criteria described in Chapter 2 and the additional RRP Program-specific criteria described in the introduction to this chapter. 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. The nexus to resources injured by the Spill is clear. See C.F.R. § 990.54(a)(2); and 6(a)-(c) of the Framework Agreement. Recreational fishing in Louisiana was adversely impacted by the Spill, as widespread closures of areas for recreational fishing were necessary because of oil and clean-up/response activities. The objective of this restoration project is to help compensate for the loss of recreational fishing services resulting from the Spill by constructing and operating the facilities described above to support and improve the State of Louisiana's management of marine fishery resources (via the production of sport and bait fish and associated research) as well as public education and outreach.

The designs for the Center are technically feasible and based on proven techniques and established methods used in other fish hatchery and research center projects. See 15 C.F.R. § 990.54 (a)(3); and 6(e) of the Framework Agreement. The project could be developed at a reasonable cost and implemented with minimal delay, as the State of Louisiana has already engaged in significant work associated with planning and permitting for the Center that demonstrates the project's feasibility and high likelihood of success. See 15 C.F.R. § 990.54 (a)(1), (a)(3); RRP Program FPEIS (NOAA et al. 2007b, p. 104); and 6(e) of the Framework Agreement. The project supports existing restoration strategies and is consistent with anticipated long-term restoration needs because it will improve scientific understanding of the fishery resource in Louisiana. See RRP Program FPEIS (NOAA et al. 2007b, p.104); and 6(d) of the Framework Agreement.

9.7.4 Performance Criteria, Monitoring, and Maintenance

Construction monitoring will be done before, during, and in a subsequent period following construction to ensure that project designs are correctly implemented. Successful implementation of this restoration project will be measured by (1) the completion of construction of the facilities and (2) the operations of the facilities as anticipated. LDWF will monitor the operations of the Center in multiple ways, including documenting compliance with all permitting requirements, monitoring the operational status of the hatchery components, and monitoring the number of fish produced and released annually. The Center is also designed as an education and outreach facility, so the number and types of visitors (e.g., tourists, school groups) to the facilities will be recorded.

The facilities at both Center locations are designed as research facilities, so there will be ongoing scientific efforts to optimize hatchery performance, including monitoring the effects of different protocols on outcomes. The production and release of marked hatchery fish are intended to be carried out in conjunction with LDWF's statewide fishery monitoring program and will help develop and

evaluate strategies for the management of marine fish species by providing information on the recruitment, survival, health, and movements of these populations.

Maintenance and staffing of the facilities will be the responsibility of LDWF and will be done as specified in the design plans for the Center.

9.7.5 Offsets

NRD Offsets are \$33,000,000 expressed in present value 2013 dollars, based on a benefit-to-cost ratio of 1.5, to be applied against the monetized value of lost recreational use provided by natural resources injured in Louisiana, which will be determined by the Trustees' assessment of lost recreational use for the Spill. See Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.⁴

9.7.6 Cost

The total estimated cost to implement this project is \$22,000,000. This cost reflects 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.

⁴ 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.

9.8 Louisiana Marine Fisheries Enhancement, Research, and Science Center: Environmental Review

9.8.1 Introduction and Background

In response to the Spill, a Gulf Coast region-wide Early Restoration effort is underway to address the impacts of the Spill on natural resources and on associated lost human uses of those resources. The Center is a component of that effort, and is intended to address a portion of the recreational uses lost as a result of the Spill. The Center would include development of two sites in Louisiana – one in Calcasieu Parish and one in Plaquemines Parish – that would support the State of Louisiana’s ongoing management of its saltwater sport fishery. The proposed facilities would support research, hatchery production of sport fish and baitfish, and public education and outreach. The proposed project would provide state-of-the art facilities for collaboration with stakeholders and for rearing fish for research projects. Fish produced at the proposed Calcasieu Parish facility would be marked and released in conjunction with the existing Louisiana Department of Wildlife and Fisheries (LDWF) marine fisheries monitoring program. This work would provide information on recruitment, survival, health, and movements of marine fish populations, which would be used to help develop and evaluate strategies for the management of Louisiana’s saltwater sport fishery. Additionally, staff and researchers at the proposed Plaquemines Parish facility would conduct and disseminate the results of research on marine baitfish production and holding techniques. The Center would also serve as a venue for public outreach and educational activities concerning marine habitats and ecosystems, as well as related fisheries management and conservation issues.

9.8.1.1 Calcasieu Parish Facility

The proposed Calcasieu Parish facility would function as the main location for the Center. The primary function of the facility would be for research on, production of, and education about marine sport fish species including red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), and southern flounder (*Paralichthys lethostigma*). Fish produced at the facility’s hatchery would be used for long-term monitoring of the fishery resources and the habitats that support them. The facility would also house a visitor complex to provide education and outreach on Louisiana’s fisheries and marine ecosystems.

9.8.1.2 Plaquemines Parish Facility

The proposed Plaquemines Parish facility would serve as a secondary location for the Center. The primary function of the facility would be for marine baitfish research. The proposed species for this research would be the Gulf killifish (*Fundulus grandis*) and the Atlantic croaker (*Micropogonias undulatus*). This facility would operate as a demonstration site for research and education activities regarding effective marine baitfish holding and culture systems.

9.8.2 Project Location

9.8.2.1 Calcasieu Parish Facility

The proposed Calcasieu Parish facility site is located on a 320.5-acre privately-owned tract of land north northeast of Lake Calcasieu and south of Lake Charles, near the Calcasieu River. The proposed facility site would occupy a small portion of the full tract (Figure 9-17). LDWF would negotiate an appropriate

long-term land use arrangement with the landowner as part of the final project design and permitting process.

The tract is located in Sections 16 and 21, T11S, R9W (Figure 9-17). The tract is transected from north to south by Big Lake Road and from west to east by Joe Ledoux Road. An unnamed tributary to the Calcasieu River crosses the northern end of the tract from west to east. The latitude/longitude of the tract is 30.097313° N, 93.288029°W (NAD83).

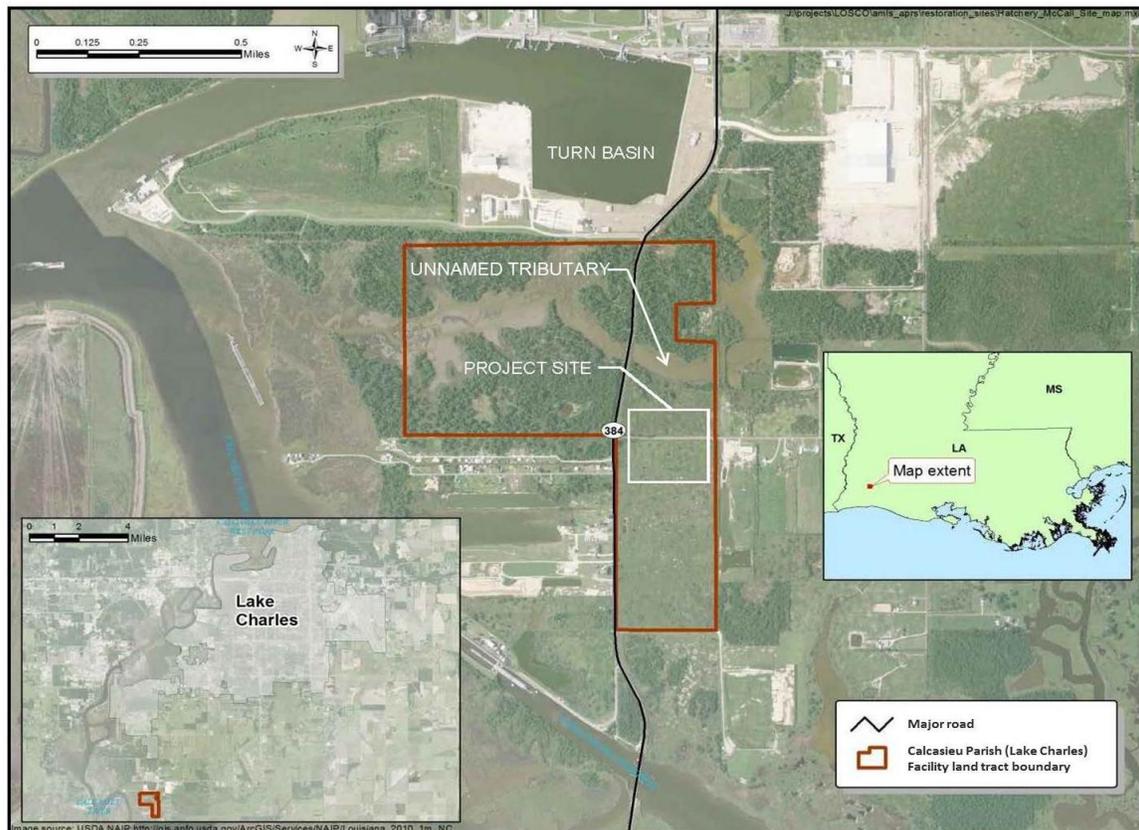


Figure 9-17. Vicinity map for the proposed Calcasieu Parish facility. The area labeled as “project site” encompasses where the buildings and ponds are expected to be situated.

The tract of land proposed for the Calcasieu Parish facility lies just outside the boundary of the Louisiana Coastal Zone, although it is mapped within the 100-year floodplain. The property is currently undeveloped and privately owned. Its natural land features include emergent wetlands, mima mounds, bayous, and forested wetlands, and the land is hydrologically connected to surrounding streams, bayous, rivers, and lakes. The wetlands within the boundary of the tract have likely been degraded by activities such as channelization, drainage, levees, logging, pumping and past cattle grazing. Surrounding land uses are primarily residential and industrial. There are no schools, churches, cemeteries, hospitals, or other public buildings located on or immediately adjacent to the tract of land proposed for the facility. According to historical records, Benoit Cemetery was originally located in the northern section of the tract, but this cemetery was relocated off the site in 1963. The Lake Charles Regional Airport is approximately 3.8 miles east of the proposed facility site.

9.8.2.2 Plaquemines Parish Facility

The proposed Plaquemines Parish facility site is located near the community of West Pointe à la Hache, on property previously leased by the Louisiana State University Agricultural Center (LSU AgCenter) from Plaquemines Parish. The former LSU AgCenter Coastal Area Research Station used the site for research on citrus and coastal plant propagation (Figure 9-18), and when it closed in 2011 the site ownership reverted back to Plaquemines Parish. LDWF would negotiate an appropriate long-term land use arrangement with the Parish as part of the final project design and permitting process. The property is bordered to the east by the Mississippi River, to the north by private property, to the west by Belle Chasse Highway (LA 23), and to the south by private property. Plaquemines Parish currently owns the property. The latitude/longitude is 29.579955°N, -89.820681°W (NAD83).

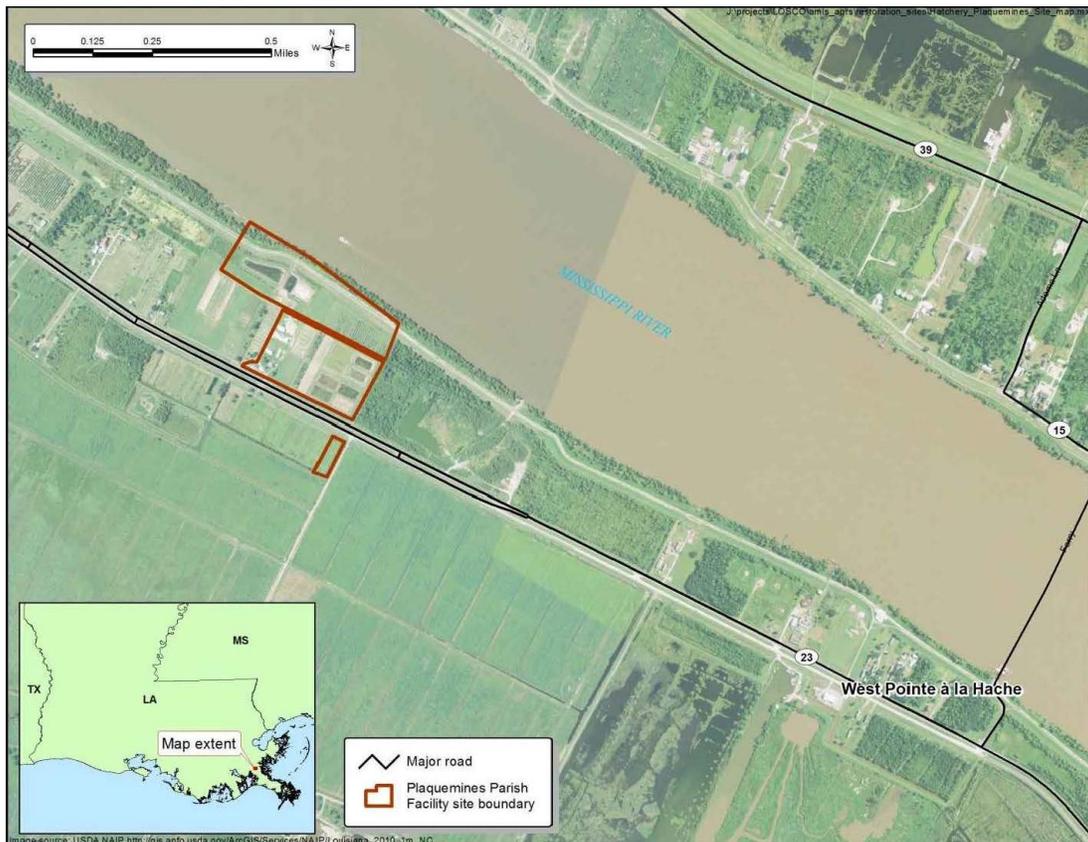


Figure 9-18. Vicinity map for the Plaquemines Parish facility.

Project activities are proposed to occur in a “fastland” area⁵ that is protected by levees. This location lies within the Louisiana Coastal Zone and is mapped within the 100-year floodplain. The site has been impacted by development, land modification, and recent hurricanes and has been primarily used for industrial, agricultural, and residential purposes. Currently, the site is used by Plaquemines Parish as a

⁵ According to the Louisiana Office of Coastal Management, “fastlands” are lands surrounded by publicly-owned, maintained, or otherwise validly existing levees or natural formations as of Jan. 1, 1979, or as may be lawfully constructed in the future, which prevent activities, not to include the pumping of water for drainage purposes, within the surrounded area from having direct and significant impacts on coastal waters.”

(<http://dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=420>, Accessed Aug. 28, 2013).

receiving location for processing piles of earthen material that will be distributed and graded across the site after it is dried. The existing ponds will not be affected by this work.

9.8.3 Construction and Installation

9.8.3.1 Calcasieu Parish Facility

The proposed Calcasieu Parish facility would require construction of a multi-purpose building and pond complex to be used for marine fisheries research and production as well as public education and outreach (Figure 9-19). The facility would also require construction of a water supply system, including: 1) an intake and pump station that would pump water from the Turn Basin, an offshoot of the Calcasieu shipping canal (see Figure 9-17 for location of Turn Basin); 2) buried pipelines for water intake and effluent; and 3) an outfall structure for release of treated effluent, currently proposed for the unnamed tributary (see Figure 9-19 for location of unnamed tributary).



Figure 9-19. Proposed site plan for the Calcasieu Parish facility.

The elevated building is envisaged to be approximately 175ft x 134ft (23,450 ft²) containing an internal drive thru corridor and would include covered porches and six exterior stair systems for ingress and egress. It would be designed as a concrete, pier-supported structure located above base flood elevation and engineered to meet hurricane wind design standards. The building would be equipped with emergency systems to help protect staff and continue operations during severe weather events.

As currently proposed, the multi-purpose building would contain a hatchery, visitor center, dormitory, administrative and staff offices, meeting rooms, crew support areas, two laboratories, covered access

corridor, maintenance shop, and equipment storage rooms (Figure 9-20). The hatchery would employ the use of modern RAS technology needed to provide the required indoor, controlled-environment fish production systems for year-round production capability. The hatchery portion of the building would be located immediately adjacent to the administrative and staff offices and crew support areas. Access to the hatchery production area would be accommodated by a 12-foot wide internal drive aisle with entry and exit ramps used to facilitate vehicle transport of fish and equipment to the elevated building. The visitor center is proposed as a 2,100 ft² dedicated space for public education on marine fisheries and restoration programs. This area would likely include a reception area, educational exhibits, display aquaria, marine animal touch-tank, and visitor restrooms.

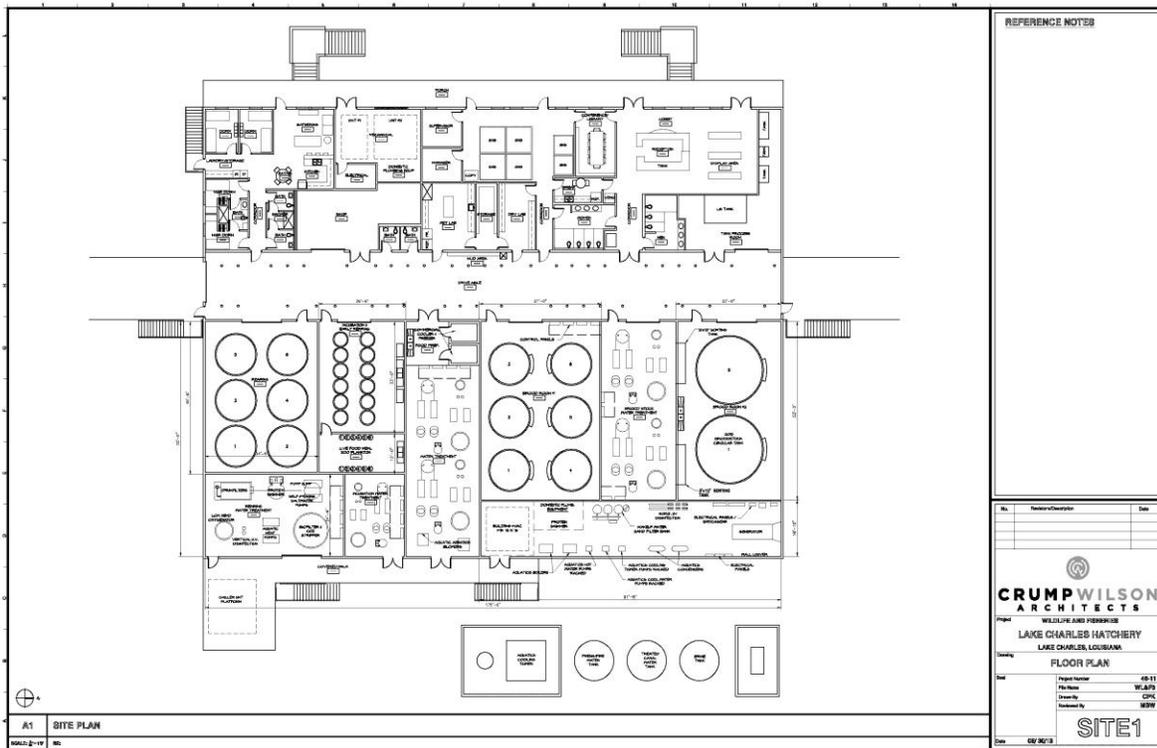


Figure 9-20. Proposed floor plan for Calcasieu Parish multi-purpose building.

The proposed facility would also include a pond complex consisting of a lined saltwater storage reservoir, three lined multi-purpose rearing ponds, and two lined effluent treatment ponds, as well as a youth fishing pond to the west of the multi-purpose building (see Figure 9-19). Each pond would be 0.5 surface acres in size, except the visitor fishing pond, which would be approximately one acre. The ponds would be constructed using compacted earthen dikes and synthetic pond liners to control seepage and improve pond fish rearing operations. Construction fill material would be obtained from existing borrow areas at or adjacent to the facility. Ponds would be equipped with concrete outlet structures and fish harvest basins (kettles), and would employ plastic piping for supply and drainage.

Grading and Ground Disturbance

The proposed facility, including the buildings, pond complex, and youth fishing pond, would be built on approximately 12 acres east of Big Lake Road. The excavation or placement of structures within or on soils would require a geotechnical evaluation to determine design and construction methodology. At a minimum, this evaluation would apply to ponds, buildings, pipelines, intake structures, and access roads. Further details are provided below.

Buildings

Multi-Purpose Building: Construction of the multi-purpose building (and associated parking areas) would impact approximately 4 acres and include clearing and grading of undeveloped land.

Storage Building: A pre-engineered storage building (3,200 ft²) would be located near the production ponds. Construction of the building would require clearing and grading of undeveloped land.

Emergency Backups: In the event of a storm, the facility would have a backup generator(s) with the capacity to run the administrative area and hatchery until normal utilities could be restored. The emergency generator(s) would be sized to handle the entire energy load for the site and are anticipated to be powered from natural gas, accessing a nearby natural gas main line. Automatic transfer switches would be installed at the hatchery building to automatically transfer the load to the generator in the event of power outage. Liquid oxygen systems would also be used to oxygenate fish systems in the event of power outages.

Ponds

Fish Production Ponds: Construction disturbances for the rearing ponds would include clearing and grading of undeveloped land for pond complex construction. There would be a total of three fish production ponds, each approximately 0.5-acre in size. The pond depths would slope from 3 to 6 feet deep. The ponds would be constructed using compacted earthen dikes and an impermeable membrane such as an EPDM rubber pond liner for seepage control and improved pond fish rearing performance. Excavation of 2-4 feet of soil would be anticipated pending results of the geotechnical evaluation. The ponds would require an under-drain system to discharge groundwater and gases away from the bottom of the ponds. Fill material for construction would be obtained from existing borrow areas, either on site or immediately adjacent to the site. Water supply would be provided for each pond, which would require excavation, trenching and backfilling to install pipelines. The pond water supply system would include a fully-looped piping system to provide deep end and shallow end water delivery. Isolation valves and system drains would also be provided within the water supply piping system for ease of maintenance. Each pond would be equipped with a concrete interior "U-shaped" fish harvest kettle, concrete outlet structure, and a concrete kettle access stairway. The pond drainage would also require pipeline excavation, trenching and backfilling.

Youth Fishing Pond: The youth fishing pond would require excavation of approximately one acre and the installation of compacted levees. The stock species, water supply, and design concepts for this pond would be developed following preliminary design.

Water Supply System

Intake and Pump Station: As proposed, the building and ponds at the Calcasieu Parish facility would receive water from the Turn Basin, approximately 0.5 mile north of the site (Figure 9-17). The Turn Basin is an offshoot of the Calcasieu shipping canal located outside of the coastal zone. Water would flow by gravity from the Turn Basin through an intake screen into a concrete sump adjacent to the Turn Basin. Pumps within the sump would provide canal water to the building and ponds. The pump station would include a multiple submersible or line shaft turbine pump system using variable frequency drive controlled motors. The proposed pump station capacity would be designed to accommodate pond filling and pond operation and to service the requirements of the building. Total water flow requirements would be anticipated to vary throughout the year based on seasonal production. The estimated flow rate would range between 500 and 1,000 gpm. All buried pipe would be installed using an open trench method.

Well: Two new wells would be drilled to accommodate fish production and facility needs. A 300 gpm well would be drilled (depth unknown at this time) to serve as a production well. The well water would be used to adjust salinity of culture water, to treat marine fish parasites, and for general facility operations. In addition, a domestic well would be drilled to meet potable water needs for the facility (depth and flow-rate unknown at this time). Regional groundwater yields reflecting State and Parish well records would be used to develop these wells. Actual depths would be determined based upon well driller data and associated testing.

Pipeline: The water supply pipeline would be a buried, 10-inch pipeline that would extend between the pump station and the building, the saltwater supply pond, and the production ponds. The ponds and building would also receive water from the new production process well located on the facility grounds. All buried pipe would be installed using an open trench method.

Saltwater Reservoir Pond: This 0.5-acre pond would be used for water storage, solar warming, and rapid pond filling. The reservoir would be lined with an impervious membrane for erosion control, seepage containment, and water quality maintenance. The pond would also function as a backup water supply when pumping station is non-operational (pump service, power outage).

Water Storage Tanks: Three insulated fiberglass tanks would be located adjacent to the visitor/hatchery building to store water for use in the RAS and water supply systems. The three 15,000 gallon tanks would hold: 1) fresh water (available also for fire safety), 2) treated Turn Basin water, and 3) manufactured brine water for salinity adjustments.

Effluent System

Effluent Ponds: Two ponds would be constructed for treatment of effluent from the building and rearing ponds. These ponds would be approximately 0.5 acres and would be constructed using the same methods used for the production ponds. These ponds would incorporate drainage structures that are used to dry the ponds for sediment removal. The two ponds would alternate in usage to facilitate sediment removal. To remove excess nutrients from discharge water, the final design process will

determine the appropriateness of using multi-trophic integrated aquaculture in conjunction with the effluent ponds, or potentially with adjacent constructed wetlands.

Discharge Pipeline: Discharge from the effluent ponds would flow via buried 24-inch pipe to an unnamed tributary of the Intracoastal Waterway approximately 1,000-feet to the north. All buried pipe would be installed using an open trench method.

General Sitework

Site Drainage: Existing site drainage would be evaluated to determine capacity during storm events. Additional drainage and grading would be required where construction activities occur. Culverts and ditches would be upsized, as needed. Site-specific drainage calculations would be evaluated during the design process.

Roads and Parking: Road construction would involve an additional 130 feet of paved two-lane road and 130 feet of additional paved single-lane road. Pedestrian sidewalks around the building and parking lot would be constructed, as appropriate. The pond complex would include construction of an additional 150 feet of paved two-lane road and about 3,300 feet of 12-foot wide aggregate road around the pond perimeters.

Mobilization, Staging and Stockpiling

Temporary staging areas for materials, supplies, equipment, and a contractor office trailer would be located within the proposed site boundary. Base aggregate, asphalt, concrete, pipe, building components, earthen pond fill material, liners, and all building equipment would be delivered to the site. Construction access to the facility would be from Joe Ledoux Road. Construction crews would include a general contractor and subcontractors for earthwork, building construction (plumbing, HVAC, electrical), pond lining, and other specialty trades. Estimated crew sizes would range between 10 and more than 50 persons depending on the type of work and the stage of project construction.

9.8.3.2 Plaquemines Parish Facility

The Plaquemines Parish facility site was severely impacted by Hurricane Isaac in 2012 and the majority of the existing pumps, water lines, buildings, greenhouses and storage facilities were damaged. At this facility, construction would include rehabilitation of existing ponds, pumping stations, water lines, and access roads, and the addition of a new elevated building (Figure 9-21).

The proposed multi-purpose building would be a concrete, pier-supported structure located above the base flood elevation, and designed to meet hurricane wind design standards (Figure 9-22). The building dimensions, as currently proposed, would be approximately 60ft x 40ft (2,400 ft²) and of similar construction to the proposed Calcasieu Parish facility building described above. The building would be elevated approximately 12 feet above ground level with an access ramp for vehicles, and would contain a staff office, crew support area, and a baitfish culture area. The administrative portion of the new structure would consist of offices, a conference room and crew support areas. Production areas would include space for tank systems, water processing, and storage and preparation.



REFERENCE NOTES

- 01) NEW HATCHERY BUILDING
- 02) RENOVATE EXISTING POND
- 03) EXISTING PUMP
- 04) NEW RAMP TO HATCHERY BUILDING
- 05) EXISTING METAL BUILDING & AWNING
- 06) EXISTING CONCRETE SLAB
- 07) EXISTING METAL BUILDING
- 08) EXISTING BRICK OFFICE
- 09) EXISTING HOUSE OFFICE
- 10) RENOVATE EXISTING ENTRANCE & ACCESS ROAD
- 11) RENOVATE EXISTING FW PUMPING SYSTEM
- 12) REPLACE EXISTING EMERGENCY GENERATOR

Figure 9-21. Site plan for the Plaquemines Parish facility.

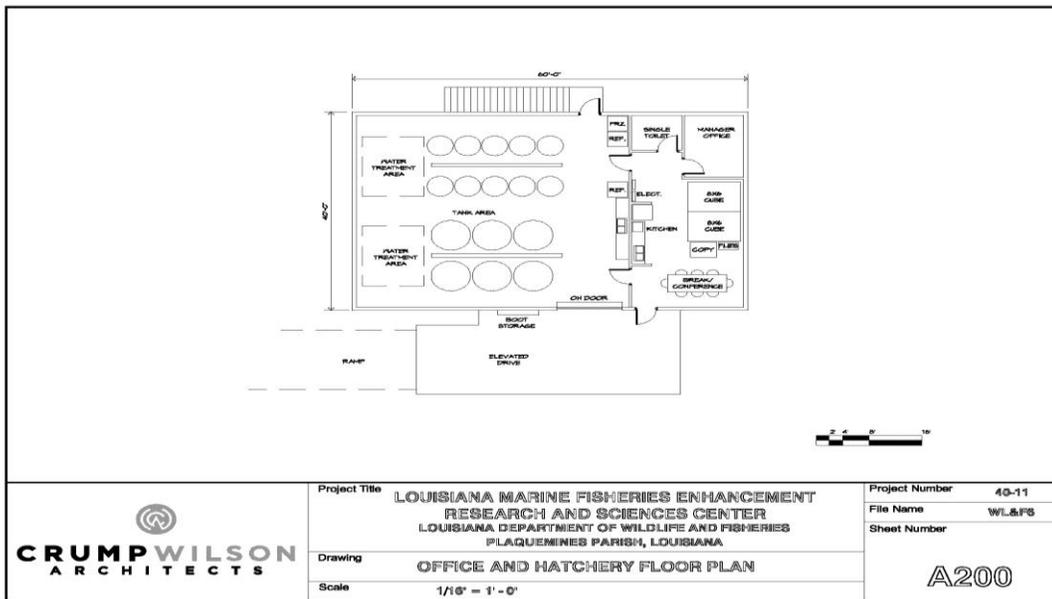


Figure 9-22. Floor plan for the Plaquemines Parish facility.

Grading and Ground Disturbance

All proposed construction would be completed in areas previously affected by construction and operation of the LSU AgCenter. The suitability of the imported earthen material observed on-site as a base for construction would be assessed during the geotechnical investigation; removal or re-grading of this material would be carried out as necessary. Work would include renovation of existing infrastructure, as well as construction of new infrastructure. The following table summarizes the work anticipated at the site (Table 9-3):

Table 9-3. Proposed construction for the Plaquemines Parish facility

EXISTING NO RENOVATION	EXISTING RENOVATION REQUIRED	NEW CONSTRUCTION
House Office	Ponds	Multi-Purpose Building
Metal Building with Awning	Freshwater Pump and Water Lines	Emergency Generator(s)
Concrete Slab	Site Utilities	Parking
Metal Building	Entrance & Access Roads	
Brick Office		

Multi-Purpose Building: The proposed building would be built on previously disturbed land within the tract described in Section 9.8.2.2. Construction of the building and parking lots would impact approximately 2 acres and would include re-grading of previously developed land.

Emergency Generator(s): In the event of a storm, the facility would have backup generator(s) with the capacity to run the administrative area and hatchery until normal utilities could be restored. The emergency generator(s) would be sized to handle the entire energy load for the site and are anticipated to be powered from natural gas, accessing a nearby natural gas main line. Automatic transfer switches would be installed at the hatchery building to automatically transfer the load to the generators in the event of power outage.

Parking: Site construction would include rehabilitation of existing roads to access the ponds. New or renovated parking would be added near the hatchery building and at the facility entrance.

Pond Renovation: Pond construction would include rehabilitation of the previous coastal plant propagation ponds and would include re-grading, compaction and installation of water supply and water control structures. Renovated ponds would be used for water storage, effluent treatment, and research on integrated multi-trophic aquaculture for freshwater and low-salinity production of baitfish and coastal plants.

Pump and Water Line Renovation: Site construction would include restoration of the existing Mississippi River water pumping system and related piping systems to support the proposed baitfish program. The existing pump system draws water from an existing intake structure in the Mississippi River and discharges into holding ponds; water is then pumped from the holding ponds to the rest of the site.

Site Utility Renovation: Construction at the facility would also require rehabilitation of existing utility systems for electrical, communications, and domestic water and wastewater treatment and connections to public utility providers.

Mobilization, Staging and Stockpiling

Temporary staging areas for material, supplies, equipment, and a contractor office trailer would be located within the proposed facility. Base aggregate, concrete, pipe, building components, and all building equipment would be delivered to the site. Construction access to the facility would be from Highway 23 (LA 23). Construction crews would include a general contractor and subcontractors for earthwork, building construction (plumbing, HVAC, electrical), and other specialty trades. Estimated

crew sizes would range from 5 to 20 persons depending on the type of work and the stage of project construction.

9.8.4 Both Facilities

9.8.4.1 Contracting

Construction would be completed based upon construction contract documents (*e.g.*, drawings, specifications, cost estimates, and contracts) reviewed and approved by the Louisiana Department of Administration and LDWF. Construction would be completed by a qualified general contractor and subcontractors using established state construction standards and requirements with comprehensive oversight by the architect/engineering design team and state construction administrators.

9.8.4.2 Construction Schedule

The estimated time for final design, any final permitting, and contractor selection needs is 18 months after procurement of funding. Construction duration (which includes construction and start-up) is then estimated to be 16 to 24 months for the Calcasieu Parish site and 14 to 18 months for the Plaquemines Parish site. Work is anticipated to be conducted between 7 am and 4 pm, Monday through Friday.

9.8.5 Operations and Maintenance

9.8.5.1 Calcasieu Parish Facility

Marine fish production would include broodstock collection and maintenance, live food production, egg incubation and larval rearing, and both pond and indoor rearing systems. Wild captured red drum, spotted seatrout and southern flounder broodfish would be collected from Louisiana waters and quarantined to monitor fish health before use in the indoor controlled spawning systems. Broodstock would be induced to spawn with temperature and photoperiod manipulation using established protocols and technology. Fertilized eggs would be collected for hatching and resultant larval fish would either be fed live foods in larval-rearing systems, or stocked in outdoor systems which provide a natural source of zooplankton for forage. Juvenile fish would be reared in a combination of tank and/or pond systems utilizing natural and artificial diets. Hatchery-produced fish would be tagged and/or marked prior to release to help inform fishery managers about the recruitment, survival, and population health of important recreational fish species and support management decisions.

Water from the source water supply systems would be micro-screened, UV disinfected, and sand filtered before use in the facility. Water salinity in the culture systems would be adjusted using artificial seawater brine systems. The facility would employ RAS technology to reduce source water volume requirements and significantly reduce operating costs associated with large volume heating and chilling of water. The indoor systems would be expected to operate using 95-to 99-% re-circulation with water treatment. This technology would include operation of self-cleaning, biosecure, and environmentally-managed circular tanks that provide controlled indoor rearing systems to spawn and rear the targeted species. These circular tank systems would provide the capability to rear advanced larger size fish (referred to as “Phase 2” or “Phase 3”) to meet precise size and timing requirements needed by LDWF research programs.

Ponds would be stocked and operated to facilitate multiple pond-rearing cycles per year. Fish production would be completed using established BMPs for marine fish production, and fish quality would be monitored and assessed using American Fisheries Society Bluebook Fish Health procedures.

Effluent water from the building and ponds requiring solids reduction would be treated in two lined, 0.5 acre settling ponds and then discharged to an unnamed tributary of the Intracoastal Waterway. Treatment would be designed to meet applicable Louisiana Pollutant Discharge Elimination System (LPDES) discharge standards.

Facility Operations

The Calcasieu Parish facility would be staffed, operated, and maintained by LDWF. Upon completion of construction, LDWF would undertake comprehensive facility commissioning, operational system testing, and staff training. Operation and maintenance manuals would be generated for all fish hatchery systems and building systems, including fish culture/spawning systems; process water treatment systems; source water supply systems; HVAC, electrical, and alarm/instrumentation systems; and emergency procedures. Operation of the facility would be enhanced by the use of computer-based instrumentation that provides computerized control of the industrial systems, on-going data acquisition, and an alarm system that would provide 24-hour/7-day per week monitoring and electronic notification of operational problems. In order to avoid fish loss, the building, emergency power systems (including emergency generators), and related hurricane-tolerant infrastructure would allow for continuous operation of the fish life-support components during adverse weather events.

LDWF would prepare an operating plan for both sites. The plan would outline the target annual production goals (including broodstock requirements) by species (*e.g.*, numbers and sizes), identify the required indoor fish culture and outdoor pond facilities and water quantities needed, and would include an annual operating budget. The LDWF operating plan would incorporate BMPs for marine fish rearing and hatchery operation, including a disease and health management plan, which addresses the protocols for wild broodfish management in addition to standard fish culture practices. A genetic resource management plan would also be developed to avoid deleterious effects to the genetic integrity of wild populations.

Sport fish produced at the Center would be marked and released to assist with the long-term monitoring of Louisiana's fishery resources and the habitats that support them. The production, release, and monitoring of marked hatchery fish would be carried out in conjunction with LDWF's statewide fishery monitoring program. Thus, the Center's performance would be evaluated in part based on its ability to help develop and evaluate strategies for the management of marine fish species by providing information on the recruitment, survival, health, and movements of these populations. Maintenance of the facility equipment and grounds would be performed by LDWF staff and through maintenance contracts with major equipment manufacturers or professional service contractors.

Plaquemines Parish Facility

The Plaquemines Parish facility would pump freshwater from the Mississippi River to holding ponds, from which water would be supplied for building and pond operations. Flow would be variable, up to 1,000 gpm, and dependent upon seasonal production needs.

The facility operation would include the use of indoor, small-scale, bio-secure and environmentally controlled culture systems, using RAS technology. Desired salinity levels in RAS would be achieved using synthetic sea salt mixtures. The RAS would be used to support research and demonstration of techniques to produce Gulf killifish and Atlantic croaker, which are important marine baitfish for recreational sport fishing. The rehabilitation of existing ponds would be used for a combination of effluent treatment and research projects on integrated multi-trophic aquaculture for freshwater and low-salinity production of baitfish and coastal plants.

Facility Operations

The Plaquemines Parish facility would be staffed, operated, and maintained by LDWF. Upon completion of construction, LDWF would conduct comprehensive facility commissioning, operational system testing, and staff training. These operations would cover all water supply source and drainage systems; indoor tank and recirculation systems; and HVAC, electrical and alarm/instrumentation systems.

Commissioning and staff training would also include how to operate the rehabilitated research ponds and other facility pond infrastructure including the existing Mississippi River water pumping system. Maintenance of the facility equipment and grounds would be completed by the LDWF staff or by service contractors. In order to avoid fish loss, the elevated building, emergency power systems (including emergency generator), and related hurricane-tolerant infrastructure would allow for continuous operation of the baitfish life-support components during adverse weather events.

The baitfish research and demonstration program for Gulf killifish and Atlantic croaker would follow an annual research plan and operating budget developed by LDWF to specifically address the seasonal variability of live marine baitfish. Currently all marine baitfish in Louisiana are wild caught, thus cultured baitfish could potentially supplement the wild supply to provide year round availability for recreational fishermen. The demonstration component of the facility would be to teach BMPs for handling and holding live marine baitfish, to improve the quality of the product whether wild caught or cultured. The research component of the facility would tackle the fundamental scientific information needs for successful live marine baitfish holding and production, including husbandry and maturation, controlled spawning, larviculture, nutrition, grow-out, fish health, economics, and marketing. The baitfish research and demonstration programs would target gaps in the science of marine baitfish production to further the propagation of important and valuable marine baitfish species. The operation of the facility would include demonstration of baitfish aquaculture technology to the Louisiana marine baitfish industry, recreational sport fishermen, and academia as a part of information dissemination through education, extension, and outreach.

9.8.6 Affected Environment and Environmental Consequences

9.8.6.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project location, the No Action alternative assumes that the Trustees would not pursue the Louisiana Marine Fisheries Enhancement, Research, and Science Center as part of Phase III Early Restoration.

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

9.8.6.2 Physical Environment

Geology and Substrates

Calcasieu Parish Facility

Affected Resources

Soils at the Calcasieu Parish facility include (AN) - Aquents, frequently flooded, (CO) - Clovelly muck, (Cr)- Crowley-Vidrine silt loams, and (GB) Ged clay. A geotechnical investigation, which would occur during the design phase, would determine the characteristics and stability of subsurface soil conditions within the footprint of the proposed facilities and ponds. This investigation could influence the design and placement of project features and reveal construction limitations.

The Calcasieu Parish site is characteristic of coastal prairie habitat and includes mima mounds, wetlands, and forested areas adjacent to an unnamed tributary. Mima mounds are natural formations that occur in some coastal prairies within the Gulf Coast Region. These land features are low, flattened, circular to oval in shape, dome-like mounds composed of loose, sandy loam or loamy sand soils. Mima mounds range in diameter from 18-feet to more than 135-feet and between 1-foot to more than 4-feet in height. The low areas between mima mounds often contain shallow, emergent, freshwater wetlands due to the restricted run off over higher clay content surface soils.

Environmental Consequences

Construction of the approximately 12-acre facility would result in long-term adverse impacts to the affected soils and soil substrate in areas where the footprint of the facility (*e.g.*, the building, roads, and ponds) would alter the soil substrate through fill, compaction and earth moving activities. Construction could also result in short-term soil erosion. To minimize impact, disturbed soils would be re-vegetated and/or landscaped thereby resulting in no long-term adverse effects from erosion. The proposed project would result in short-term minor adverse impacts to soil resources surrounding the facility.

Specific measures would be implemented during construction to minimize impacts to soils including best management practices (BMPs) such as the implementation of an erosion control and storm water management plan, installation of sediment traps prior to commencement of construction activities, post-construction revegetation, and on-going construction monitoring to ensure compliance.

Plaquemines Parish Facility

Affected Resources

Soils at the Plaquemines Parish facility include (CV)-Carville, Cancienne, and Schriever, frequently flooded, (Cm)-Cancienne silt loam, (Co)-Cancienne silty clay loam, (Ha)-Harahan clay, and (Sk)-Schriever clay. As described previously, earthen material is being processed and spread at the site.

This project facility is proximal to the Mississippi River and the Mississippi River and Tributaries levee. The U.S. Army Corps of Engineers, New Orleans District regulates activities within 1,500 ft of the levee. A geotechnical investigation, which would occur during the final design phase, would evaluate project features and determine if there are any unusual subsurface conditions.

Environmental Consequences

New construction of a building (approximately 2400 ft²), access roads, and parking at the Plaquemines Parish facility would result in short-term adverse impacts to soils (< 10 acres). The impact footprint would be small because the majority of the facility was previously developed. Subsequent to construction, affected soils at the periphery of the facility would be revegetated and/or landscaped; thereby reducing erosion effects. The proposed project would result in short-term minor adverse impacts to soil resources surrounding the facility.

Specific measures would be implemented during construction to minimize impacts to soils including best management practices (BMPs) such as the implementation of an erosion control and storm water management plan, installation of sediment traps prior to commencement of construction activities, post-construction revegetation, and on-going construction monitoring to ensure compliance. The proposed excavation of existing ponds and pump modifications would also be subjected to an Engineering Review for minor Section 408 requirements at the USACE District level, including evaluation of the geotechnical analysis.

9.8.6.3 Hydrology and Water Quality

Calcasieu Parish Facility

Affected Resources

Hydrology

The proposed Calcasieu Parish facility located on Map Number 22019C0635F (effective February 18, 2011) is within FEMA Zones A/AE, the 100-year flood zone. The land that contains the facility is characteristic of coastal prairie habitats within the Gulf Coast region.

A 2013 field delineation of the study area (87.67 acres within a 320.5 acre land tract) identified a total of approximately 6.96 acres of wetlands. The non-tidal areas north of Joe Ledoux Road had a lower percentage of depressional wetlands than the southern side due in part to drainage towards the lower tidal areas. Two ponds, totaling 0.24 acres, were identified on the north and south sides of Joe Ledoux Road (Figure 9-23),

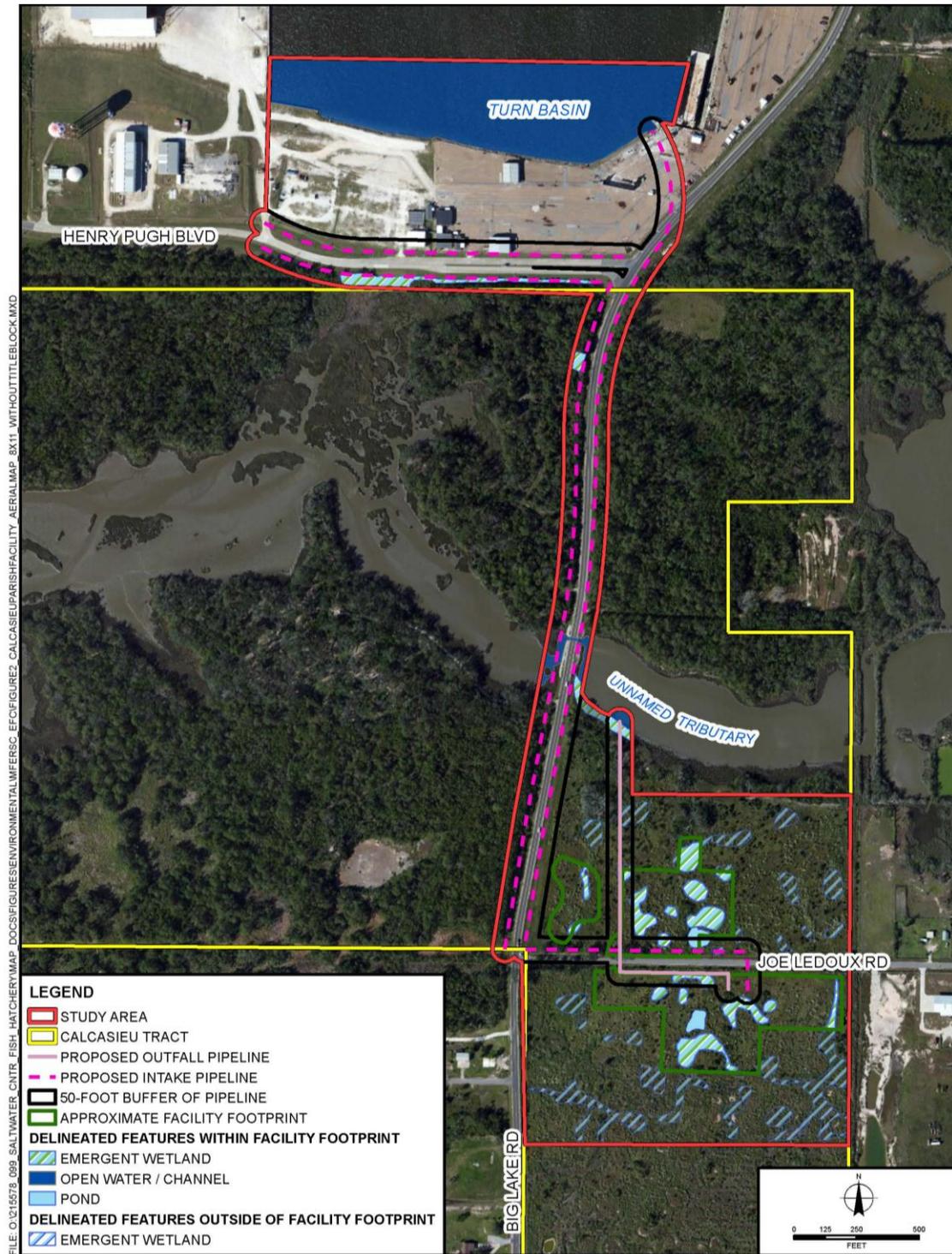


Figure 9-23. Calcasieu Parish facility preliminary wetland delineation based on 2013 field survey.

Two open waters (channels) totaling 12.1 acres were also identified during field investigations. The first open water/channel is an unnamed tributary of the Calcasieu River, located within the study area, which is a tidally influenced waterway and a receiving body of storm water runoff. Although the channel appears to be a natural land feature, it has been altered from its natural geomorphological character

due to the Big Lake Road crossing and the construction of the Turn Basin, in addition to other land use disturbances upstream of the study area. Water flow within the channel was apparent, but slow. Little shoreline erosion was observed during field investigations. A desktop review of aerial imagery concluded that mud flats appear along the edges of the channel when the water level is low and during dry seasons (Figure 9-23).

The second open water/channel that lies within the study area was identified as the Turn Basin which connects to the Calcasieu River. It is located north of Henry Pugh Road and within the LNG Shipping Yard. Field investigations revealed that the shoreline of the channel is lined with concrete matting and riprap and consists of few areas of natural vegetation. Little shoreline erosion of the Turn Basin shoreline within the study area was observed (Figure 9-23).

The field delineation also identified several excavated drainage ditches in the study area. The ditches occur along Henry Pugh Boulevard, Big Lake Road, and Joe Ledoux Road. These ditches appear to have been excavated in uplands for the purposes of stormwater flow away from transportation infrastructure. These drainage ditches appear to convey water directly to the unnamed tributary. The ditch running parallel to the south side of Henry Pugh Boulevard appears to hold some water based on the field investigation (Figure 9-23).

Water Quality

Segments within 5 miles of the proposed project were assessed for the Final 2012 Louisiana Water Quality Inventory: Integrated Report (305(b)/303(d)) (Segments LA 030301_00, LA 030303_00, LA 030304_00, LA 030305_00, LA 030401_00, LA 030402_00, LA 030403_00, LA 030901_00, LA 031001_00, LA 031002_00, LA_031101_00). According to the 2012 303(d) list of impaired waters, as reported by the Louisiana Department of Environmental Quality, one of these Segments found within 5 miles of Calcasieu Parish facility was listed as impaired: the Gulf Intracoastal Waterway.

The Gulf Intracoastal Waterway, from Calcasieu Lock to East Calcasieu River (Segment LA 031101_00), is listed as impaired due to the presence of higher than allowable levels of chloride, sulfates, total dissolved solids, and water temperature. The suspected sources for the chloride, sulfates, and total dissolved solids included changes in tidal circulation and flushing and impacts from hydrostructure flow regulation and modification. The suspected source for water temperature included natural sources and drought-related impacts. This impaired water was located approximately 0.3 mile southwest and downgrade of the Calcasieu Parish facility (Table 9-4). Prien Lake (Segment LA 030303_00) and the Calcasieu River, from below Moss Lake to the Gulf of Mexico (Segment LA 030401_00) were both listed as impaired in the 2008 303(d) list of impaired water bodies due to higher than allowable levels of fecal coliform and low dissolved oxygen concentrations. According to the 2012 303(d) list, these Segments are no longer considered impaired.

Table 9-4. 303(d) impaired waters within 5-miles of the facility.

STREAM SEGMENT NUMBER	STREAM SEGMENT DESCRIPTION	SUSPECTED CAUSES OF IMPAIRMENT	SUSPECTED SOURCES OF IMPAIRMENT	RELATION TO SITE
Calcasieu Parish Facility				
LA031101_00	Intracoastal Waterway-From Calcasieu Lock to East Calcasieu River Basin boundary	Chloride	Changes in Tidal Circulation/Flushing; Impacts from Hydrostructure Flow	Located downgrade southwest 0.3 mile
LA031101_00	Intracoastal Waterway-From Calcasieu Lock to East Calcasieu River Basin boundary	Sulfates	Changes in Tidal Circulation/Flushing; Impacts from Hydrostructure Flow	Located downgrade southwest 0.3 mile
LA031101_00	Intracoastal Waterway-From Calcasieu Lock to East Calcasieu River Basin boundary	Total Dissolved Solids	Changes in Tidal Circulation/Flushing; Impacts from Hydrostructure Flow	Located downgrade southwest 0.3 mile
LA031101_00	Intracoastal Waterway-From Calcasieu Lock to East Calcasieu River Basin boundary	Temperature, water	Drought-related Impacts; Natural Sources	Located downgrade southwest 0.3 mile

Source: LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY 2012 303d List Of Impacted Waters.

Environmental Consequences

Construction of the facility would result in minor modifications to hydrology at the Calcasieu Parish facility site. The introduction of impermeable surfaces (parking lot, roads, sidewalks) would create higher rates of runoff during storm events, resulting in faster hydrographic peaking and potential for erosion and sedimentation of ancillary waterways. The degree to which impacts would occur would be reduced through the implementation of mitigation measures such as revegetation around the facility or other appropriate and cost-effective on-site treatment options. Despite the incorporation of these measures, however, natural hydrologic flows would be altered to some degree by the construction of the facility. These adverse impacts would be long-term but are expected to be relatively minor, given the small footprint of the facility compared to the overall size of the land tract. Approval from local floodplain administrators and FEMA would be sought for potential impacts to the 100-year floodplain that might modify the characteristics of floodwaters. During final design, standard engineering review would include an analysis of both the volume and velocity of runoff from the site to ensure that offsite effects would be reduced.

There are currently no ground water restrictions in place for Calcasieu Parish. However, prior notification to the Louisiana Department of Natural Resources (LDNR) Groundwater Resources Program would be provided before construction of process waterwells for the proposed developments. Review by the LDNR would ensure that no adverse effects to groundwater would occur. Pond lining would

prevent seepage of pond water into groundwater. Therefore, no adverse impacts to groundwater would be expected from pond construction.

Construction would result in short-term, adverse impacts to stormwater due to increased sedimentation from disturbance of ground cover, extensive excavation, and grading of the facility. A comprehensive Stormwater Pollution Prevention Plan with Best Management Practices to protect water quality (e.g., silt fence, re-vegetation) would likely mitigate these impacts (see section 9.8.6.2 for additional discussion on erosion effects). Additionally, these measures would also likely fulfill the requirements of the Section 401 Certification.

Operation of the facility could result in long-term, minor impacts to the Turn Basin from construction and operation of the water intake system. Operation of the facility would result in long-term, minor impacts to an unnamed tributary of the Intracoastal Waterway from the discharge of effluent water for location of tributary). It is expected that this impact would be minor because the treatment of effluent in lined, 0.5 acre settling ponds would be designed to meet applicable LPDES discharge standards. There are no LPDES general permits that authorize operational discharges from hatcheries. According to Louisiana Environmental Regulatory Code, Title 33, Part IX, Subpart 1, Section 2507, a fish hatchery may be designated on a case-by-case basis as a concentrated aquatic animal production facility by the state administrative authority if it is determined to be a “significant contributor of pollution to waters of the state.” No permit is required until the state administrative agency has made its determination based on a facility inspection (Title 33 §2507 (C)(2)). Coordination with the state administrative authority would be initiated to assist in a determination of LPDES applicability. If required during the final permitting process, additional evaluations including a review of the water balance of the Turn Basin and surrounding systems would be performed to assess any potential impacts to surrounding waters and determine if modifications to the design of the proposed intake or effluent systems are needed.

Based on the preliminary conceptual designs currently available, construction on this facility site will likely require a permit for Section 404 of the Clean Water Act to authorize impacts to waters of the U.S., including wetlands. Construction of the facility within the currently proposed facility footprint may result in adverse impacts to approximately 2.85 acres of emergent wetlands, 0.48 acres of open water/channels, and 0.24 acres of ponds. As design progresses, impacts to wetlands and other waters will be minimized by modifying the site plan to the extent practicable. The compensatory mitigation requirements of Section 404 permitting would provide for the replacement of the functions of wetlands and waters impacted by the proposed project.

Plaquemines Parish Facility

Affected Resources

Hydrology

Despite the facility’s proximity to the Mississippi River, no natural hydrologic connections between the River and the site were apparent, due to the constructed levee system. The Plaquemines Parish facility located on Map Number 2201390430B (effective May 1, 1985) is entirely within FEMA Zone A, the 100-year flood zone.

During field investigations held in September of 2013, existing open water/ponds and wetland areas were observed within the Plaquemines Parish facility study area (approximately 40.34 acres of the land tract were studied). The open water/pond and wetland features observed are remnants of previously constructed ponds and wetlands which were used for research purposes at the LSU AgCenter that once operated on the property. No natural wetlands or aquatic features occur on the property. The wetlands present are characterized as freshwater emergent and have resulted from the cessation of constant artificial pumping of water inflows to the constructed ponds. Approximately 5.6 acres of emergent wetlands and approximately 2.3 acres of ponds were delineated within the study area (Figure 9-24) based on the field investigations.

According to the LDNR online database (Strategic Online Natural Resource Information System [SONRIS] 2011), three Coastal Use Permits (CUPs) were previously acquired for work conducted partially or completely within the Plaquemines Parish facility. In February 2007, the LSU AgCenter received a permit (CUP NUM:P20070171) to create wetland propagation ponds on the project site. In June 2008, LSU AgCenter received a permit (CUP NUM:P20080659) to improve existing buildings and build new structures. In April 2009, CLL Partnership, LTD received a permit (CUP NUM:P20090080) across Hwy 23 from the LSU AgCenter to excavate a borrow pit for fill material.

Water Quality

Segments within 5-miles of the proposed project were assessed for the Final 2012 Louisiana Water Quality Inventory: Integrated Report (305(b)/303(d)) (LA 020904_00, LA 020907_00, LA 042102_00, LA 042104_00, LA 070301_00). According to the 2012 303(d) List of impaired waters as reported by the Louisiana Department of Environmental Quality, there were no impaired water bodies within 1-mile of the Plaquemines Parish facility. Two impaired water bodies were located approximately 4.3 and 4.8 miles north and upriver from the Plaquemines Parish facility. An estuarine segment (Segment LA 042102_00) of the River Aux Chenes, also called the Oak River, and Petit Lake (Segment LA 042104_00) was listed as impaired due to the presence of higher than allowable levels of fecal coliform. Suspected sources of impairment are listed below in Table 9-5.



Figure 9-24. Plaquemines Parish facility preliminary wetland delineation based on 2013 field survey.

Table 9-5. 303(d) impaired waters within 5 miles of the facility.

STREAM SEGMENT NUMBER	STREAM SEGMENT DESCRIPTION	SUSPECTED CAUSES OF IMPAIRMENT	SUSPECTED SOURCES OF IMPAIRMENT	RELATION TO SITE
Plaquemines Parish Facility				
LA042102_00	River Aux Chenes; also called Oak River (Estuarine)	Fecal Coliform	Wildlife Other than Waterfowl	Located upgrade north 4.3 miles
LA42104_00	Petit Lake	Fecal Coliform	Marina/Boating Sanitary On-vessel Discharges	Located upgrade north 4.8 miles
LA42104_00	Petit Lake	Fecal Coliform	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	Located upgrade north 4.8 miles
LA42104_00	Petit Lake	Fecal Coliform	Wildlife Other than Waterfowl	Located upgrade north 4.8 miles

Source: Louisiana Department of Environmental Quality 2012 303d list of Impacted Waters.

Environmental Consequences

Construction of the facility would result in minor modifications to hydrology at the site. The small footprint of new construction would increase the area of impermeable surface and would create higher rates of runoff during storm events resulting in faster hydrographic peaking and potential for erosion and sedimentation of ancillary waterways. The degree to which impacts would occur could be reduced through the implementation of mitigation measures such as re-vegetation around the facility. Despite the incorporation of these measures, however, natural hydrologic flows would be altered to some degree by the construction of the facility. During final design, standard engineering review would include an analysis of both the volume and velocity of runoff from the site to ensure that offsite effects would be reduced. These adverse impacts would be long-term but would be expected to be very minor, given the small footprint of new construction on an already developed site.

There are currently no groundwater restrictions in place for Plaquemines Parish. Pond lining would prevent seepage of pond water into groundwater. No adverse impacts to groundwater would be expected.

Construction would result in short-term, adverse impacts to stormwater due to increased sedimentation from disturbance of ground cover, excavation, and grading of the facility. A comprehensive Stormwater Pollution Prevention Plan with Best Management Practices to protect water quality (*e.g.*, silt fences, re-vegetation) and reduce potentially adverse effects to water quality. These measures would also likely fulfill the requirements of the Section 401 Water Quality Certification and mitigate these impacts.

Based on conceptual plans, the operation of the facility would result in long-term, minor impacts to an inland marsh of the Barataria Estuary from the discharge of effluent water. This impact would be expected to be minor because the treatment of effluent in 0.5 acre settling ponds would be designed to

meet applicable LPDES discharge standards. The water leaving the effluent ponds would enter an existing drainage ditch system that crosses LA 23 and discharges into an inland marsh of the Barataria Estuary. As described above, there are no LPDES general permits that authorize operational discharges from hatcheries. According to Louisiana Environmental Regulatory Code, Title 33, Part IX, Subpart 1, Section 2507, a fish hatchery may be designated on a case-by-case basis as a concentrated aquatic animal production facility by the state administrative authority if it is determined to be a “significant contributor of pollution to waters of the state.” No permit is required until the state administrative agency has made its determination based on a facility inspection (Title 33 §2507 (C)(2)). Coordination with the state administrative authority would be initiated to assist in a determination of LPDES applicability.

Approximately 3.2 acres of emergent freshwater wetlands and 2.3 acres of open water/ponds resulting from previous agricultural activities were delineated within the facility foot print (six renovated ponds outlined in green) during field investigations held in September of 2013 (Figure 9-24). The Plaquemines Parish facility is proposed to be located within a “fastland¹” area with no anticipated impacts to natural wetlands and aquatic features.

9.8.6.4 Air Quality and Greenhouse Gas Emissions

Both Facilities

Affected Resources

The Clean Air Act of 1970 and EPA regulatory programs govern air pollution assessment and control. In Louisiana, the EPA and Louisiana Department of Environmental Quality are responsible for air quality protection. Under authority of the Clean Air Act, the EPA established primary and secondary pollutant criteria called the National Ambient Air Quality Standards. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. EPA has established standards for the following six principal pollutants, which are called "criteria" pollutants: particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

A regulatory driver for air emissions and air quality analysis is the federal General Conformity program, the rules for which are set forth in 40 C.F.R. § 93, Subpart B. The purpose of the General Conformity program under the Clean Air Act is to prevent, or force mitigation of, any federal actions that would impair a state’s approved plan to achieve attainment with the National Ambient Air Quality Standards. If there is a federal agency action to approve/permit or to provide funds for the Proposed Action, General Conformity rules may apply. The General Conformity program applies only to projects located in an area that is designated as “non-attainment” (geographic areas that do not adhere to national ambient air requirements) or “maintenance” (former non-attainment area) with respect to one or more of the National Ambient Air Quality Standards.

The Louisiana Department of Environmental Quality is federally authorized to administer the federal Part 70 (Title V) and New Source Review programs. The EPA has delegated to Louisiana Department of Environmental Quality the authority to implement and enforce certain New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants (NESHAPs) promulgated by EPA under 40 C.F.R. §§ 60, 61, and 63. Besides exemptions that do not require Louisiana Department of Environmental Quality approval, any source that emits, or has the potential to emit, any air contaminant (defined as “particulate matter, dust, fumes, gas, mist, smoke, or vapor, or any combination thereof, visible or not, produced by processes other than natural”) requires written approval from Louisiana Department of Environmental Quality. If the Proposed Action has the potential to emit air contaminants, it should be further evaluated for the applicability of exemptions and/or air permitting requirements. For instance, construction activities for the Proposed Action should meet ambient air quality, visibility, odor, and opacity standards and implement reasonable particulate matter control.

The proposed facilities are located in Plaquemines and Calcasieu Parishes. These parishes are not listed as a non-attainment or maintenance areas for the National Ambient Air Quality Standards. Thus, the proposed project is not likely to be subject to General Conformity requirements.

Greenhouse gases are chemical compounds found in the Earth’s atmosphere that absorb and trap infrared radiation as heat. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the greenhouse gas emission (release) rate over the removal (storage) rate, which results in a net increase of greenhouse gases in the atmosphere. The principal greenhouse gases emitted into the atmosphere through human activities are CO₂, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EPA 2010b). CO₂ is the major greenhouse gas emitted, and the burning of fossil fuels accounts for 81 percent of all U.S. greenhouse gas emissions (EPA 2010b; Houghton 2010; U.S. Energy Information Administration 2009b).

Environmental Consequences

Temporary adverse impacts to air quality would be minor for the proposed project. Air emissions from standard construction equipment and vehicular traffic would be expected, but would be anticipated to be within reasonable allowable limits. Potential impacts would be temporary and limited to construction. Reasonable particulate matter control measures would be implemented. Air quality issues would be minor during facility operations. This would include automobile emissions associated with employees and visitors traveling to and from the site. Additional emissions would be produced by electricity generated offsite needed to support the facility.

Construction of the facilities would require use of equipment that would contribute to air quality emissions and GHGs such as CO₂. Due to the small area, the exhaust emissions are expected to be minor, with bulldozer, backhoe, and grader being the most likely equipment used to prepare the site to be developed. Any air quality degradation would be very limited to the area immediately around the construction site and would only last during the site preparation period— estimated to be 16 to 24 months for the Calcasieu Parish site and 14 to 18 months for the Plaquemines Parish site. Table 9-6 describes the estimated GHG emission scenario for the implementation of both facilities. Because detailed construction plans have not

yet been developed, this scenario (total hours for different types of equipment) is a preliminary estimate. The calculation of greenhouse gas impacts provides an indication of the relative magnitude of emissions from the construction activities and should not be considered a precise estimate.

Table 9-6. Greenhouse gas impacts of the proposed project for major construction equipment.

EQUIPMENT DESCRIPTION	EQUIPMENT SIZE (HP) ¹	LOAD FRACTION ²	TOTAL HOURS USED	Power Consumed (hp-hr)	CO ₂ FACTOR-kg/hp-hr ^{3,4}	CO ₂ (MT)	CH ₄ FACTOR-kg/hp-hr ^{3,4,5}	CH ₄ (MT)	N ₂ O FACTOR-kg/hp-hr ^{3,4,5}	N ₂ O (MT)	TOTAL CO ₂ e (MT)
Preliminary Greenhouse Gas (GHG) Emissions during Construction of the Calcasieu Parish Facility											
Diesel Dumpers/Tenders	10.00	0.21	1,583	3,324.3	0.51772	1.72	0.00044	0.00	0.00130	0.00	1.7
Diesel Cement & Mortar Mixers	5.98	0.43	186	478.5	0.51772	0.25	0.00044	0.00	0.00130	0.00	0.2
Diesel Grader	231.20	0.59	689	93,985.1	0.51772	48.66	0.00044	0.04	0.00130	0.12	48.8
Diesel Backhoe	87.17	0.21	405	7,413.8	0.51772	3.84	0.00044	0.00	0.00130	0.01	3.9
Diesel rubber tire dozer	136.30	0.59	262	21,069.3	0.51772	10.91	0.00044	0.01	0.00130	0.03	10.9
Diesel loader	87.17	0.21	1,583	28,977.9	0.51772	15.00	0.00044	0.01	0.00130	0.04	15.1
Diesel Cranes	237.70	0.43	1,200	122,653.2	0.51772	63.50	0.00044	0.05	0.00130	0.16	63.7
Diesel Trenchers	61.02	0.59	27	972.0	0.51772	0.50	0.00044	0.00	0.00130	0.00	0.5
Diesel Excavator	137.60	0.59	1,741	141,341.3	0.51772	73.18	0.00044	0.06	0.00130	0.18	73.4
Diesel Asphalt Paver	134.60	0.59	91	7,226.7	0.51772	3.74	0.00044	0.00	0.00130	0.01	3.8
Diesel Tandem Roller	84.76	0.59	148	7,401.2	0.51772	3.83	0.00044	0.00	0.00130	0.01	3.8
Diesel Vibratory Roller	84.76	0.59	190	9,501.6	0.51772	4.92	0.00044	0.00	0.00130	0.01	4.9
Diesel Water Truck	419.90	0.59	600	148,644.6	0.51772	76.96	0.00044	0.07	0.00130	0.19	77.2
Diesel Pick Up Truck	56,000 gallons of fuel used	16,800	10.2068 (kg/gallon)	571.56	0.008694 (kg/gallon)	0.49	0.025668 (kg/gallon)	1.44	573.5		
Total				878.6		0.7		2.2	881.5		
Preliminary Greenhouse Gas (GHG) Emissions during Construction of the Plaquemines Parish Facility											
Diesel Dumpers/Tenders	10.00	0.21	558	1,171.8	0.51772	0.61	0.00044	0.00	0.00130	0.00	0.6
Diesel Cement & Mortar Mixers	5.98	0.43	62	159.5	0.51772	0.08	0.00044	0.00	0.00130	0.00	0.1
Diesel Grader	231.20	0.59	18	2,455.3	0.51772	1.27	0.00044	0.00	0.00130	0.00	1.3
Diesel Backhoe	87.17	0.21	117	2,141.8	0.51772	1.11	0.00044	0.00	0.00130	0.00	1.1
Diesel rubber tire dozer	136.30	0.59	91	7,317.9	0.51772	3.79	0.00044	0.00	0.00130	0.01	3.8
Diesel Loader	87.17	0.21	558	10,214.6	0.51772	5.29	0.00044	0.00	0.00130	0.01	5.3

EQUIPMENT DESCRIPTION	EQUIPMENT SIZE (HP) ¹	LOAD FRACTION ²	TOTAL HOURS USED	Power Consumed (hp-hr)	CO ₂ FACTOR-kg/hp-hr ^{3,4}	CO ₂ (MT)	CH ₄ FACTOR-kg/hp-hr ^{3,4,5}	CH ₄ (MT)	N ₂ O FACTOR-kg/hp-hr ^{3,4,5}	N ₂ O (MT)	TOTAL CO ₂ e (MT)
Diesel Cranes	237.70	0.43	600	61,326.6	0.51772	31.75	0.00044	0.03	0.00130	0.08	31.9
Diesel Trenchers	61.02	0.59	8	288.0	0.51772	0.15	0.00044	0.00	0.00130	0.00	0.1
Diesel Excavator	137.60	0.59	17	1,380.1	0.51772	0.71	0.00044	0.00	0.00130	0.00	0.7
Diesel Asphalt Paver	134.60	0.59	16	1,270.6	0.51772	0.66	0.00044	0.00	0.00130	0.00	0.7
Diesel Tandem Roller	84.76	0.59	34	1,700.3	0.51772	0.88	0.00044	0.00	0.00130	0.00	0.9
Diesel Vibratory Roller	84.76	0.59	67	3,350.6	0.51772	1.73	0.00044	0.00	0.00130	0.00	1.7
Diesel Water Truck	419.90	0.59	600	148,644.6	0.51772	76.96	0.00044	0.07	0.00130	0.19	77.2
Diesel Pick Up Truck	5667 gallons of fuel used	1,700	10.2068 (kg/gallon)	57.84	0.008694 (kg/gallon)	0.05	0.025668 (kg/gallon)	0.15	58.0		
Total						182.8		0.2		0.5	183.4

HP = horse power
kg/hp-hr=kilograms per horse power per hour
CO₂= carbon dioxide
mt = metric tons
CH₄ = methane
N₂O = nitrogen dioxide
CO₂e= CO₂ equivalent

1 U.S. Environmental Protection Agency. Assessment and Standards Division, Office of Transportation and Air Quality. Nonroad Engine Population Estimates. EPA-420-R-10-017. NR-006e. July 2010, pages A12-A25.

<http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2010/420r10017.pdf>

2 U.S. Environmental Protection Agency. Assessment and Standards Division, Office of Transportation and Air Quality. Nonroad Engine Population Estimates. EPA-420-R-10-017. NR-006e. July 2010, pages A12-A25.

<http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2010/420r10017.pdf>

3 For CO₂: U.S. Government Printing Office. Electronic Code of Federal Regulations. 40 C.F.R. 98. Table C-1 to Subpart C of Part 98: Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel.

For CH₄ and N₂O: U.S. Government Printing Office. Electronic Code of Federal Regulations. 40 C.F.R. 98. Table C-2 to Subpart C of Part 98: Default CH₄ and N₂O Emission Factors and High Heat Values for Various Types of Fuel."

4 EPA Publication AP-42, Compilation of Air Pollutant Emission Factors, Volume 1, Stationary Point and Area Sources, Table 3.3-1, page 3.3-6.

5 U.S. Government Printing Office. Electronic Code of Federal Regulations. 40 C.F.R. 98. Table A-1 to Subpart A of Part 98—Global Warming Potentials.

Based on the assumptions detailed in Table 9-6, the project would generate approximately 1,065 metric tons of GHGs during project construction. The following mitigation measures have been identified to reduce emissions from the project:

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

Operation of the two facility sites would increase energy consumption above pre-construction levels. The use of RAS would minimize emissions associated with water heating and cooling compared to facilities that use flow-through systems. Based on the above, and with the incorporation of mitigation measures, the Center would have long-term minor impacts on greenhouse gas emissions.

9.8.6.5 Noise

According to the EPA, noise is defined as “unwanted or disturbing sound.” Sound becomes unwanted when it either interferes with normal activities, such as sleeping or conversation, or disrupts or diminishes one’s quality of life. Ambient noise is defined as existing background noise generated from multiple sources in a surrounding environment, such as noise from construction sites, air traffic, automobiles, and industrial operations.

The Noise Control Act of 1972 establishes a national policy to help ensure that all Americans are protected from noise at a level that may jeopardize their health and welfare. The Act also serves to (1) establish a means for effective coordination of federal research and activities in noise control; (2) authorize the establishment of federal noise emission standards for products distributed in commerce; and (3) provide information to the public regarding the noise emission and noise reduction characteristics of these products.

Units of noise are measured and reported in dBA, a typical weighted measurement of sound. Institutional recognition of noise is provided by the Occupational Noise Exposure (29 C.F.R. Part 1910.95) under the Occupational Safety and Health Act of 1970. This section mandates that noise levels emitted from construction equipment be below 90 dBA for exposures of 8 hours per day or more. The upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration (OSHA) is 115 dBA.

Calcasieu Parish Facility

Affected Resources

Ambient noise levels at the Calcasieu Parish facility are moderate, resulting from sources such as roadway traffic, industrial facilities operations, barge traffic near the port, recreational boating noise, and air traffic from the nearby airport (located approximately three miles from the project site). Local

residents will experience direct, yet temporary noise impacts from construction, typical of construction equipment and human labor activities.

Environmental Consequences

A minor, temporary increase in noise (*e.g.*, similar to that of noise stemming from nearby port and oil and gas activities) could be expected in association with construction equipment, machinery, and human labor activities at the proposed project facility. Construction would be limited to daylight working hours in order to reduce the noise impacts to the surrounding environment. Noise from construction activities dissipates as it emanates further from its source. While the nearest residential area lies within 500 feet of the proposed facility, these adjacent homes are located behind the project site off of Joe Ledoux Road and are likely not to be directly impacted from operational traffic associated with facility maintenance vehicles, supply trucks, or visitors, utilizing Big Lake Road as the main entrance to the site. Residences adjacent to the facility (a minimum of approximately 500 feet from the site) will experience the more direct impact, with more populated residential areas further north being able to perceive less of the noise. Noise levels during construction and facility operations will not exceed acceptable limits of OSHA regulations, will be temporary and localized in nature, and will not adversely impact or add stress to the environment or its human and biological inhabitants. Construction access is anticipated to be from Joe Ledoux Road. Ambient noise directly surrounding the site would not likely exceed noise levels pre-construction because of the large undisturbed area and natural forest type vegetation around the facility footprint providing a buffer for residential areas to the north.

Plaquemines Parish Facility

Affected Resources

The Plaquemines Parish site lies in a semi-rural setting along LA 23, with the nearest residential area located approximately 500-feet of the facility. Across LA 23, the predominant land use type is agriculture. The residential areas within one mile of the facility lie mostly on the east side of LA 23, with populations increasing to the south of the project site. Varying degrees of ambient noise levels are experienced daily by residents from current highway construction, highway traffic along LA 23, barge traffic on the Mississippi River, industrial plant operations, agricultural operations, and recreational and commercial fishing boats in nearby waterways and marinas. Noise from vehicular traffic along LA 23 and agricultural and industrial plant operations are usually between 50 and 60 dBA at 100 feet.

Environmental Consequences

A minor, temporary increase in noise (*e.g.*, similar to noise associated with current road construction on LA 23) can be expected in association with construction equipment, machinery, and human labor activities at the proposed project facility. Construction would be limited to daylight working hours in order to reduce the noise impacts to the surrounding environment. Noise from construction activities dissipates as it emanates further from its source. Residences adjacent to the facility will experience the more direct impact, with more populated residential areas further south being able to perceive less of the noise. Noise levels during construction and facility operations will not exceed acceptable limits of OSHA regulations, will be temporary and localized in nature, and will not adversely impact or add stress to the environment or its human and biological inhabitants.

9.8.6.6 Biological Environment

Coastal and Submerged Aquatic Vegetation

Calcasieu Parish Facility

Affected Resources

The project is within the northern portion of the Western Gulf Coastal Plain ecoregion which is typically characterized by relatively flat coastal plain and grassland habitats. Inland from this region, the plains are older and mostly forest or savanna-type habitats. The vegetation in the vicinity of the project area transitions from tidal brackish marsh to a narrow-band of live oak riparian habitat and coastal prairie to the south. The narrow band of tidal brackish marsh dominated by smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*) occurs along the unnamed tributary north of the proposed facility. On August 27th, 2013, no submerged aquatic vegetation was observed by HDR Engineering, Inc. (“HDR”) in the unnamed tributary or the Turn Basin north of the project site, at the potential locations for outfall and intake structures, respectively. The tidal marsh is bordered by a narrow band of riparian woods containing live oak and pines with an understory dominated by yaupon (*Ilex vomitoria*).

The project site’s history of cattle grazing, altered hydrology, fire suppression, and lack of brush management has resulted in the invasion of the coastal prairie by Eastern baccharis (*Baccharis halimifolia*) and Chinese tallow (*Triadica sebifera*), which have altered the natural vegetative community. The project site consists of a matrix of depressional wetlands within the upland areas on the site. The uplands are dominated by Eastern baccharis, Chinese tallow, southern bayberry (*Myrica cerifera*), goldenrod (*Solidago spp.*), and bermudagrass (*Cynodon dactylon*). Vegetation observed in wetland depressions include cattail (*Typha spp.*), sand spikerush (*Eleocharis montevidensis*), roundhead rush (*Juncus validus*), buttonweed (*Diodia virginiana*), smartweed (*Polygonum hydropiperoides*), and creeping primrose-willow (*Ludwigia repens*). Due to previous grazing and alterations on the site, the encroachment and dominance by invasive shrub species has reduced the diversity of the wetland vegetation community, thus resulting in a diminished functional quality of the wetland depression matrix.

The proposed facility would obtain water for its operations from the Turn Basin and the treated effluent would be discharged to the unnamed tributary to the north of the proposed facility. The Turn Basin is located near Henry Pugh Road and is the proposed location of the intake pipeline (Figure 9-23). Most areas along the shoreline of the Turn Basin are lined with concrete matting and consist of few areas of natural vegetation. Little shoreline erosion was observed near the Turn Basin by HDR during a site visit on August 27, 2013. The existing shoreline vegetation includes both invasive and native plants dominated by species such as cordgrass (*Spartina spp.*), groundseltree, chinese tallow, black willow (*Salix nigra*), rouseau cane (*Phragmites australis*), and Mimosa spp.

The proposed location of the intake pipeline would begin at the Turn Basin and follow Big Lake Road south along its right of way (“ROW”) to the 0.5-acre storage reservoir south of Joe Ledoux Road. Although the exact location of the pipeline has yet to be determined, the construction corridor would be

no wider than 50 feet and would stay within or as close to the road ROW as possible to minimize disturbance to adjacent upland forested habitat. Figure 9-23 illustrates a conceptual plan for the proposed intake and outfall pipeline locations. Upland areas along the Big Lake Road ROW are dominated by loblolly pine (*Pinus taeda*), yaupon (*Ilex vomitoria*), hackberry (*Celtis occidentalis*), and wax myrtle (*Morella cerifera*).

Environmental Consequences

Several sensitive natural vegetation communities were observed on the Calcasieu Parish facility site. The proposed facility will be located in the most heavily degraded portion of the property where native plants were cleared and non-native grasses were planted for livestock grazing. Siting the proposed facility in this area would minimize impacts to coastal prairie, a mima mound wetland complex at the southern portion of the site, and bottomland hardwood and brackish marsh located along the unnamed tributary and west of Big Lake Road. This plan would preserve the majority of the mima mound-wetland complex, brackish marsh, and bottomland forest for potential enhancement and outdoor environmental educational activities complementary to the mission of the facility. The construction of the facility, ponds, and parking areas would result in permanent impacts to the grassland and shrub habitat. Impacts to wetlands would be required to be mitigated through the Section 404 process that requires replacement of the functions and values of the wetlands affected by project implementation.

Construction of the water supply and outfall pipelines would require temporary disturbance of vegetation in the grassland, woodlands and tidal areas. However, impacts to large specimen trees would be avoided through design and the surface herbaceous vegetation could be restored with native species following construction.

Plaquemines Parish Facility

Affected Resources

Vegetation at the Plaquemines Parish Facility consists primarily of bermudagrass, ruderal vegetation, and other grasses and forbs typical of disturbed sites such as goldenrod (*Solidago spp.*) and sumpweed (*Iva annua*). Vegetation including chinese tallow, groundsel tree, golden rod, bermudagrass, alligator weed (*Alternanthera philoxeroides*) and wild cow pea (*Vigna luteola*) dominates the berms surrounding the production ponds. Due to the extensive, recent deposition of earthen material, most of the site is bare dirt with depressions where water has pooled.

Most of the constructed ponds were used for wetland plant propagation. However, since suspension of operations of the LSU AgCenter in 2011, pioneer wetland species that are characteristic of disturbed sites have invaded the ponds. Vegetative conditions within the ponds can be characterized as having low structural diversity and few plant strata. The majority of the ponds are dominated by species such as wild cow pea, smartweed, pond flat-sedge (*Cyperus odoratus*), common duck weed (*Lemna minor*), and angle-stem primrose-willow (*Ludwigia leptocarpa*) which create a generally uniform mat of vegetation. The fringes contain species such as cattail and giant reed (*Phragmites australis*) which provide the only structural diversity.

Environmental Consequences

Due to the extent of previous alterations of the site for agriculture and for construction and operation of the LSU AgCenter as well as current alterations associated with the processing and placement of earthen material, impacts to native vegetation communities from this proposed project are expected to be minor or non-existent. Rehabilitation of constructed ponds would result in the loss of vegetation that might have recruited since the suspension of AgCenter operations in 2011.

9.8.6.7 Terrestrial Wildlife Species (including birds)

Calcasieu Parish Facility

Affected Resources

The Calcasieu Parish facility is within the Western Gulf Coastal Plain ecological region, which is a sub-region of the Great Plains and covers the coastal plain from southwestern Louisiana to northeastern Mexico (Wiken *et al.* 2011). The region has a humid, sub-tropical climate with hot summers and mild winters. The region is marked by flat coastal plains, barrier islands, dunes, beaches, bays, estuaries, and tidal marshes. Prior to conversion to cropland, livestock grazing and urban development, the coastal prairies consisted of tallgrass prairie in southwest Louisiana and southeast Texas, transitioning to sandy plains in southern Texas and northeast Mexico. Native vegetation in the prairies included little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), yellow Indiangrass (*Sorghastrum nutans*), tall dropseed (*Sporobolus compositus*), silver bluestem (*Bothriochloa saccharoides*), and common curleymesquite (*Hilaria berlangeri*) in a mixture with hundreds of other herbaceous species. Dominant vegetation in coastal marsh communities typically consists of cordgrass (*Spartina* spp.), saltgrass (*Distichlis* spp.), needlerush (*Juncus roemerianus*), and saltmarsh bulrush (*Scirpus robustus*) (Wiken *et al.* 2011).

Typical wildlife of the Western Gulf Coastal Plain would include a diverse avian, mammalian, amphibian, reptile and invertebrate community, including species such as white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), ringtail (*Bassariscus astutus*), armadillo (*Dasypus novemcinctus*), swamp rabbit (*Sylvilagus aquaticus*), cottontail (*Sylvilagus floridanus*), northern yellow bat (*Lasiurus intermedius*), American alligator (*Alligator mississippiensis*), northern cricket frog (*Acris crepitans*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), small-mouthed salamander (*Ambystoma texanum*), alligator snapping turtle (*Macrochelys temminckii*), LeConte's sparrow (*Ammodramus leconteii*), Sprague's pipit (*Anthus spragueii*), least bittern (*Ixobrychus exilis*), yellow rail (*Coturnicops noveboracensis*), Wilson's snipe (*Gallinago delicata*), and many species of ducks and geese. The Calcasieu site's history of cattle grazing and modification of the natural vegetation community has altered the potential for terrestrial wildlife use of the site.

The August 2013 site visit, although not a formal survey, revealed very low avian diversity around the approximate footprint of the proposed multi-purpose facility, which was dominated by generalist and disturbance-tolerant species such as the American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), northern cardinal (*Cardinalis cardinalis*), and northern mockingbird (*Mimus polyglottos*). Snowy egrets (*Egretta thula*) and great egrets (*Ardea alba*) were observed in the unnamed tributary and may have colonial roosting and nesting sites (*i.e.* rookeries) along the tributary. A September 2013

survey of the potential intake pipeline corridor along Big Lake Road revealed more woodland avian species as well as brushy edge species including Carolina wren (*Thryothorus ludovicianus*), northern flicker (*Colaptes auratus*), pileated woodpecker (*Dryocopus pileatus*), red-bellied woodpecker (*Melanerpes carolinus*), American redstart (*Setophaga ruticilla*), Carolina chickadee (*Poecile carolinensis*), gray catbird (*Dumetella carolinensis*), brown thrasher (*Toxostoma rufum*), and belted kingfishers (*Ceryle alcyon*) adjacent to the unnamed tributary. Also, several raptor species were observed, including the black vulture (*Coragyps atratus*), red-tailed hawk (*Buteo jamaicensis*) and red-shouldered hawk (*B. lineatus*). In addition, signs of common generalist mammal species such as the raccoon (*Procyon lotor*) and the nine-banded armadillo (*Dasypus novemcinctus*) were also observed at the site.

No surveys or trapping surveys have been conducted for reptiles or amphibians at this site; however, the matrix of small depressional wetlands on the project site may provide cover and breeding areas for local populations. These depressions range from <0.1 acres to 1.2 acres in size and have various hydrological regimes. Many of these depressions may only have saturated soils and no standing water, while others may hold water for sufficient periods for amphibian breeding requirements. Typical southern Louisiana amphibians which may utilize the project site for breeding and cover include the southern leopard frog (*Rana sphenoccephala*), the gulf coast toad (*Bufo nebulifer*), Fowler's toad (*Anaxyrus fowleri*), eastern narrowmouthed toad (*Gastrophryne caroliniensis*), and green frog (*Lithobates clamitans*). Reptiles potentially present on the project site include green anole (*Anolis carolinensis*), five-lined skink (*Plestiodon fasciatus*), and eastern mud turtle (*Kinosternun subrubrum*).

Environmental Consequences

The Calcasieu Parish facility is planned primarily in areas with hydrology and vegetation previously affected by road and grazing activities. Shrub-nesting passerine habitat could experience minor impacts due to land clearing; however, the observed species were considered highly adaptable and tolerant of disturbance, so no substantial adverse effects to the population would be anticipated.

The current site plan would result in the loss of approximately 2.18 acres of small depressional wetland and upland pond areas that might provide cover and breeding habitat for common amphibians. However, the quality of these areas has been impacted due to historic alterations to the vegetative community resulting in the encroachment of shrubs and a likely reduction in the diversity of amphibian and reptile species. The loss of depressional wetlands could lead to short-term, lower reproductive success for species adapted to the lower quality habitats; however, similar habitat and/or higher quality habitat would remain around the planned facility (*i.e.* mima mound-wetland complex and tributary-marsh habitat). The proposed facilities would be located adjacent to Joe Ledoux Road and would create a moderate barrier to dispersal. However, mitigation required by Section 404 of the Clean Water Act would require the replacement of the functions and values of the wetlands adversely affected by the project.

Plaquemines Parish Facility

Affected Resources

The Plaquemines Parish facility is within the Mississippi Alluvial Plain eco-region which extends from southern Illinois south to the Gulf of Mexico. The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and approximately 3.2 million square kilometers before the river finally reaches the Gulf (Griffith, 2010). This region has a humid subtropical climate where winters are generally mild and precipitation and temperatures increase from north to south. Prior to settlement and cultivation, bottomland forest covered most of the region. However, due to extensive agricultural development and levee systems, which affect the hydroperiod of the floodplain, this ecological region is the most altered in the U.S. (Griffith, 2010). The region is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief.

Native bottomland deciduous forest which covered the region before much of it was cleared included inundated river swamp forests containing bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*); frequently-flooded hardwood swamp forests consisting of water hickory (*Carya aquatica*), red maple (*Acer rubra*), green ash (*Fraxinus pennsylvanica*), and river birch (*Betula nigra*); and seasonally-flooded areas dominated by sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), laurel oak (*Quercus laurifolia*), Nuttall oak (*Q. nutallii*), and willow oak (*Q. phellos*). The widespread loss of forest and wetland habitat has significantly impacted wildlife and bird populations in the region, although it is still a major bird migration corridor. Representative species in forested bottomlands of the alluvial plain include white-tailed deer, black bear (*Ursus americanus*), bobcat (*Felis rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon, swamp rabbit, wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaid macroura*), wood thrush (*Hylocichla mustelina*), yellow-throated vireo (*Vireo flavifrons*), American alligator, wading birds, ducks and geese (Griffith 2010).

The Plaquemines Parish site has been heavily impacted due to development, construction and operation of the LSU AgCenter and recent hurricanes. Vegetation observed at the Plaquemines Parish site in September 2013 consisted primarily of bermudagrass, ruderal vegetation, and other grasses and forbs typical of disturbed sites such as goldenrod (*Solidago* spp.) and sumpweed (*Iva annua*). Vegetation including chinese tallow, groundsel tree, golden rod, bermudagrass, alligator weed (*Alternanthera philoxeroides*) and wild cow pea (*Vigna luteola*) dominates the berms surrounding the production ponds. Due to the extensive, recent deposition of earthen material, most of the site is bare dirt with depressions where water has pooled.

Most of the constructed ponds were used for wetland plant propagation. However, since suspension of operations in 2011, pioneer wetland species which are characteristic of disturbed sites have invaded the ponds. Vegetative conditions within the ponds can be characterized as having low structural diversity and few plant strata. The majority of the ponds are dominated by species such as wild cow pea, smartweed, pond flat-sedge (*Cyperus odoratus*), common duck weed (*Lemna minor*), and angle-stem primrose-willow (*Ludwigia leptocarpa*) which create a generally uniform mat of vegetation. The fringes contain species such as cattail and giant reed (*Phragmites australis*) which provide the only structural diversity. At least 2-in of surface water is visible in each pond, and the soils are saturated.

No formal terrestrial species surveys were conducted, so a full inventory of wildlife was not obtained during the site visit. Due to the recent disturbance at the site, no evidence of common generalist mammalian species were observed. However, representative species could include the raccoon, armadillo, feral hog (*Sus scrofa*), and coyote (*Canis latrans*). Reptile and amphibian species that may use the site include rat snake (*Elaphe obsoleta*), green anole, gulf coast toad, northern cricket frog, and the red-eared slider (*Trachemys elegans*). Bird species observed during the September 2013 site visit included great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), great egret (*Ardea alba*), cattle egret (*Bubulcus ibis*), tricolored heron (*Egretta tricolor*), least sandpiper, killdeer (*Charadrius vociferus*), black-necked stilt (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), mourning dove (*Zenaida macroura*), red-bellied woodpecker, and northern cardinal.

Environmental Consequences

Proposed construction would include restoration of existing access roads, plant propagation ponds and site buildings damaged in recent hurricanes. Pond construction would include the rehabilitation of ponds previously used for coastal plant propagation by re-grading, compaction and installation of water supply and water control structures. One new building, approximately 40ft by 60ft would be constructed. All proposed construction would be completed in areas previously impacted by the LSU AgCenter.

Dredging and rehabilitation of the on-site constructed ponds would remove herbaceous wet-edge habitat that could have developed since suspension of management operations. This could result in minor adverse effects to wildlife which may have utilized these edge habitats over the past two years, including wading birds, reptiles and amphibians. Due to the extent of previous alteration and current ground disturbance activities, adverse environmental consequences to terrestrial wildlife and avian species would be minor.

Environmental Consequences – Both Facilities

The construction of aquaculture ponds for the brooding and rearing of bait fish and commercial sport fishes could attract piscivorous bird species, such as herons, cormorants, egrets, kingfishers, and ducks, as well as mammals such as raccoons. Damage prevention and/or control strategies for managing bird damage and/or losses at each of the proposed facilities would be assessed during project development. Any prevention or control measures deemed necessary would be established in compliance with the Migratory Bird Treaty Act and LDWF regulations. Ground-clearing construction activities would be conducted outside of the avian nesting season, March 15 to September 15, to avoid direct impacts to nesting birds, in accordance with the Migratory Bird Treaty Act. If the project schedule should require ground-clearing activities during this time, pre-construction nest surveys of areas to be cleared would be conducted by a qualified biologist.

9.8.6.8 Marine and Estuarine Fauna (fish, shell beds, benthic organisms)

Both Facilities

Affected Resources

The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in Waters of the United States. The Magnuson-Stevens Act defines essential fish habitat (“EFH”) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The National Marine Fisheries Service and Gulf of Mexico Fishery Management Council have identified EFHs for the Gulf of Mexico in its fishery management plan amendments. Fishery management plans developed by the Gulf of Mexico Fishery Management Council include plans for shrimp, red drum, stone crab, and reef fish. There is also a federally implemented fishery management plan for small coastal sharks.

The southwest region (Calcasieu Parish facility) and the southeast region (Plaquemines Parish facility) are tidally influenced and support a wide variety of living aquatic resources including resident and migratory fishes, crustaceans, and benthic invertebrates. Some of these species are federally managed, and EFH has been designated for multiple species and life stages in the areas surrounding the Calcasieu Parish facility and Plaquemines Parish facility. These regions typically include but are not limited to, estuarine emergent wetlands (e.g., marsh edge, inner marsh, marsh ponds, and tidal creeks); submerged aquatic vegetation; seagrasses; mud, sand, shell, and rock substrates (e.g., oyster reefs and barrier island flats); mangrove wetlands; and estuarine water column. Habitats currently represented at both facilities include estuarine emergent wetlands.

Detailed information on EFH is provided by the Gulf of Mexico Fishery Management Council (1998, 2004, 2005, 2009, and 2011) for a variety of life stages of brown shrimp, white shrimp, red drum (*Sciaenops ocellatus*), Gulf stone crab (*Menippe adina*), gray snapper (*Lutjanus griseus*), dog snapper (*Lutjanus jocu*), lane snapper (*Lutjanus synagris*), bonnethead shark (*Sphyrna tiburo*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), and blacknose shark (*Carcharhinus acronotus*). Table 9-7 presents species-specific EFH requirements during various life stages of the 10 Federally-managed species known to reside in Gulf of Mexico waters and managed by the Magnuson-Stevens Act. These species could occur in the vicinity of the Calcasieu and Plaquemines Parish facilities. The five applicable fishery management plan authorities for the Gulf of Mexico, and individual species covered by those plans for which EFH was designated, are discussed below. All are applicable to the Plaquemines Parish facility, but for the Calcasieu Parish facility, only the red drum is managed under the EFH in the Gulf of Mexico. This species appears to have a year-round presence that extends into the Calcasieu River (NOAA 2011).

Table 9-7. Designated EFH for listed federally managed species by various life stages identified for Plaquemines and Calcasieu Parishes.

SPECIES	LIFE STAGE	SYSTEM ¹	DESIGNATED EFH
Brown shrimp <i>Farfantepenaeus aztecus</i>	Eggs	M	18-110 m; sand/shell/soft bottom
	Larvae	M/E	<82 m; planktonic; sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	Juvenile	E	<18 m: SAV, sand/shell/soft bottom, emergent marsh, oyster reef
	Adult	M	<14-110 m; sand/shell/soft bottom
White shrimp <i>Litopenaeus setiferus</i>	Eggs	M	9-34 m; sand/shell/soft bottom
	Larvae	M/E	<82 m; planktonic; soft bottom, emergent marsh
	Juvenile	E	<30 m; SAV, soft bottom, emergent marsh
	Adult	M	9-34 m; sand/shell/soft bottom
Red Drum <i>Sciaenops ocellatus</i>	Eggs	M	<46m; nearshore and offshore Gulf of Mexico (GOM)
	Larvae/Postlarvae	E	All estuaries; planktonic, SAV, sand/shell/soft bottom, emergent marsh
	Juvenile	M/E	GOM <5 m; all estuaries, SAV sand/shell/soft/hard bottom, emergent marsh
	Adult	M/E	GOM 1-46 m; all estuaries SAV, pelagic, sand/shell/soft/hard bottom, emergent marsh
Gulf stone crab ² <i>Menippe adina</i>	--	--	REPEALED effective 10-24-11
Gray snapper <i>Lutjanus griseus</i>	Eggs	M	Pelagic; offshore shelf waters, coral reefs
	Larvae	M	Pelagic ; offshore shelf waters, coral reefs
	Post larvae/Juvenile	M/E/F	Coastal waters, estuaries, rivers, mangrove
	Adult	M/E/F	Coastal waters, estuaries, rivers in shallow vegetated areas to deep shelf bank reefs
Dog snapper ³ <i>Lutjanus jocu</i>	--	--	REPEALED effective 1-30-12
Lane snapper <i>Lutjanus synagris</i>	Eggs	M	4-132 m; pelagic
	Larvae	E/M	4-132 m; reefs, SAV
	Juvenile	E/M	<20 m; SAV, mangrove, reefs, sand/shell/soft bottom
	Adult	M	Pelagic 4-132 m ; offshore sand bottoms, reefs
Bonnethead shark <i>Sphyrna tiburo</i>	Adult	M	Shallow coastal waters <25 m over muddy and sandy bottoms
Atlantic sharpnose shark <i>Rhizoprionodon terraenovae</i>	Neonate/YOY ⁴	M	Inlet, estuaries, coastal waters <25 m
	Juvenile	E/M	Shallow coastal waters <25 m; estuaries and bays
	Adult		
Blacknose shark <i>Carcharhinus acronotus</i>	Adult	M	Pelagic; Offshore coastal waters over a variety of bottom types
Sources: GMFMC, 1998, 2004, 2005, 2011 M=Marine; E=Estuarine; F=Freshwater GMFMC, 2011; NMFS, 2013 NMFS, 2013 Newborn/Young-of-year			

Shrimp Fishery Management Plan

Commercially, the white and brown shrimp are the two important penaeid species along the Atlantic and Gulf coasts. Spawning and larval development of these two species occur in the Gulf. They have similar life history stages, are estuarine-dependent and vary seasonally in abundance. Brown shrimp utilize the same nursery grounds as the white shrimp during the growth period from the post larval stage to the adult stage. Marine shrimp are omnivorous scavengers, their diet include polychaetes, nematodes, fish tissue, algae and plant matter. Young brown shrimp move into the estuaries during the late winter and spend several months feeding before beginning the return journey to the Gulf of Mexico to spawn. They normally reach harvestable size and congregate in open bays during May. White shrimp behave similarly but the postlarvae do not reach inshore waters until early summer when brown shrimp are moving out. White shrimp move offshore in the fall when cooling water temperatures trigger a return migration (LSU, 1999).

Red Drum Fishery Management Plan

The red drum occurs in a variety of habitats over different substrates throughout the Gulf of Mexico. Habitats range in depth from about 40 meters offshore to very shallow in estuarine wetlands with substrates that include sand, mud and oyster reefs (GMFMC, 1998). There exists a general Gulfward migration in the late fall and a bayward movement in the spring. After spawning occurs in the Gulf, the planktonic larvae are carried by tidal currents into the quiet, shallow water of estuaries preferring areas with grassy clumps or slightly muddy bottoms. Juveniles develop and become abundant in the shallow water areas in late fall and move into deeper water of the bay as the weather becomes colder, and many may leave the bay systems while others remain. Adults are roving marine predators that opportunistically feed both on and off the bottom on a variety of invertebrate and vertebrate prey including marine worms, crab, shrimp and other fishes.

Stone Crab Fishery Management Plan

NOAA Fisheries Service and the Gulf of Mexico Fishery Management Council conducted a review of all their fishery management plans in 2010 and 2011. It was decided to repeal the Fishery Management Plan for the Stone Crab Fishery of the Gulf of Mexico effective October 24, 2011. Since the stone crab fishery operates primarily in state waters off the coast of Florida, the Florida Fish and Wildlife Conservation Commission voted to extend its management of this fishery into Federal waters (GMFMC, 2011).

Reef Fish Fishery Management Plan

Wetlands and water bottoms have been designated as EFH for the juvenile stage of three species of snapper: gray snapper (*Lutjanus griseus*), dog snapper (*L. jocu*), and lane snapper (*L. synagris*). After Gulf of Mexico Fishery Management Council review of this fishery management plan, the dog snapper was removed from federal protection effective January 30, 2012 (NMFS, 2013b). Gray snapper are found year round on tropical coral reefs in the southern Atlantic and Caribbean, and on live bottom and artificial reefs in the Gulf of Mexico and Mid-Atlantic States. Also known as mangrove snapper, this species is common around mangroves, SAV beds, and coral reefs over muddy, sandy, and rocky substrates. Spawned in offshore pelagic shelf waters, the planktonic larvae migrate inland as the post-larvae begin to utilize shoalgrass and manatee grass beds. Juveniles are found in turtlegrass beds, SAV

meadows, marl bottoms, and mangrove roots within estuaries, bayous, channels, SAV beds, marshes, mangrove swamps, ponds and freshwater creeks (GMFMC, 1998). Adults are found both near-shore and offshore at depths between 90 and 600 feet over hard-bottomed substrates including rocks, ledges, wrecks, and coral reefs. The lane snapper exhibits a similar life history cycle. Spawning occurs offshore, the pre- and post-larvae migrate into vegetated estuaries, while juveniles begin to utilize grass flats, reefs, and offshore areas to depths of 66 ft. (20 m). Adults occupy a wide range of offshore habitats including natural and artificial hard surfaced bottoms and soft mud bottoms in water with salinities near 35 ppt (GMFMC, 2004).

Federally Implemented Fishery Management Plan, Small Coastal Sharks

Portions of southern Louisiana near the Gulf of Mexico also serve as EFH for the neonate (newborn), juvenile, and adult life stages of Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), and for adult bonnethead shark (*Sphyrna tiburo*), and blacknose shark (*Carcharhinus acronotus*) (NMFS 2009).

Typically sharks move inshore during March and April, remain inshore during the summer and early fall and then relocate offshore around October. When compared to the larger shark species, these small coastal sharks exhibit relatively productive life history strategies such as rapid growth, early maturity, and annual reproduction in addition to high population growth rates. The Atlantic sharpnose shark, one of the smallest coastal shark species, spawn and hatch offshore, migrate to coastal bays during the spring and move among adjacent bays during summer. They are tolerant of low salinities often entering rivers and are common in bays, estuaries, and shallow offshore areas. The EFH for the early life stages (e.g., neonate/young-of-year/juvenile) of the bonnethead and blacknose sharks have relatively small geographical ranges in the Gulf of Mexico while each adult stage is widely distributed. Development of young bonnethead shark occurs in the continental shelves, shallow bays, and estuaries found along the Texas, Mississippi, Alabama, and Florida coastlines. Adults begin to expand their territory to include the coastal waters of Louisiana and are typically found in depths ranging from 32 to 262 feet where they feed upon small fish and invertebrates. Young blacknose sharks utilize the shallow muddy and sandy channels adjacent to seagrass habitats along the Atlantic coastlines of North Carolina, South Carolina, Georgia, and Florida, and the Gulf of Mexico coastlines of Florida and Alabama. Adults extend their range into the coastal waters of Mississippi, Louisiana, and Texas.

Environmental Consequences

This section describes the potential project impacts at both facilities to marine and estuarine fauna, including EFH as a result of facility construction and operation. EFH found at both facilities include emergent wetlands, oyster reefs, estuarine water column, and estuarine unconsolidated substrate. Riverine habitat and emergent wetlands habitat near the two proposed facilities could potentially function as EFH during periods of inundation for the following species: juvenile and adult brown and white shrimp, larval to adult red drum, juvenile and adult gray snapper and blacknose shark, juvenile lane snapper, and adult bonnethead shark. Of these, gray snapper and the three shark species, are considered rare or not present in the Calcasieu or Mississippi rivers, and therefore, are not likely to occur in the vicinity of the two proposed facilities.

In addition to being designated as EFH, the tidally influenced wetlands, seagrass, mud, clay, and sand substrates and shallow water habitats in the vicinity of both facilities provide nursery, foraging and

refuge habitats that support various recreationally and economically important marine fishery species such as spotted seatrout (*Cynoscion nebulosus*), southern flounder (*Paralichthys lethostigma*), Atlantic croaker (*Micropogonias undulatus*), black drum (*Pogonias cromis*), Gulf menhaden (*Brevoortia patronus*), striped mullet (*Mugil cephalus*) and blue crab (*Callinectes sapidus*). Such estuarine-dependent species serve as prey for other managed fisheries such as red drum, snappers and sharks.

Calcasieu Parish Facility

Construction of the facility could impact EFH in the vicinity of the proposed intake and outfall structures. Impacts to habitats would be limited to the bottom sediment and water column. The extent of area affected during site construction would primarily depend on the dimensions of construction easements. Direct impacts to EFH bottom sediments would occur from removal of habitat during excavation, disturbance or destruction of habitat from pipeline installation, and conversion of bottom substrate along some portion of the proposed pipeline (soft bottom substrate would be converted to hard structure) at the placement of the water intake structure. Trenching of sediment to install the proposed pipeline and intake would directly impact EFH through disturbance and/or conversion of benthic habitat.

Installation could result in a short-term loss of the benthic forage organisms that juvenile and adult fish species feed upon. The number of organisms impacted in this way would be minor, and would not result in population level impacts. The intake of water from the Turn Basin could result in the minor entrainment and impingement of aquatic organisms; however, this is expected to be minor because the intake screen and location would be designed to minimize entrainment and impingement of organisms.

A narrow band of 2.02-acres of tidal wetlands composed of smooth cordgrass (*Spartina alterniflora*), bulrush, cattail, and groundsel tree dominate the outfall area proposed for the Calcasieu Parish facility. However, since growth was sparse and located above the tide line, this area would not function as fish habitat. Because there was no submerged aquatic vegetation observed at the Calcasieu Parish facility, no construction impacts to EFH would be anticipated.

During the construction and operation of the facility, water will be supplied from the Turn Basin into storage reservoir ponds located within the proposed project site. Water from the source water supply systems would be micro-screened, UV disinfected, and sand filtered before use in the facility to reduce pollutant discharge and fish interception from the Turn Basin. The amount of water withdrawal from the Turn Basin is anticipated to be minimal compared to the amount of water already present; therefore, there will be little to no effect on water quality of EFH anticipated as a result of water withdrawn from the Turn Basin.

The facility would employ RAS technology to increase overall efficiency and reduce source water volume requirements. The indoor systems would be expected to operate using 95 to 99 percent re-circulation with water treatment. The amount of water withdrawal from the Turn Basin is anticipated to be minimal compared to the amount of water already present; therefore, little to no effects on EFH is anticipated as a result of water withdrawal.

Operation of the Calcasieu Parish Facility would result in long-term, minor impacts to an unnamed tributary of the Intracoastal Waterway from the discharge of effluent water (see Figure 9-23 for location

of tributary). It is expected that this impact on the water quality of the EFH would be minor because the treatment of effluent in lined, 0.5-acre settling ponds would be designed to meet applicable LPDES discharge standards. These effluent ponds would incorporate drainage structures used to dry the ponds for the removal of sediment to reduce potential turbidity in receiving waters.

If found in proximity to construction activities, oysters could be temporarily affected by elevated suspended sediment concentrations similar to episodic increases caused by vessel traffic and storm events; however, only minor temporary impacts are expected.

The estuarine water column is sensitive to the vertical and horizontal distributions of waterborne constituents such as salinity, temperature, dissolved oxygen, nutrients, turbidity, all influenced directly by freshwater inflow from inland sources.

Temporary and minor direct impacts to the bottom sediment disturbed by equipment during the construction phase and the estuarine water column would result from the incidental suspension of solids and turbidity, the release of potential contaminants contained within the sediments, and a reduction in the dissolved oxygen (DO) levels in the area as a result of the release of oxygen demanding materials such as organic materials contained within the sediments. Any impact associated with contaminated sediments, if such sediments are present, would be insignificant and temporary. Theoretically, DO concentrations along the proposed pipeline corridor could be reduced however; any impacts would be localized and temporary.

The most likely impact to shellfish and finfish from construction activities in the water would be temporary behavioral or avoidance of the area. The duration of avoidance for these species would be determined by construction time expended in/near the water, but a rapid return to normal distribution and behavior would be anticipated. EFH supporting all life stages of red drum have been identified in the area of the proposed pipeline route. Due to their mobility, this EFH-managed species would be able to escape the construction area. Benthic organisms, such as clams, worms, and other infauna within the construction area would be directly affected. Larger, more mobile benthic and epibenthic species would experience temporary displacement. Since construction activities would not have a substantial effect on sessile species occupying a small portion of the open water benthic community, the species inhabiting the areas of construction activity would be expected to re-establish from adjacent populations. Therefore, impacts would not be expected to be long-term or significant.

During the construction of the facility, equipment and transport vehicles could potentially release minor amounts of petroleum products into the water system and wetland areas through operational use and spillage. Given the small footprint of the facility, pollutants released during facility construction will result in minor impacts to EFH. Water quality impacts to the pelagic water column could occur as a result of accidental spills of petroleum lubricants and fuel during pipeline construction. Impacts from hydrostatic testing of the pipeline could occur from toxic effects of chemical additives after discharge of the used test water. Hydrostatic test water should be treated, and discharges would be conducted in accordance with applicable Louisiana Pollution Discharge Elimination System (LPDES) requirements.

BMPs such as turbidity curtains, erosion control screens, and staked hay bales would be used to reduce or eliminate erosion and elevated turbidity during the construction phase. Overall, impacts would be minor because of the small footprint of the intake/outfall structures in the waterways near both facilities. In the long term, the aquatic community could benefit from the facilities' research activities that have a potential to improve management of marine species.

The release of hatchery-produced fish will occur as part of LDWF's research and management programs and is not intended to affect local or regional native stock. Thus, no adverse impacts to federally-managed species are expected to result from introduction of hatchery produced specimens.

Plaquemines Parish Facility

During the construction and operation of the facility, water will be supplied from the Mississippi River into storage reservoir ponds located within the proposed project site. Water from the source water supply systems would be micro-screened, UV disinfected, and sand filtered before use in the facility to reduce pollutant discharge and fish interception from the Mississippi River. The amount of water withdrawal from the Mississippi River is anticipated to be minimal compared to the amount of water already present; therefore, there will be little to no effect on EFH water quality as a result of water withdrawn from the Mississippi River is anticipated.

The facility would employ RAS technology to increase overall efficiency and reduce source water volume requirements. The indoor systems would be expected to operate using 95 to 99 percent re-circulation with water treatment. The amount of water withdrawal from the Mississippi River is anticipated to be minimal compared to the amount of water already present; therefore, little to no effects on EFH is anticipated as a result of water withdrawal.

Operation of the Plaquemines Parish facility would result in long-term, minor impacts to an inland marsh of the Barataria Estuary from the discharge of effluent water. The water leaving the effluent ponds would enter an existing drainage ditch system that crosses LA 23 and discharges into an inland marsh of the Barataria Estuary. These effluent ponds would incorporate drainage structures used to dry the ponds for the removal of sediment to reduce potential turbidity in receiving waters. This impact on EFH water quality would be expected to be minor because the treatment of effluent in 0.5 acre settling ponds would be designed to meet applicable LPDES discharge standards.

Since no extensive, open water habitat will be adversely affected by this project, impacts to EFH bottom sediment, EFH estuarine water column, and EFH-managed species during active over-land construction would be minor and largely temporary. Erosion controls would be implemented to prevent discharges of storm water runoff that can have a significant impact on sediment transport and water quality to receiving waters.

The primary operational impact to EFH-managed species during operation of the proposed Plaquemines Parish facility would be impingement and/or entrainment in the renovated existing Mississippi River water pumping system and related piping systems. Mortality of mobile species in both juvenile and adult life stages would not be expected, but these species would be temporarily displaced from their habitat. Water intake velocity of 0.5 foot per second or less reduces the potential for fish egg and larval

mortality through the impingement and/or entrainment of ichthyoplankton. Because the estimated impingement/entrainment usually represents such a small percentage of the general standing crop of EFH-managed species in general, these impingement/entrainment losses are not expected to affect the general finfish population within the Mississippi River, nor specifically the EFH-managed species. EFH related to water resources associated with water intakes are considered minor, but long term because they would continue for the life of the proposed facility.

If found in proximity to construction activities, oysters could be temporarily affected by elevated suspended sediment concentrations similar to episodic increases caused by vessel traffic and storm events; however, only minor temporary impacts are expected.

Temporary and minor direct impacts to the bottom sediment and water column would result from the incidental suspension of substrate disturbed by equipment during the construction phase. The most likely impact to shellfish and finfish from construction activities in the water would be temporary behavioral or avoidance of the area. The duration of avoidance for these species would be determined by construction time expended in/near the water, but a rapid return to normal distribution and behavior would be anticipated. Benthic organisms, such as clams, worms, and other infauna within the construction area would be directly affected. Larger, more mobile benthic and epibenthic species would experience temporary displacement. Since construction activities would not have a substantial effect on sessile species occupying a small portion of the open water benthic community, the species inhabiting the areas of construction activity would be expected to re-establish from adjacent populations. Therefore, impacts would not be expected to be long-term or significant.

During the construction of the facility, equipment and transport vehicles could potentially release minor amounts of petroleum products into the water system and wetland areas through operational use and spillage. Given the small footprint of the facility, pollutants released during facility construction would result in minor impacts to EFH.

BMPs such as turbidity curtains, erosion control screens, and staked hay bales would be used to reduce or eliminate erosion and elevated turbidity during the construction phase. Overall, impacts would be minor because of the small footprint of the intake/outfall structures in the waterways near both facilities. In the long term, the aquatic community could benefit from the facilities' research activities that have a potential to improve management of marine species.

The production of baitfish is not intended to affect local or regional native stock. Thus, no adverse impacts to federally-managed species are expected to result from introduction of hatchery produced specimens.

9.8.6.9 Protected Species

Both Facilities

Affected Resources

Plants and animals with federal classifications of Endangered or Threatened are protected under the Endangered Species Act (ESA), as amended. In addition, Candidate species have sufficient information to

warrant listing, but statutory protection is precluded by higher listing priorities. Section 7 of the ESA requires federal agencies to consult with the USFWS or National Marine Fisheries Service regarding any actions that may adversely affect listed species. Protection is also afforded to Louisiana state-listed species, and the LDWF enforces the state regulations.

Based on the USFWS Critical Habitat Mapper (<http://criticalhabitat.fws.gov/crithab/flex/crithabMapper>) no critical habitat for federally listed species has been designated within the Plaquemines Parish or Calcasieu Parish project locations. Species habitat requirements, aerial photographs, and street level views (Google Maps) were reviewed to determine if potential habitat exists for any federal or state-listed species. For the Calcasieu facility, determination of the presence or absence of suitable habitat is based on a review of species' habitat requirements and field observations from an August 2013 site visit. Federal- and state-listed species and the habitat determinations for both facilities are included in Table 9-8.

Table 9-8. Endangered, threatened, and rare species with potential to occur at the proposed facilities in Calcasieu and Plaquemines Parishes.

COMMON NAME/ SCIENTIFIC NAME	LISTING STATUS	FACILITY	PREFERRED HABITAT AND POTENTIAL FOR OCCURRENCE
Piping plover <i>Charadrius melodus</i>	Federal: Threatened State: Threatened	Plaquemines	Habitat: Open, sparsely vegetated coastal beaches Potential: No suitable habitat
Peregrine falcon <i>Falco peregrinus</i>	Federal: None State: Threatened	Plaquemines	Habitat: Open areas along the coast Potential: Yes, facility ponds may attract birds which are prey for falcons
Bald eagle <i>Haliaeetus leucocephalus</i>	Federal: Delisted State: Endangered	Calcasieu, Plaquemines	Habitat: Nests in large trees near open water, primarily in southeast LA Potential: Yes, potential winter habitat available in the bottomland forested areas on the Calcasieu property
Brown pelican <i>Pelecanus occidentalis</i>	Federal: Delisted State: Endangered	Plaquemines	Habitat: Bays, tidal estuaries or along the coast, nests in shrub thickets within dunes of barrier islands, feeds in deep and shallow coastal waters Potential: No suitable habitat
Red-cockaded woodpecker <i>Picoides borealis</i>	Federal: Endangered State: Endangered	Calcasieu	Habitat: Mature, longleaf pine savannah Potential: No suitable habitat
Sprague's pipit <i>Anthus spragueii</i>	Federal: Candidate State: None	Calcasieu, Plaquemines	Habitat: Open prairie or fields Potential: Low, former agricultural pasture at Plaquemines facility may have suitable wintering habitat
Red wolf <i>Canis rufus</i>	Federal: Endangered State: Extirpated	Calcasieu	Habitat: Upland and lowland forest, shrubland, river bottoms, coastal prairies and marshes Potential: No, believed to be extirpated from LA
West Indian manatee <i>Trichechus manatus</i>	Federal: Endangered State: Endangered	Plaquemines	Habitat: Marine open water, bays, and rivers Potential: No suitable habitat
Green sea turtle <i>Chelonia mydas</i>	Federal: Threatened State: Threatened	Plaquemines	Habitat: Warm bays and oceans, seagrass beds, estuaries; mainland beaches and islands Potential: No suitable habitat
Hawksbill sea turtle <i>Eretmochelys imbricata</i>	Federal: Endangered State: Endangered	Plaquemines	Habitat: Warm bays and shallow portions of oceans; seagrass beds; estuaries; mainland beaches and islands (nesting). Potential: No suitable habitat
Kemp's Ridley sea turtle <i>Lepidochelys kempii</i>	Federal: Endangered State: Endangered	Plaquemines	Habitat: Warm bays and coastal waters; tidal rivers; estuaries; sea grass beds; sandy coastal beaches are used for nesting. Potential: No suitable habitat
Leatherback sea turtle <i>Dermochelys coriacea</i>	Federal: Endangered State: Endangered	Plaquemines	Habitat: Open ocean and deeper waters of the Gulf and coastal bays; coastal beaches and barrier islands (nesting). Potential: No suitable habitat
Gulf sturgeon <i>Acipenser oxyrinchus desotoi</i>	Federal: Threatened State: Threatened	Plaquemines	Habitat: All saltwater habitats, except during the spawning season when it is found in major rivers that empty into the Gulf of Mexico Potential: No suitable habitat

COMMON NAME/ SCIENTIFIC NAME	LISTING STATUS	FACILITY	PREFERRED HABITAT AND POTENTIAL FOR OCCURRENCE
Pallid sturgeon <i>Scaphirhynchus albus</i>	Federal: Endangered State: Endangered	Plaquemines	Habitat: Large rivers in Southeast United States, prefers the main channels of excessively turbid rivers in areas with strong currents over firm sandy bottom Potential: No suitable habitat
Sources: USFWS Information, Planning, and Conservation System (IPaC) Official Species List for Plaquemines and Calcasieu Project Locations (September 12, 2013), Louisiana Natural Heritage Program - Species by Parish Lists for Calcasieu and Plaquemines Parishes (September 12, 2013), LDWF Rare Animal and Plant Tracking Lists and Fact Sheets, NatureServe Explorer (http://www.natureserve.org/explorer/), Native Plant Information Network (http://www.wildflower.org/explore/).			

Environmental Consequences

Suitable habitat could be present at one or both facilities for the peregrine falcon, bald eagle, and Sprague’s pipit.

The peregrine falcon typically nests on cliffs in the north and western regions of the U.S., and it has been documented using buildings for nesting in the eastern U.S. Historically, breeding falcons have also used cavities in large trees in the southern U.S. Wintering falcons are typically found in open coastal areas, where they feed primarily on other birds, including small passerines, shorebirds, doves, pigeons, and ducks. No suitable nesting habitat occurs at either project location; however, the hatchery ponds may attract piscivorous bird species which may be prey for wintering falcons. No suitable roosting habitat occurs at either project location, so falcons would not use either site for cover or roosting, but a transient foraging falcon could be observed feeding at a site. Due to the lack of suitable habitat and transient occurrence of a foraging falcon, the proposed projects are not likely to adversely affect the species.

The bald eagle is a large raptor which breeds and winters across the U.S. and North America. Eagles typically nest near open water bodies in large trees but also may nest in other structures capable of supporting the large stick nests. Wintering eagles use similar habitat during the winter, including major river corridors, large lakes and reservoirs, and coastal areas. In Louisiana, the bald eagle breeds mostly in river and coastal areas of southeast Louisiana. Wintering eagles may occur along other rivers and lakes or reservoirs across Louisiana. Eagles are primarily piscivorous but also steal food from other raptors and scavenge available carrion. The bald eagle may occur at either facility as a transient forager, but the lack of suitable roosting and nesting habitat at the sites precludes the occupation of the project areas by a breeding or wintering eagle. Due to the lack of suitable habitat and transient occurrence of a foraging eagle, the proposed projects are not likely to impact the species.

The Sprague’s pipit is a small, cryptic, prairie grassland bird which breeds in the northern U.S. and Canada and winters in the southern U.S. and northern Mexico. The Sprague’s pipit prefers dry, open grasslands with no shrubs or trees to breed and winter. The pipit is strictly a ground nesting species and feeds primarily on insects and seeds. The pipit has been declining due to conversion of grassland to agriculture and grazing. The project locations are within the wintering range of the pipit; however, only a 1.5 acre portion of the Plaquemines Parish facility site, on the southwest side of Highway 23, may contain suitable wintering habitat. Due to the small size of this parcel and historic agricultural use of the site, the proposed impacts are not likely to impact the Sprague’s pipit.

Consultation under the ESA will be initiated with USFWS to evaluate potential impacts to listed, proposed, or candidate species. Any measures determined necessary by USFWS or LDWF to avoid or minimize impacts to listed or otherwise protected species will be implemented by the Trustees.

9.8.6.10 Human Uses and Socioeconomics

9.8.6.10.1 Socioeconomics and Environmental Justice

Calcasieu Parish Facility

Affected Resources

The Calcasieu Parish facility is located entirely in Calcasieu Parish, near the Calcasieu River and several lakes and canals. The land near the facility is characteristic of rural lands developed for residential areas and port-side industries.

In 2010, the total population of the block group intersecting the Calcasieu Parish facility was 10,014. According to the U.S. Census Bureau, the population of Calcasieu Parish has increased by about five percent over the past 10 years from 183,577 in 2000 to 192,768 in 2010. Approximately 13 percent of the population in the block group intersecting the Calcasieu Parish facility is considered to be minority. By contrast, 29 percent of the Calcasieu Parish population is considered to be minority.

The block group containing the Calcasieu Parish facility has a median household income of \$40,852, which is above the 2011 HHS poverty guideline. The median household income for Census Tract 1800 (which includes this block group) is \$46,037.

Environmental Consequences

The proposed project would not be expected to change the socioeconomic conditions surrounding the Calcasieu Parish facility or generate pressure on housing or public services that could not be absorbed by the existing infrastructure. The proposed project would be anticipated to support community cohesion by providing permanent and temporary employment for local residents. As estimated by LDWF, the proposed project would create 8 permanent jobs (1 manager, 1 supervisor, 3 biologists, and 3 technicians). The project engineer estimates that 30 construction related jobs would be generated for 18 months during the construction of the facility. Beneficial economic effects would be associated with the project (employment and visitors).

Environmental Justice Analysis

In this analysis, an analytical unit, such as a block group, census tract, or parish, 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 areas 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 Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There are no identified minority and low income populations located in the vicinity of the Calcasieu Parish site. Furthermore, there are no high and adverse impacts anticipated from the proposed project.

Plaquemines Parish Facility

Affected Resources

The Plaquemines Parish facility is adjacent to the Mississippi River and many of the commercial and industrial developments in the area depend on fisheries and on marine vessels utilizing the river for trade and transport. The land surrounding the Plaquemines Parish facility is used for industrial and agricultural uses.

In 2010, the total population of the U.S. Census Bureau block group intersecting the project area was 834. According to the U.S. Census Bureau, the population of Plaquemines Parish has decreased by about 14 percent over the past ten years from 26,757 in 2000 to 23,042 in 2010.

Approximately 65 percent of the population in the block group (Block Group 1 of Census Tract 504) intersecting the project area is considered to be minority. Approximately 13 percent of the population in the census tract containing the Plaquemines Parish facility is considered to be minority, whereas Plaquemines Parish as a whole is approximately 30 percent minority.

The block group containing the Plaquemines Parish facility has a median household income below the poverty guideline. Block Group 1 of Census Tract 504 has a median household income of \$19,405 while the whole of Census Tract 504 has a median household income of \$36,354.

Environmental Consequences

The proposed project would not be expected to change the socioeconomic conditions surrounding the Plaquemines Parish facility or generate pressure on housing or public services that could not be absorbed by the existing infrastructure. Although the immediate area surrounding the project site has a significant minority population, the proposed project would not result in adverse impacts to these groups. The proposed project would be anticipated to support community cohesion by providing several permanent and temporary jobs for local residents. As estimated by LDWF, the proposed project would generate 3 permanent positions (2 biologists, 1 technician). The project engineer estimates that 20 construction related jobs would be generated for 12 months during the construction of the facility. There would be beneficial economic effects associated with the increased temporary and permanent employment and income generated by visitors.

Environmental Justice Analysis

As described above, 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 Trustees find that this project location does not meet the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. Although the population in the immediate vicinity of the project area (Block Group 1 of Census Tract 504) is considered to be minority and low-income, the project would not result in a high and adverse impact to any of the analyzed resource categories, including environmental and economic categories.

9.8.6.11 Cultural Resources

The potential for cultural resources within the proposed project locations were investigated in preparation for compliance with both NEPA and Section 106 of the National Historic Preservation Act, as amended (“NHPA”). NEPA requires consideration of important historic and cultural aspects of our national heritage, while Section 106 of the NHPA requires federal agencies to “take into account” the “effect” that an undertaking will have on “historic properties.” Historic properties are those included in or eligible for inclusion in the National Register of Historic Places (NRHP) and may include structures, buildings, districts, objects, and sites. In accordance with the Advisory Council on Historic Preservation (ACHP) regulations pertaining to the protection of historic properties (36 C.F.R. 800.4), federal agencies are required to identify and evaluate historic-age (50 years or older) resources for NRHP eligibility and assess the effects that the undertaking would have on historic properties.

Calcasieu Parish Facility

Affected Resources

Project historians reviewed the NRHP and the Louisiana Cultural Resource Map (sponsored by the Louisiana Department of Culture, Recreation, and Tourism [LDCRT]) to identify any previously documented historic and archeological historic resources in the project area. Under the NHPA, the Louisiana Office of Cultural Development (LOCD) within LDCRT is given the role of the State Historic Preservation Office (SHPO). Archeologist Clayton M. Tinsley conducted initial visits to the proposed Calcasieu Parish facility location on November 7 and 8, 2011. HDR cultural resource staff completed additional field work at the Calcasieu Parish facility location the week of August 19-23, 2013.

A Phase I cultural resources survey of the project area was conducted to determine all potential impacts to cultural resources as required by NEPA and Section 106 of NHPA. A Phase I survey was conducted of the Calcasieu Parish facility site in August 2013 and did not identify any prehistoric archaeology. The survey did record one historic age archaeological site, which likely represents the scattered remains of a domestic dwelling dating to the 1930s or 1940s. The historic-age site was recorded at the southeast intersection of Joe Ledoux Road and Big Lake Road. The site lacked contextual integrity and would not

be recommended as eligible for listing in the NRHP. No further work would be recommended for this facility.

Environmental Consequences

Because no NRHP-eligible historic resources were found during the Phase I survey of the Calcasieu Parish facility site, the proposed project would not be expected to have adverse impacts on cultural resources. A complete review of this project under Section 106 of the National Historic Preservation Act 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

Plaquemines Parish Facility

Affected Resources

The facility would be located directly adjacent to the levee of the main channel of the Mississippi River. The Plaquemines Parish facility location has been heavily affected by development, land modification, and hurricanes. Two historic-age domestic residences were identified and photographed within the Plaquemines Parish location during a visit conducted in 2011 by HDR Archaeologist Clayton Tinsley. The photographs were subsequently examined by HDR Architectural Historian Ann Keen. The second building (the only one in existence today) has been heavily damaged by recent storm events. Historic-age cultural resources could be potentially affected in the project area. However, no known prehistoric cultural resources were discovered during that initial visit.

Environmental Consequences

The Plaquemines Parish facility has a low potential for buried cultural resources because of the significant alterations to the site; therefore no archaeological field work is anticipated to be required for this project facility location. The original historic-age houses have been either removed or extensively damaged. There is a very low probability that the remaining structure or any potential cultural resources would qualify for NRHP eligibility, therefore no direct or indirect effects are anticipated. As environmental review continues, direct and indirect effects of the proposed project on cultural resources along with any relevant planned mitigation measures of the Plaquemines Parish facility would be determined upon review of this project under Section 106 of the NHPA.

9.8.6.12 Infrastructure

Calcasieu Parish Facility

Affected Resources

The Calcasieu Parish facility is located off Big Lake Road, which is a two-way two-lane, undivided minor arterial. Based on information gathered from the LaDOTD, the flow of vehicular traffic appears relatively light along the portion of the highway adjacent to the site. Currently, there is no known infrastructure for onsite water supply.

Based on information from Louisiana One Call, Entergy provides electric service in the area and has electrical poles along Big Lake Road. Centerpoint Energy has a gas main in the area from which service can be extended; however, they do not have a gas main adjacent to the proposed project site.

Environmental Consequences

When in full operation, the facility is projected to attract approximately 15,000 visitors per year, translating to an average of 55 visitors per day. Carpooling is typical for a facility of this type; therefore, the number of vehicles that would approach the facility could be expected to be much lower than the number of visitors. The facility would be expected to mostly attract recreational road users (visitors on weekends), and as such, should not greatly impact the Annual Average Daily Traffic in the area. Although no major road improvements would be anticipated because of this project, minor improvements such as an exclusive right turn lane could be considered in the event that traffic studies determine the need for road improvement. Some traffic control devices such as reduced speed signage could also be necessary to accommodate the increase in vehicular and pedestrian traffic.

It is not anticipated that during construction or operations the increase in traffic would substantially affect the circulation network. A traffic control plan would be instituted during construction to provide for safe ingress/egress of construction workers, equipment and materials (e.g., scheduling, staging, signage, flagmen). With the incorporation of a traffic control plan, the effects associated with construction activities would be minimized.

During final design, the localized circulation network would be reviewed by a qualified traffic engineer to ensure that there are no adverse issues related to turning movements, queuing, ingress/egress, etc. Signage (in accordance with all local requirements) to the facility could be implemented at final design; however, at this phase of development, those types of details are unknown. If signage was included in the final plans, effects to traffic would be further minimized.

Water for the Calcasieu Parish facility would be sourced from proposed onsite wells and the offsite Turn Basin – a branch of the Calcasieu shipping canal and the Gulf Intracoastal Waterway. The offsite water supply basin is located approximately 0.5 miles north of the site; therefore a conveyance system is proposed to transport water to the site. Water from the basin will gravity-flow through a proposed intake screen and then into an adjacent concrete sump. Pumps within the sump are proposed to pump water at the rate of 500 – 1,000 gpm to the ponds through a proposed sub-surface 10-inch pipe. Two on-site wells, one for potable water and another for process water are also proposed to service the 2,400 ft² building and ponds, respectively. Potable water withdrawn from the wells would be needed for employees and visitors to the facility. Due to the limited number of staff needed to support the facility, it would be expected that groundwater supplies would be adequate to support the facility. During final design, an assessment would be conducted to identify the daily capacity of water needed to support the site and conduct an assessment of the groundwater supplies to determine if adequate volume of water is available. This assessment would need to verify that there would be no adverse effects on existing users of the groundwater supplies. In the event that groundwater supplies were found to not be available, potable water would be transported to the site. Other water needed for the facility would be

marine (salt water). It is, therefore, expected that groundwater would not be adversely affected by the project.

Design plans have not been formulated at this time; however, it would be expected that electric service would be supplied from the nearest pole along Big Lake Road. The type of connection will depend on the electric load required to operate the facility. During final design, coordination with the electric provider (Entergy) would ensure that all improvements are installed as required.

Based on discussions with Centerpoint Energy, a natural gas line can be extended to serve the proposed facility. As noted for electric service, design plans have not been formulated at this time. During final design, coordination with Centerpoint Energy would ensure that all gas facilities are installed as required.

Plaquemines Parish Facility

Affected Resources

The site for the proposed Plaquemines Parish facility is located off LA 23. Locally known as Belle Chasse Highway, LA 23 is a two-way, four-lane, divided road. A driveway access to the facility is located on the northbound side of the highway and there is a U-turn in the vicinity of the site for southbound traffic to obtain access to the property. The LaDOTD provides live traffic information for the portion of Belle Chasse Highway that is adjacent to the facility. These broadcasts indicate that there is no perceivable traffic congestion (e.g. traffic slow-downs) in the area even during peak morning and afternoon hours, suggesting that there is capacity for a higher usage.

A pump station and pipeline still exists near the Mississippi River; however, a conditions assessment of the pump and water line has not been conducted. Water service is available and provided by Severn Trent Services with meters already in place. Entergy currently has infrastructure along LA 23 and supplies electric power along that corridor. There is an existing electricity connection to the Plaquemines Parish facility. Natural gas is available through Atmos Energy from lines in place along LA 23, between Lacrosse Lane and Loafala Lane.

Environmental Consequences

When in operation, the facility is projected to attract approximately 1,000 visitors per year. Due to the current light road usage and the low volume of traffic projected to visit this facility, no major road improvements or installation of traffic signals are anticipated.

It is not anticipated that during construction or operations that the increase in traffic would substantially affect the circulation network. It is assumed that a traffic control plan would be instituted during construction to provide for safe ingress/egress of construction workers, equipment and materials (e.g., scheduling, staging, signage, flagmen). With the incorporation of a traffic control plan, the effects associated with construction activities would be minimized.

During final design, the localized circulation network would be reviewed by a qualified traffic engineer to ensure that there are no adverse issues related to turning movements, queuing, ingress/egress, etc. Signage (in accordance with all local requirements) to the facility may be implemented at final design;

however, at this phase of development, those types of details are unknown. If signage is included in the final plans, there would be no adverse effects to traffic.

Water for facility operations at the Plaquemines Parish facility would be sourced from the Mississippi River. Existing pumps would be used to convey fresh water from the Mississippi River into holding ponds and then to the proposed facility.

Capacity for potable water for use in the building is readily available through Severn Trent Services. According to the provider, two or more water meters are currently in place. Potable water would be supplied to the facility via connections to the trunk line that runs along LA 23.

Although a load sheet was unavailable during discussions with the provider, Entergy anticipates they can service the facility with electric power and does not foresee any issues with regard to load. Based on the current site plan, Entergy may require an onsite pad, built to flood elevation, and use multiple connection points to deliver power.

To provide natural gas service to the facility, Atmos would need to install a service line from LA 23 to the facility point of metering. As noted for the electric services, final design has not progressed to the point of design of the infrastructure. During final design, coordination with Atmos Energy would occur to ensure that all gas facilities are installed as required. Potable water would be provided by Severn Trent Services. At this time, project design has not quantified the amount of water needed and waste water generated by the facility. Due to the fairly small size of the facility, it is not anticipated that this would be a limiting factor. Coordination with the water department would occur to verify that water/wastewater services can be adequately supplied.

Construction and operation of the proposed project is not anticipated to adversely impact the existing infrastructure.

9.8.6.13 Land and Marine Management

Under the Louisiana State and Local Coastal Resources Management Act of 1978, the LDNR Office of Coastal Management (OCM) is charged with implementing the Louisiana Coastal Resources Program (LCRP). OCM's authority derives from Louisiana Revised Statute 49:214.21. The OCM administers the Coastal Use Permit (CUP) program to ensure activities in the Coastal Zone are performed in accordance with the guidelines in the LCRP. The CUP program specifically focuses on activities that may result in the loss of wetlands and aquatic resources. The proposed project would comply with all requirements of the CUP program, ensuring that project activities will have no direct or significant impact on state public resources or the natural and human environment.

Calcasieu Parish Facility

Affected Resources

According to the Calcasieu Parish Police Jury GIS interactive website (<http://cppj.totaland.com/>), the project site for the Calcasieu Parish facility was designated and coded as being zoned for "i2, Heavy Industrial". The area surrounding the project site was largely zoned Heavy Industrial, with the exception of a few small tracts west of Big Lake Road being zoned as "mhp, Manufactured Home Park" and "a1,

Agricultural” and the area adjacent to the east of the project site being zoned as “i2r, Heavy Industrial Restricted” and “r2, Mixed Residential” (see Figure 9-25). The southeast section of the project site was also zoned by Calcasieu Parish as having “Parish Higher Standards”, having a particular provision regulating elevation. The tract is located in Floodzone “AE”, typically having a construction elevation requirement of 11 feet. Due to known flooding in this area, Calcasieu Parish Government has implemented the provision that constructed buildings on this site be elevated to 12 feet (Figure 9-26).

Land uses in the vicinity include agriculture, boat launches, docks, residential housing, barge terminal, oil and gas production, and local industry. There are no schools, churches, cemeteries, hospitals, or other public buildings on the Calcasieu Parish land tract. Natural land features within the tract include emergent wetlands, mima mounds, and forested wetlands. Natural streams, bayous, rivers and lakes surround the location and are used to support recreational and commercial fishing and navigation.

Environmental Consequences

Although the facility location and placement of the intake pump and pipeline are outside of the Louisiana Coastal Zone, a Joint Permit Application would still be submitted to the LDNR OCM and forwarded to the USACE and Louisiana Department of Environmental Quality for Section 10/404 permit review for potential impacts to Waters of the U.S., including wetlands. The proposed project facility and associated discharge would not be expected to have adverse impacts to land use and will have no effect on current land use zoning designated by Calcasieu Parish.



Figure 9-25. Calcasieu Parish facility land use zoning.

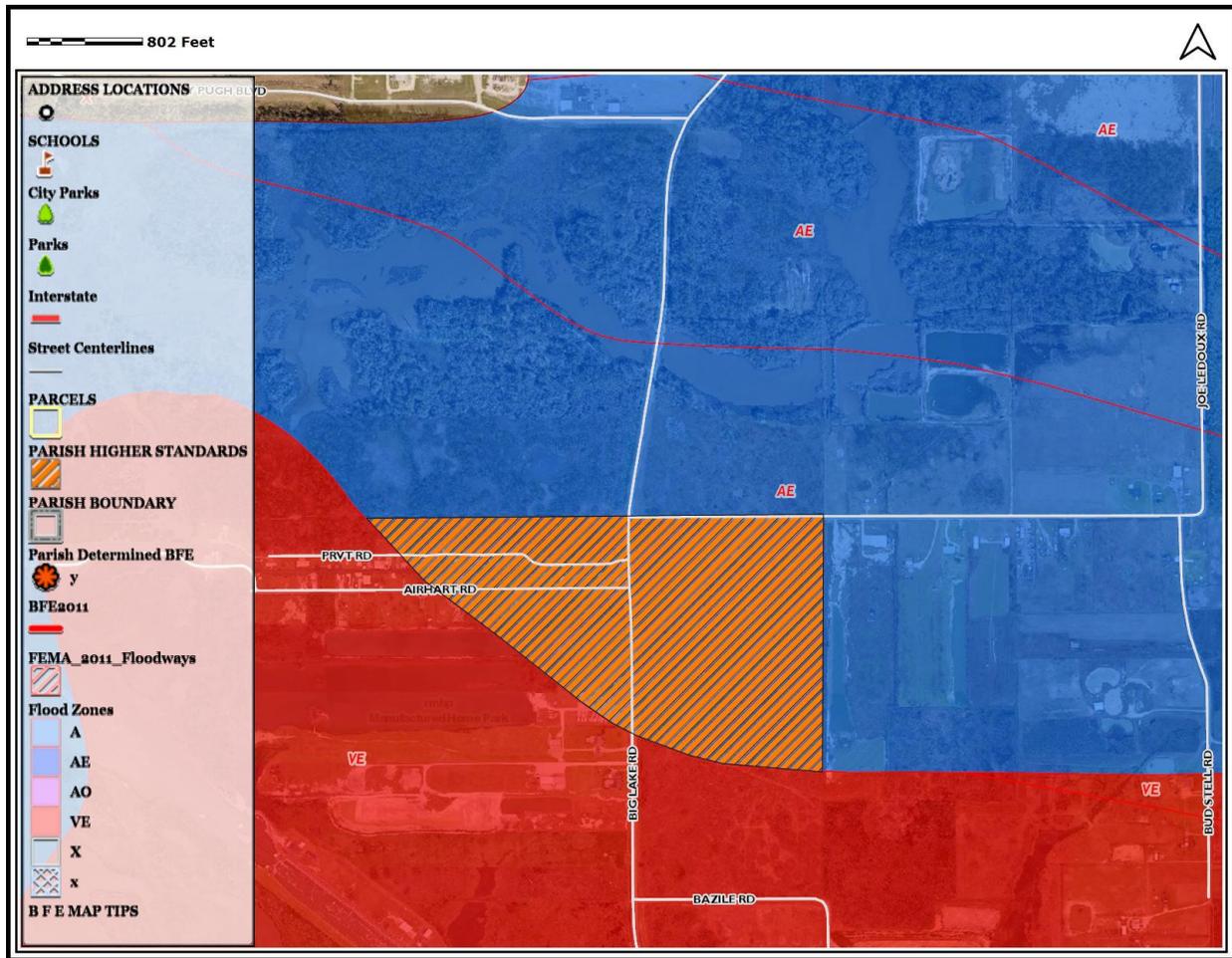


Figure 9-26. Calcasieu Parish facility flood zones.

Plaquemines Parish Facility

Affected Resources

Discussions had with the Plaquemines Parish Planning and Zoning Department revealed that the Plaquemines Parish facility falls within the Plaquemines Parish Flood Plain District. This District comprises areas subject to periodic or occasional inundation from stream overflows, storms, and tidal conditions. The use of property and buildings or structures within the Flood Plain District are subject to residential, commercial, and industrial requirements of the Plaquemines Parish Building and Sanitary Codes. Permitted land use of this property is limited to single and two-family residences, farming and keeping of agricultural livestock, public recreation, fishing/hunting lodges, camps, boat houses/docks, shipyards, marinas/yacht club, oil field services and supply companies, warehouses, mineral extraction and development of natural resources, and ice making plants. Mobile homes and all other commercial and industrial uses of properties within the Flood Plain District are subject to the approval of the Parish Council.

The Plaquemines Parish facility was once State property that was leased as a citrus and coastal plant research facility. The project facility site has already been heavily impacted because of this

development and land modification. Land use in the vicinity includes conventional agriculture, citrus orchards, residential housing, oil and gas production, river transportation, and local industry. Natural land features surrounding the facility are typical of riverine and marsh habitat.

The proposed project area lies entirely within the Louisiana Coastal Zone as designated by LDNR OCM.

Environmental Consequences

The LCRP requires compensatory mitigation for impacts to vegetated wetlands in the Louisiana Coastal Zone. It is likely that the proposed project would require a CUP because the entire Plaquemines Parish facility is located within the Louisiana Coastal Zone. A Joint Permit Application would be submitted to OCM and USACE for a CUP and USACE authorization under Section 10/404. Construction may result in adverse impacts to vegetated wetlands within the footprint of the construction area; these impacts would be mitigated by fulfilling compensatory mitigation requirements. See Section 9.8.6.3 for a description of wetlands on the site.

Improvements and activities associated with this facility would require a Coastal Use Permit and approval from the Parish Council, but would have no impact to land use zoning as it would be consistent with local zoning regulations.

9.8.6.14 Aesthetics and Visual Resources

Calcasieu Parish Facility

Affected Resources

The proposed project would be located at 8277 Big Lake Road in Lake Charles, Louisiana. The facility is undeveloped and its natural land features include emergent wetlands, mima mounds, forested wetlands, streams, bayous, rivers, and lakes. Oil and gas infrastructure is present in surrounding areas, as are port traffic and recreational and commercial fishing.

Plaquemines Parish Facility

Affected Resources

The proposed project would be located at 22193 Highway 23 in Port Sulfur, Louisiana and would consist of construction within a fastland area adjacent to the Mississippi River within the Louisiana Coastal Zone. The landscape surrounding the project area is characteristic of natural riverine habitats and supports rural residential, agricultural, and industrial areas along LA 23 and the Mississippi River.

Both Facilities

Environmental Consequences

The use of large equipment could have a temporary, adverse visual impact during project construction. These short-term construction-related impacts to visual resources would be minor. The design of the proposed Calcasieu Parish facility is intended to have an attractive aesthetic that would blend into the southwest Louisiana landscape and be attractive to visitors. However, it would result in a permanent change to the existing landscape. Impacts to visual and aesthetics as the Calcasieu facility would be long term and minor.

The rehabilitation of the proposed Plaquemines Parish facility would benefit local aesthetics as compared to the current condition, which reflects the adverse impact of hurricane damage. Overall, there would be a long term moderate net benefit to visual and aesthetics as the Plaquemines Parish facility.

9.8.6.15 Tourism and Recreational Use

Calcasieu Parish Facility

Affected Resources

There are limited tourism facilities in Calcasieu Parish near the proposed facility location. The City of Lake Charles has tourism infrastructure, including hotels and restaurants.

Plaquemines Parish Facility

Affected Resources

There are limited tourism facilities in Plaquemines Parish near the proposed facility location. Tourism is primarily associated with fishing and other outdoor recreational activities.

Both Facilities

Environmental Consequences

Both facilities would provide a venue for public recreation and education, as well as a research and production center for marine species to be used by LDWF, local academia, and the general public. It is anticipated that the proposed project would benefit tourism through the recreational and educational use of the project facilities, with the greatest benefit in the vicinity of the Calcasieu Parish facility because of the visitor's center at that location. The proposed Calcasieu Parish facility is anticipated to benefit from convenient access and good exposure, as it would be located off a prominent highway in the area. Interstate access to the Calcasieu Parish facility is available via I-10. Along I-10, around the City of Lake Charles, the Interstate Highway 210 turns south and connects to Highway 385 which splits and leads to Big Lake Road. Local visitors heading from areas to the east of the tract can use E Gauthier Road (Highway 3092).

9.8.6.16 Public Health and Safety and Shoreline Protection

Both Facilities

During the operations of the fish hatchery, chemicals that may be classified as hazardous may be transmitted, stored and used on site in minor quantities. The chemicals that may be considered for use during fish husbandry operations include formalin, chelated copper, praziquantel, oxytetracycline, potassium permanganate, MS222, hydrogen peroxide and tamed iodophors. All chemicals used are to be approved by USDA for fish.

All employers with hazardous chemicals in their workplaces must have labels and Material Safety Data Sheets for their exposed workers, and train them to handle the chemicals appropriately (OSHA 2013). These chemicals will be stored in the appropriate container types (by classification) and will be restricted from public access.

In addition to the hazardous materials discussed above, there is a potential that it may be necessary to transmit, store and handle medications (e.g., antibiotics) to control diseases (e.g., fungal infections) of the fish. Existing regulations are in effect that would result in minor adverse effects. All chemicals will be stored in appropriate containers restricted from the public and with certain chemicals, in explosion proof cabinets/rooms with temperature controls.

In the event of an emergency, police, fire, and hospital facilities would be able to adequately serve the project locations. The Calcasieu Parish Sheriff's office and Cajun Country Fire Department are both located approximately five miles from the site in Lake Charles. Women and Children's Hospital is located approximately six miles from the site in Lake Charles. The Plaquemines Parish Sheriff's office and Port Sulfur Volunteer Fire are both located approximately 10-11 miles from the site in Port Sulfur. The Plaquemines Medical Center is located approximately 12 miles from the site in Port Sulfur.

Shorelines near the Calcasieu Parish facility currently appear to be stable through natural stabilization and manmade features such as articulated concrete matting and vegetation.

Construction of the Plaquemines Parish facility is planned within 1,500-ft of the channelized and highly altered Mississippi River shoreline. The Mississippi River and Tributary levee system bordering the river appears to be stabilizing the shoreline.

Environmental Consequences

The transportation of hazardous materials is regulated by the Department of Transportation. Safe handling, storage and disposal of these types of chemicals are mandated by a variety of Federal and state regulations, including OSHA. Employees whose responsibilities include handling hazardous materials must undergo training. Therefore, with the required adherence to the established regulations required for the transportation, storage and handling of hazardous materials, no adverse effects to public health or environment are expected to occur associated with the use of minor amounts of hazardous materials at the facilities.

Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the site during construction. Construction of the Calcasieu and Plaquemines Parish facilities is not anticipated to have any impacts on nearby shorelines. Shoreline stabilization measures would be incorporated into design as needed in areas where the potential exists for erosion to occur in order to protect marine resources and ensure public health and safety. As a result, no impacts to public health and safety are expected to occur from the implementation of the Proposed Action.

9.8.6.17 Phase I Environmental Site Assessment

As part of due diligence, an ASTM-conforming Phase I Environmental Site Assessment would be completed for both proposed locations as part of the development of negotiated arrangements for long-term land use with the site owners. The first step of a Phase I Environmental Site Assessment is typically an environmental records search that searches for hazardous waste sites on or near the locations of interest. On September 13, 2013, an environmental records search was requested through Environmental Data Resources, Inc. (EDR, Inc.), a national environmental database provider for

hazardous waste sites that are known to regulatory agencies. EDR searched environmental databases for the subject sites, and a buffer zone surrounding the subject sites, for all databases (federal, state, local, and tribal) listed in the American Society for Testing and Materials (ASTM) E 1527-05 guidance for the performance of Phase I Environmental Site Assessments. The distances searched vary for each database (up to 1 mile), in accordance with ASTM requirements, because different issues have different potential travel distances of contaminants. No proposed, active, or delisted National Priority List “Superfund” sites were found within 1 mile of both proposed site locations.

It is important to note that not all of the required elements of an ASTM-conforming Phase I have been conducted yet, only the database search task. A site visit by a qualified Environmental Professional (as defined in ASTM E 1527), review of historical source data, review of specific case files, and interviews with representatives of businesses in the area would be conducted when the Phase I assessments are completed. Based on the Phase I results and conclusions, recommendations for additional investigation or remediation could be proposed at that time.

9.8.7 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), selection of project types emphasizing recreational opportunities (Alternative 3), or selection of a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4). As proposed, the Louisiana Marine Fisheries Enhancement, Research, and Science Center implements restoration techniques within Alternatives 3 and 4.

The proposed Louisiana Marine Fisheries Enhancement, Research, and Science Center would establish state of the art facilities to responsibly develop aquaculture-based techniques for marine fishery management. The proposed project would include two sites (Calcasieu Parish and Plaquemines Parish) with the shared goals of fostering collaborative multi-dimensional research on marine sport fish and bait fish species; enhancing stakeholder involvement; and providing fisheries extension, outreach, and education to the public. 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 minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. The project would provide long-term benefits by supporting the State of Louisiana’s ongoing management of its saltwater sport fishery. The proposed facilities would support research, hatchery production of sport fish and baitfish, and public education and outreach. 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.

9.8.8 References

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9.9 Cumulative Impacts of Phase III Early Restoration Projects Proposed in the State of Louisiana

9.9.1 Introduction

This section analyzes the potential for cumulative impacts to resources to occur as a result of the Phase III early restoration projects proposed in Louisiana. The projects are physically separate from each other and are distributed across a large area of coastal Louisiana. The potential for cumulative impacts was therefore analyzed at appropriate smaller regional scales.

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 Louisiana, DOI intends to adopt existing NEPA analyses, including cumulative impacts analyses, for three locations of the proposed Louisiana Outer Coast restoration project: Chenier Ronquille, Shell Island (East and West Lobes), and Caillou Lake Headlands. These cumulative impact analyses are briefly summarized below in Section 9.9.2. For the remainder of the proposed Phase III projects in Louisiana, three regional analyses were developed 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.

Analysis 1: Breton Sound

Analysis 2: Calcasieu Parish in the vicinity of Lake Charles

Analysis 3: Southeastern Plaquemines Parish

9.9.2 Summary of Existing Cumulative Impact Analyses for Three Barrier Island Locations

As discussed previously, DOI has independently evaluated the LCA EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010), the Chenier Ronquille EA, BA-76, prepared by NOAA (2013) ,and the Louisiana Coastal Area (LCA) Barataria Basin Barrier Shoreline Restoration Final Integrated Construction Report and Final Environmental Impact Statement (EIS) (USACE 2012a) and intends to adopt these three documents to fulfill DOI's NEPA requirements for analysis of the Caillou Lake Headlands, Chenier Ronquille, and Shell Island (East and West Lobes) locations of the Louisiana Outer Coast Restoration project, respectively. The cumulative impact analyses included in these documents consider the direct and indirect impacts of past, present, and reasonably foreseeable future events in the analysis of proposed project consequences, including other Federal, State, local, and private restoration efforts across coastal Louisiana.

The EA analysis completed for Chenier Ronquille (NOAA 2013) and the EIS analysis completed for Shell Island (USACE 2012) considered the effects of the Spill in the analyses included in these documents. The

Spill was not previously considered in the LCA EIS for the Terrebonne Basin Barrier Shoreline Restoration (USACE 2010) that includes analysis of the Caillou Lake Headlands project, and therefore the environmental consequences of the Caillou Lake Headlands alternatives were not considered in light of the Spill. However, the environmental consequences of the Caillou Lake Headlands alternatives would occur regardless of the Spill and are would not materially change because of the Spill.

The proposed implementation of all four locations of the Louisiana Outer Coast Restoration project does not represent a material change in the cumulative impact analyses already completed for the Chenier Ronquille, Caillou Lake Headlands, and Shell Island (East and West Lobes) locations. Each of these cumulative impact analyses already considered other barrier island restoration efforts across coastal Louisiana as part of their analysis of past, present, and reasonably foreseeable future events.

9.9.3 Breton Sound (North Breton Island)

Table 9-9 summarizes the impacts to resources associated with the proposed North Breton Island location of the Louisiana Outer Coast Restoration project. This project location is not grouped together for a cumulative analysis with other proposed Phase III projects in Louisiana because of its location in Breton Sound, on the opposite (east) side of the Mississippi River from the other proposed Phase III projects in Louisiana (see Figure 9-1). This project location is evaluated to determine if the effects of restoration on North Breton Island, when combined with other past, present, and reasonably foreseeable actions in Breton Sound, may result in cumulative effects to resources.

Cultural resource investigations and consultations would be completed for all the proposed Phase III projects that are selected for implementation. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

Table 9-9. Summary of Impacts of Proposed Phase III Early Restoration Project- North Breton Island location of the Louisiana Outer Coast Restoration Project.

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Habitats	Socioeconomics and Environmental Justice	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline
Early Restoration Proposed Project													
North Breton Island	s	s	s	s	+/s	+/s	+/s	+	NE	s	+/s	NE	NE

- Represents an adverse effect

+ Represents a beneficial effect

s Represents a short-term adverse effect

NE represents no effect

+/s represents a long-term beneficial effect, but a short-term adverse effect

The impacts of the proposed North Breton Island location of the Louisiana Outer Coast Restoration project that are most relevant to consider for assessment of cumulative impacts are:

- Short-term, minor adverse effects to water quality and noise during construction.
- Short-term, minor adverse effects to living coastal and marine resources during construction, with an overall long-term major beneficial effect on vegetation, wildlife, and marine and estuarine fauna.
- Short-term, moderate adverse impacts to piping plovers and red knot due to construction and dredging related disturbances, with the proposed project ultimately restoring and increasing the longevity of piping plover critical habitat by restoring dune and beach habitat. Best management practices to protect piping plover, red knot, and piping plover critical habitat will be developed during ESA section 7 consultation with USFWS and will be followed during construction.
- Minor socioeconomic benefits through increased employment during construction. Key past, present and reasonably foreseeable future actions included in this analysis include on-going refuge management activities as discussed in the Delta and Breton National Wildlife Refuges Comprehensive Conservation Plan (CCP) (USFWS 2008) and a variety of on-going general activities in Breton Sound, including marine transportation, on-going oil and gas industry activities, on-going commercial fishing activities, and on-going tourism and recreational activities associated with the Delta and Breton National Wildlife Refuges. No Phase I or Phase II early restoration projects contribute to cumulative impacts for North Breton Island activities.

Past, present and reasonably foreseeable activities in Breton Sound have contributed to adverse cumulative effects to certain resources. Activities that result in coastal land loss contribute to adverse cumulative effects to habitat and living coastal marine resources, including sensitive habitats and protected species. Ongoing activities in Breton Sound, such as marine transportation activities (including shipping and dredging), commercial fishing, and activities associated with the oil and gas industry can contribute to impacts to resources such as water quality, noise, habitats, and living coastal and marine resources. Visitor use at the Delta and Breton National Wildlife Refuges also can contribute to impacts to resources. The Phase I early restoration project “Louisiana Oyster Cultch Project” includes cultch placement locations in Breton Sound. The proposed North Breton Island location of the Louisiana Outer Coast Restoration project is not expected to affect these oyster resources. There are no other Phase I or Phase II early restoration projects that contribute to cumulative impacts for the proposed North Breton Island location of the Louisiana Outer Coast Restoration project.

There are also environmental stewardship and restoration activities that have occurred, are underway or proposed for Breton Sound. For example, on-going refuge management activities are discussed in the Delta and Breton National Wildlife Refuges Comprehensive Conservation Plan (CCP) (USFWS 2008).

Overall, the proposed North Breton Island location of the Louisiana Outer Coast Restoration project would result in minor short-term incremental contributions to effects on geology and substrates, water quality, air quality, noise, and visual resources in Breton Sound, but would not substantially contribute to adverse cumulative impacts in the region for these resources. Although the proposed project would likely result in short-term moderate adverse impacts to protected species, other living coastal and

marine resources, and their habitats, the proposed project would ultimately restore and increase the longevity of habitat, including critical habitat for protected species, on the island. Thus, the project would not contribute incrementally to cumulative adverse impact to protected species or their habitats.

List of past, present and reasonably foreseeable actions that have been considered as part of this analysis:

1. Delta and Breton National Wildlife Refuges Comprehensive Conservation Plan (CCP) (USFWS 2008)
2. On-going marine transportation activities in Breton Sound
3. On-going commercial and recreational fishing activities in Breton Sound
4. On-going oil and gas activities in Breton Sound
5. Visitor use at Delta and Breton National Wildlife Refuges

In addition to foreseeable actions identified in the table 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. Five of these projects are in Louisiana:

1. Caminada Beach and Dune Increment II: Engineering & Design
2. East Timbalier Island: Engineering & Design
3. Mid-Barataria Sediment Diversion: Engineering & Design
4. Lower Mississippi River Sediment Diversions: Planning
5. Increase Atchafalaya Flow to Terrebonne: Planning

The NFWF projects were recently announced. Because the projects in Louisiana focus on engineering and design and planning activities for potential future restoration projects, the Trustees do not believe that they will contribute to the cumulative impacts of the proposed Phase III actions in Louisiana. As more information becomes available, the Trustees may consider the implications of these projects as they relate to the assessment of the cumulative impacts of the proposed Phase III actions in Louisiana. As part of the comments on this Draft Phase III ERP/PEIS, the public is invited to comment on how the proposed projects contribute to cumulative impacts.

9.9.4 Calcasieu Parish in the vicinity of Lake Charles

Table 9-10 summarizes the impacts to resources associated with the proposed Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center. This project location is not grouped together for a cumulative analysis with other proposed Phase III projects in Louisiana because of its location in western Louisiana, more than 200 miles to the west of other proposed projects (see Figure 9-15). This project location is evaluated to determine if the effects of restoration in Calcasieu Parish in the vicinity of Lake Charles, when combined with other past, present, and reasonably foreseeable actions in this area, may result in cumulative effects to resources.

Cultural resource investigations and consultations would be completed for all the proposed Phase III projects that are selected for implementation. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

Table 9-10. Summary of Impacts of Proposed Phase III Early Restoration Projects- Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center.

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Habitats	Socioeconomics and Environmental Justice	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline
Early Restoration Proposed Project													
Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center	-	-	-	s	-	NE	-	+	NE	+/s	+	NE	NE

- Represents an adverse effect

+ Represents a beneficial effect

s Represents a short-term adverse effect

NE represents no effect

+/s represents a long-term beneficial effect, but a short-term adverse effect

The impacts of the proposed Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center that are most relevant to consider for assessment of cumulative impacts are:

- Short-term, minor adverse effects to water quality and visual resources during construction.
- Short-term and long-term minor adverse effects to geology and substrates, hydrology and water quality, air quality, living coastal and marine resources and habitats resulting from construction and operations of the facility. Moderate adverse effects to wetlands on-site would require compensatory mitigation under Clean Water Act Section 404 permitting.

- Short-term and long-term socioeconomic and tourism benefits through increased employment during construction and on-going operation of the facility, including a visitor center.

Past, present and reasonably foreseeable activities in Calcasieu Parish in the vicinity of Lake Charles have contributed to adverse cumulative effects to certain resources. These activities include industrial expansion, commercial development, and restoration and environmental stewardship activities with various types of adverse impacts as well as benefits. Industrial expansion and commercial development projects such as refinery expansion and shopping mall construction would generally have adverse effects on geology and substrates, water quality, living coastal and marine resources, and habitats. The projects are providing socioeconomic benefits and benefits to infrastructure. Restoration and environmental stewardship activities at Black Lake and other locations provide benefits to geology and substrates, hydrology, living coastal and marine resources, and habitats. There are no Phase I or Phase II early restoration projects that contribute to cumulative impacts for the proposed Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center.

Overall, the proposed Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center would result in minor incremental contributions to effects on geology and substrates, hydrology and water quality, air quality, living coastal and marine resources and habitats in Calcasieu Parish in the vicinity of Lake Charles, but would not substantially contribute to adverse cumulative impacts in the region for these resources. Cumulatively, the proposed Calcasieu Parish location could provide a benefit to socioeconomic conditions and tourism and recreation in the region.

List of past, present and reasonably foreseeable actions that have been considered as part of this analysis:

1. ConocoPhillips Refinery Addition
2. Equistar Chemicals Facility Addition
3. Lake Charles Power Center (shopping center) Construction
4. PPG Industries Expansion
5. New export grain terminal at the Port of Lake Charles
6. Other Industrial/Commercial Expansion
7. Black Lake Terracing Project (marsh restoration)

In addition to foreseeable actions identified in the table 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. Five of these projects are in Louisiana:

1. Caminada Beach and Dune Increment II: Engineering & Design
2. East Timbalier Island: Engineering & Design
3. Mid-Barataria Sediment Diversion: Engineering & Design
4. Lower Mississippi River Sediment Diversions: Planning
5. Increase Atchafalaya Flow to Terrebonne: Planning

The NFWF projects were recently announced. Because the projects in Louisiana focus on engineering and design and planning activities for potential future restoration projects, the Trustees do not believe that they will contribute to the cumulative impacts of the proposed Phase III actions in Louisiana. As more information becomes available, the Trustees may consider the implications of these projects as they relate to the assessment of the cumulative impacts of the proposed Phase III actions in Louisiana. As part of the comments on this Draft Phase III ERP/PEIS, the public is invited to comment on how the proposed projects contribute to cumulative impacts.

9.9.5 Southeastern Plaquemines Parish

Table 9-11 summarizes the impacts to resources associated with the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center. This project location is not grouped together for a cumulative analysis with other proposed Louisiana Phase III projects because of its location along the Mississippi River, which is not connected to the locations of the Louisiana Outer Coast Restoration Project or to the Calcasieu Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center, more than 200 miles to the west (see Figure 9-16). This project location is evaluated to determine if the effects of restoration in southeastern Plaquemines Parish, when combined with other past, present, and reasonably foreseeable actions in this area, may result in cumulative effects to resources.

Table 9-11. Summary of Impacts of Proposed Phase III Early Restoration Projects- Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center.

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine	Protected Species	Habitats	Socioeconomics and	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and
Early Restoration Proposed Project													
Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center	s	-	-	s	s	NE	-	+	NE	+/s	+	NE	NE

- Represents an adverse effect

+ Represents a beneficial effect

s Represents a short-term adverse effect

NE represents no effect

+/s represents a long-term beneficial effect, but a short-term adverse effect

Cultural resource investigations and consultations would be completed for all the proposed Phase III projects that are selected for implementation. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

The impacts of the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center that are most relevant to consider for assessment of cumulative impacts are:

- Short-term, minor adverse effects to geology and substrates, noise, and living coastal and marine resources during construction.
- Short-term and long-term minor adverse effects to hydrology and water quality, air quality, and habitats resulting from construction and operations of the facility. Based on conceptual plans, the operation of the hatchery would result in long-term, minor impacts to an inland marsh of the Barataria Estuary from the discharge of effluent water. This impact would be expected to be minor because the treatment of effluent in 0.5 acre settling ponds would be designed to meet applicable LPDES discharge standards.
- Short-term and long-term socioeconomic and tourism benefits through increased employment during construction and on-going operation of the facility.

Past, present and reasonably foreseeable activities in southeastern Plaquemines Parish have contributed to adverse cumulative effects to certain resources. These activities include activities at the site of the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center, such as the past operation of the LSU AgCenter and the current use of the site for the deposition of earthen material. Other activities in southeastern Plaquemines Parish include activities at the port of Venice, commercial development, and restoration and environmental stewardship activities with various types of adverse impacts as well as benefits. Industrial expansion and commercial development projects would generally have adverse effects on geology and substrates, water quality, living coastal and marine resources, and habitats. The projects are providing socioeconomic benefits and benefits to infrastructure. Restoration and environmental stewardship activities in the Parish provide benefits to geology and substrates, hydrology, living coastal and marine resources, and habitats. The Phase I early restoration project “Lake Hermitage Marsh Creation – NRDA Early Restoration Project” is also located in Plaquemines Parish but has no hydrologic connection to the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center and would not affect the same resources. There are no other Phase I or Phase II early restoration projects that contribute to cumulative impacts for the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center.

Overall, the proposed Plaquemines Parish location of the Louisiana Marine Fisheries Enhancement, Research, and Science Center would result in minor incremental contributions to effects on geology and substrates, hydrology and water quality, air quality, living coastal and marine resources and habitats in southeastern Plaquemines Parish, but would not substantially contribute to adverse cumulative impacts

in the region for these resources. Cumulatively, the proposed Plaquemines Parish location could provide a benefit to socioeconomic conditions and tourism and recreation in the region.

List of past, present and reasonably foreseeable actions that have been considered as part of this analysis:

1. Operation of the LSU AgCenter Coastal Area Research Station in Plaquemines Parish
2. Deposition of earthen material at the proposed project site
3. Operation of the Port of Venice
4. Lake Hermitage Marsh Creation – NRDA Early Restoration Project (Phase I early restoration project)
5. Buras Marina Remote Oyster Setting Facility
6. Elevating and partial paving of the Lake Hermitage Road

In addition to foreseeable actions identified in the table 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. Five of these projects are in Louisiana:

1. Caminada Beach and Dune Increment II: Engineering & Design
2. East Timbalier Island: Engineering & Design
3. Mid-Barataria Sediment Diversion: Engineering & Design
4. Lower Mississippi River Sediment Diversions: Planning
5. Increase Atchafalaya Flow to Terrebonne: Planning

The NFWF projects were recently announced. Because the projects in Louisiana focus on engineering and design and planning activities for potential future restoration projects, the Trustees do not believe that they will contribute to the cumulative impacts of the proposed Phase III actions in Louisiana. As more information becomes available, the Trustees may consider the implications of these projects as they relate to the assessment of the cumulative impacts of the proposed Phase III actions in Louisiana. As part of the comments on this Draft Phase III ERP/PEIS, the public is invited to comment on how the proposed projects contribute to cumulative impacts.

9.9.6 References

NOAA. 2013. Chenier Ronquille Barrier Island Restoration Project Environmental Assessment, Fed No. BA-76, Plaquemines Parish, Louisiana.