Chapter 5: Texas Rookery Islands Project

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5.1 Restoration and Protection of Texas Rookery Islands: Project Description

The Texas Rookery Islands project consists of restoration and protection actions on four rookery islands (Dickinson Bay II, Rollover Bay, Smith Point, and Dressing Point).

Within the remainder of this chapter, there is a subsection that provides a general description of each of the project's four islands with relevant background information. The following discussions embody the entire project, representing all four islands, and include the project's consistency with project evaluation criteria; a description of planned performance criteria, monitoring and maintenance; a description of the type and quantity of Offsets BP will receive for funding the Texas Rookery Island project; and information about estimated project costs.

Section 5.2 includes the Environmental Assessment for the project. The Texas Rookery Islands project is analyzed and described as one EA comprised of two sections, based on geographic location and observed similarities among the four islands. Each of the two sections includes resource specific discussions on the affected environment and an analysis of the anticipated environmental consequences involved with the project. After the two sections, there is a synopsis that summarizes the overall impacts of the project. The two sections of the project EA are separated by bay, Galveston or East Matagorda, and include these rookery islands:

1. Galveston Bay, which addresses Dickinson Bay II, Rollover Bay, and Smith Point Islands; and
2. East Matagorda Bay, which addresses Dressing Point Island.

5.1.1 Project Summary

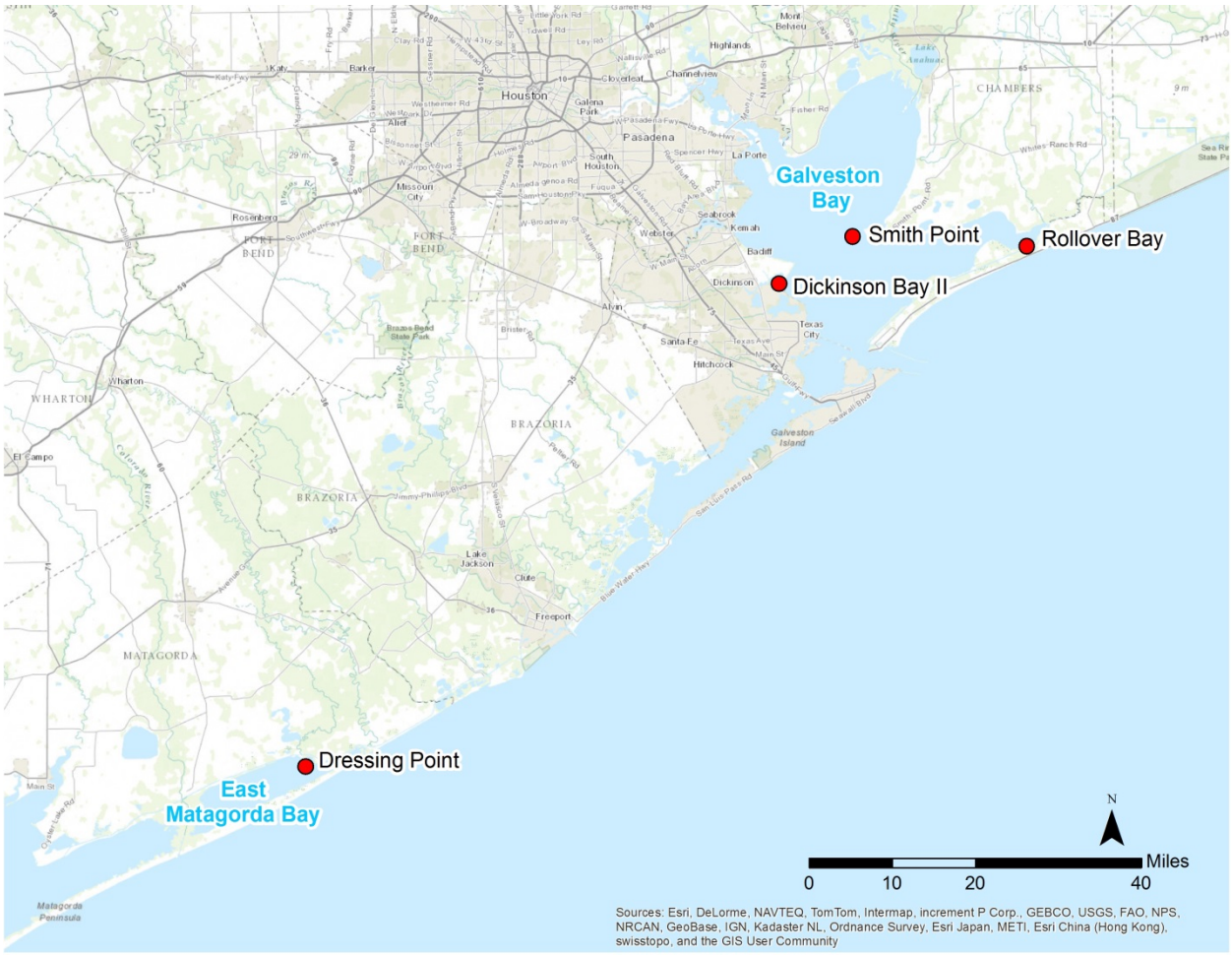
The Texas Rookery Islands project will restore and protect three rookery islands in Galveston Bay and one rookery island in East Matagorda Bay using coastal engineering techniques (Figure 5-1).

The primary goal of the project is to partially compensate for injuries to birds by increasing nesting pairs of colonial waterbirds, which include the following species:

- brown pelican, *Pelicanus occidentalis*
- laughing gull, *Leucophaeus atricilla*
- royal tern, *Thalasseus maxima*
- sandwich tern, *Thalasseus sandvicensis*
- great blue heron*, Ardea herodias*
- roseate spoonbill, *Platalea ajaja*
- reddish egret, *Egretta rufescens*
- great egret, *Ardea alba*
- snowy egret, *Egretta thula*
- tricolored heron, *Egretta tricolor*, and
- black-crowned night heron, *Nycticorax nycticorax.*

Restoration actions at each rookery island will increase the amount of available nesting habitat by expanding the size of the island and enhancing the quality of habitat for nesting birds. Habitat longevity will be increased by raising the island elevation and constructing protective features, such as breakwaters or armoring levees. These restoration actions will result in an increase in the numbers of nesting colonial waterbirds. Rookery islands in Galveston Bay include Dickinson Bay Island II, located within Dickinson Bay; Rollover Bay Island, located in East (Galveston) Bay; and Smith Point Island, located west of the Smith Point Peninsula. Dressing Point Island lies in East Matagorda Bay, and is part of the Big Boggy National Wildlife Refuge.

Figure 5-1. Texas Rookery Islands Project Locations



5.1.2 Background and Project Description

Preliminary engineering has been completed for the Dickinson Bay II and Dressing Point Islands. The plans developed for Smith Point and Rollover Bay Islands are currently conceptual in design. Refined design and construction specification packages for each of the islands will be developed by professional licensed engineers (PE) with coastal restoration experience. The following descriptions for each of the island construction elements are preliminary and based on current planning efforts and resource agency experience with similar projects. Table 5-1 summarizes the proposed construction tasks for each island.

Table 5-1. Proposed Restoration and Protection Actions

RESTORATION AND PROTECTION ACTIONS	RESTORATION OUTCOME
Dickinson Bay Island II (Galveston Bay)	
Construct 4 island acres by placing clean fill over submerged land	Constructed rookery island acres restores nesting habitat for colonial waterbirds
Construct 2,000 feet of armored levees	Armored levees contain island material, protect the island from erosion, and maintain structure for the expected lifespan of the project
Build 0.8 acres of submerged levee	Submerged levee creates a water/shore interface for avian use and provides wave protection
Plant 3.5 island acres with native scrub-shrub vegetation	Enhanced scrub-shrub habitat provides nesting for colonial waterbirds (wading birds)
Rollover Bay Island (Galveston Bay)	
Construct 10 island acres by placing clean fill over submerged land or existing island	Constructed rookery island acres restores nesting habitat for colonial waterbirds
Construct 4,500 feet of armored levees	Armored levees contain island material, protect the island from erosion, and maintain structure for the expected lifespan of the project
Plant 4 island acres with native scrub-shrub vegetation	Enhanced scrub-shrub habitat provides nesting for colonial waterbirds (wading birds)
Smith Point Island (Galveston Bay)	
Construct 6 island acres by placing clean fill over submerged land	Constructed rookery island acres restores nesting habitat for colonial waterbirds
Enhance 2,000 feet of existing breakwater	Breakwaters contain island material, protect the island from erosion, and maintain structure for the expected lifespan of the project
Construct 250 feet of new breakwater	
Raise the elevation of 2 acres of shell beach	Shell beach provides nesting habitat for colonial waterbirds
Plant 3 island acres with native scrub-shrub vegetation	Enhanced scrub-shrub habitat provides nesting for colonial waterbirds (wading birds)
Dressing Point Island (East Matagorda Bay)	
Construct 5 island acres by placing clean fill over submerged land and raise the elevation on 2 acres of existing island	Constructed rookery island acres restores nesting habitat for colonial waterbirds
Construct 5,000 feet of new breakwater	Breakwaters protect the island from erosion, and maintain structure for the expected lifespan of the project
Raise the elevation of an existing shell knoll to build 0.35 acres of emergent shell hash	Shell hash knoll provides nesting habitat for colonial waterbirds
Plant 7 island acres with native scrub-shrub vegetation	Enhanced scrub-shrub habitat provides nesting for colonial waterbirds (wading birds)

The general conceptual design for the restoration and protection of the rookery islands will include raising the elevation and area of the islands using clean fill material, building structures to reduce

erosion and to contain fill material (armored levees, breakwaters, and/or temporary levees), planting native scrub-shrub habitat for wading birds, gulls, and brown pelicans on all four islands and, for Smith Point and Dressing Point Islands, creating or enhancing habitat for ground nesting terns. For ground nesting terns, shell or shell-like material will be placed in shallow water or on the island itself to raise elevations. Island construction will use clean sediments consisting of clay, silts, and sand, which will be sculpted to prescribed slopes and elevations. Once the earthen fill has dewatered and sediments have settled, portions of the island will be planted with native scrub-shrub vegetation. The islands will be protected by armored levees or breakwaters to ensure longevity of the restored habitat against forces that caused the loss of the original islands. The final elevation of the improved island will be such that it will support nesting species of colonial waterbirds.

5.1.2.1 Galveston Bay Rookery Islands

Galveston Bay supports several colonial waterbird islands. The area is able to support a diverse and abundant waterbird community. These birds are supported by significant areas of estuarine and palustrine wetlands combined with opportunities for nesting on isolated and protected islands. Changes in the bay such as relative sea level rise, increased erosion rates, human disturbance, increased predation, and sediment management practices have resulted in reduced opportunities for nesting colonial birds. The intent of this project is to reverse that declining trend.

Restoration and protection of the Galveston Bay rookery islands supports the needs or goals of several conservation plans. These plans include but are not limited to the following national, state and regional planning documents:

- The Galveston Bay Plan: The Comprehensive Conservation and Management Plan for the Galveston Bay Ecosystem (Galveston Bay Estuary Program [GBEP] 1994);
- Galveston Bay Habitat Conservation Blueprint: A Plan to Restore the Habitats and Heritage of Galveston Bay Habitat (Galveston Bay Foundation 1998);
- Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1 (Kushlan et. al. 2002);
- Southeast United States Regional Waterbird Conservation Plan (U.S. Fish and Wildlife Service [USFWS] and North Carolina Audubon Society 2006);
- Strategic Plan: The Coastal Program Stewardship of Fish and Wildlife Through Voluntary Conservation Regional Step-Down Plan Region 2 (Texas) Part 2 of 3 FY 2006-2010 (USFWS 2006);
- Charting the Course to 2015: Galveston Bay Strategic Action Plan (GBEP 2009);
- Gulf Coast Joint Venture Conservation Planning for Reddish Egret (Vermillion and Wilson 2009);
- Texas Conservation Action Plan 2012 – 2016: Gulf Coast Prairies and Marshes Handbook (Texas Parks and Wildlife Department [TPWD] 2012);
- Texas Mid-Coast Initiative Area Fact Sheet (Gulf Coast Joint Venture 2012);
- Reddish Egret Conservation Action Plan (Wilson et. al. 2014); and

- Draft Texas Colonial Waterbird Rookery Island Conservation Plan (Audubon Texas 2014).

The information provided in each of the planning documents listed above may be for a specific species or may target a group or guild of waterbirds. Actions or recommendations in each may be directly related to restoration of a specific island such as Smith Point Island; typical nesting islands; or they may emphasize the need of a species that will benefit from the three Galveston Bay Rookery Islands described herein.

5.1.2.1.1 Dickinson Bay Island II

In 1934, the U.S. Army Corps of Engineers (USACE) constructed three islands in Dickinson Bay with dredged material from the Dickinson Channel Project. Historically, these three islands supported colonial waterbirds along the Dickinson Bay Channel (historical charts of these islands can be viewed here http://historicalcharts.noaa.gov/historicals/preview/image/519-10-1966). These islands suffered severe erosion and by the 1970s no longer supported nesting birds. Subsidence from severe groundwater withdrawal and long-term erosion, exacerbated by a series of tropical storms in the 1990s, resulted in the complete loss of all three islands. The loss of these islands created a void in available nesting habitat in that area of Galveston Bay. Groundwater regulatory measures have resulted in a substantial decrease in the rate of subsidence in the Galveston Bay Region, including Dickinson Bay. The design for the restoration and protection of Dickinson Bay Island II will take into consideration methods to protect the island from future land loss associated with erosion and relative sea level rise. Restoration and protection will also restore the island's size and elevation such that it will provide sufficient area and height to support colonial nesting birds.

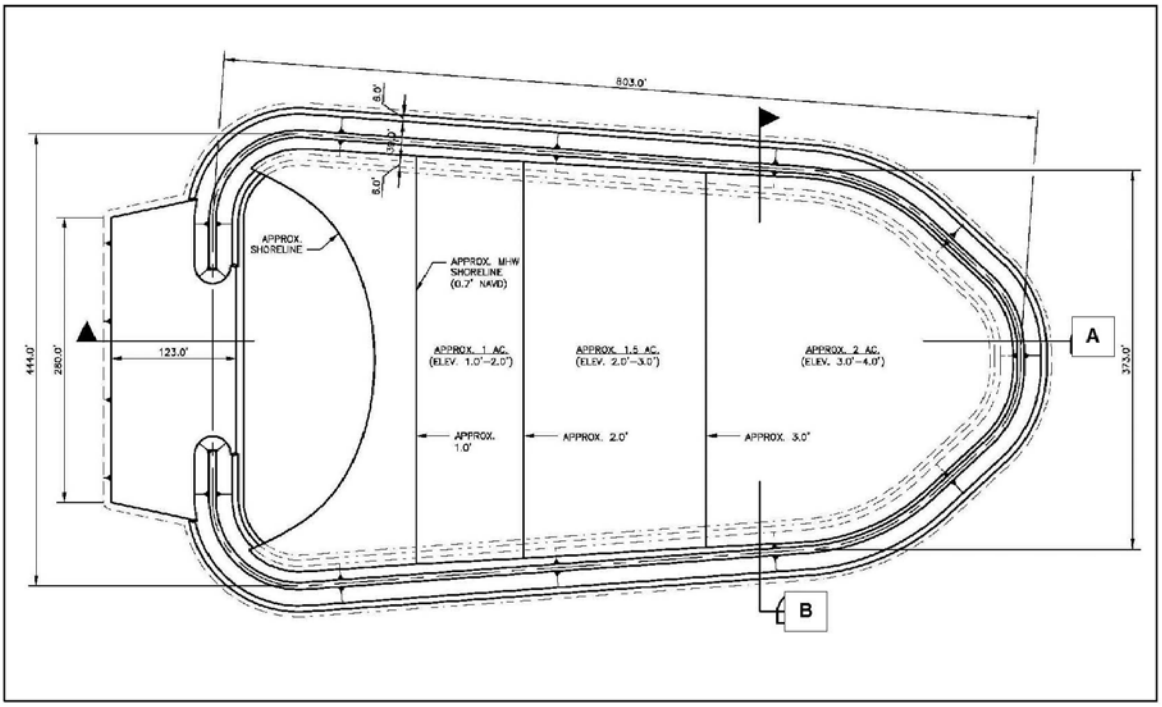
In the spring of 2002, agency, advocacy, and industry partners met to address the habitat loss in Dickinson Bay and to evaluate the potential to restore the three lost islands. The Galveston Bay Foundation and partners began planning to restore the three islands to support colonial waterbirds. With guidance provided by multiple conservation and management plans, the partnership completed the successful restoration of one of the islands in 2004, Dickinson Bay Island I.

Dickinson Bay Island II and III are currently in the preliminary engineering design stage. The Dickinson Bay Bird Nesting Islands Alternatives Analysis (Alternatives Analysis) was completed in 2014 (HDR Engineering [HDR] 2014). The scope of the Alternatives Analysis was to create conceptual designs for two islands that would support shore nesting bird habit. Design criteria for the islands were established for the project sites and consisted of wind, wave, tide, and storm conditions. The document summarized survey, benthic, and initial geotechnical investigations performed under previous investigations and detailed in the Data Collection Memorandum (HDR 2013). Additional geotechnical investigations were performed as part of the Alternatives Analysis, along with the summarization of meteorological and oceanographic conditions at the sites. For this Early Restoration effort, the Trustees are targeting Dickinson Bay Island II for restoration. One of two potential sites under evaluation would be chosen for construction of Dickinson Bay Island II (Figure 5-2). Dickinson Bay Island III is not part of this project and will not be discussed.

Figure 5-2. One of two potential sites would be chosen for construction of Dickinson Bay Island II

After construction is completed, the island footprint will be approximately 4 acres. To accomplish this, armored and potentially temporary levees will be constructed to contain fill material. The restored island will be protected by approximately 2,000 feet of armored levees around three sides of its perimeter. The remaining open side of the island will be bounded by a submerged levee. About 3.5 acres of the restoration area will be planted with native scrub-shrub vegetation. The submerged levee incorporated into the design serves to create a water/shore interface that will facilitate the use of the island by avian species. The preliminary design is shown in Figure 5-3.

Figure 5-3. Preliminary design drawing of the Dickinson Bay Island II restoration, showing the potential footprint of the fill material and armored levee



5.1.2.1.2 Rollover Bay Island

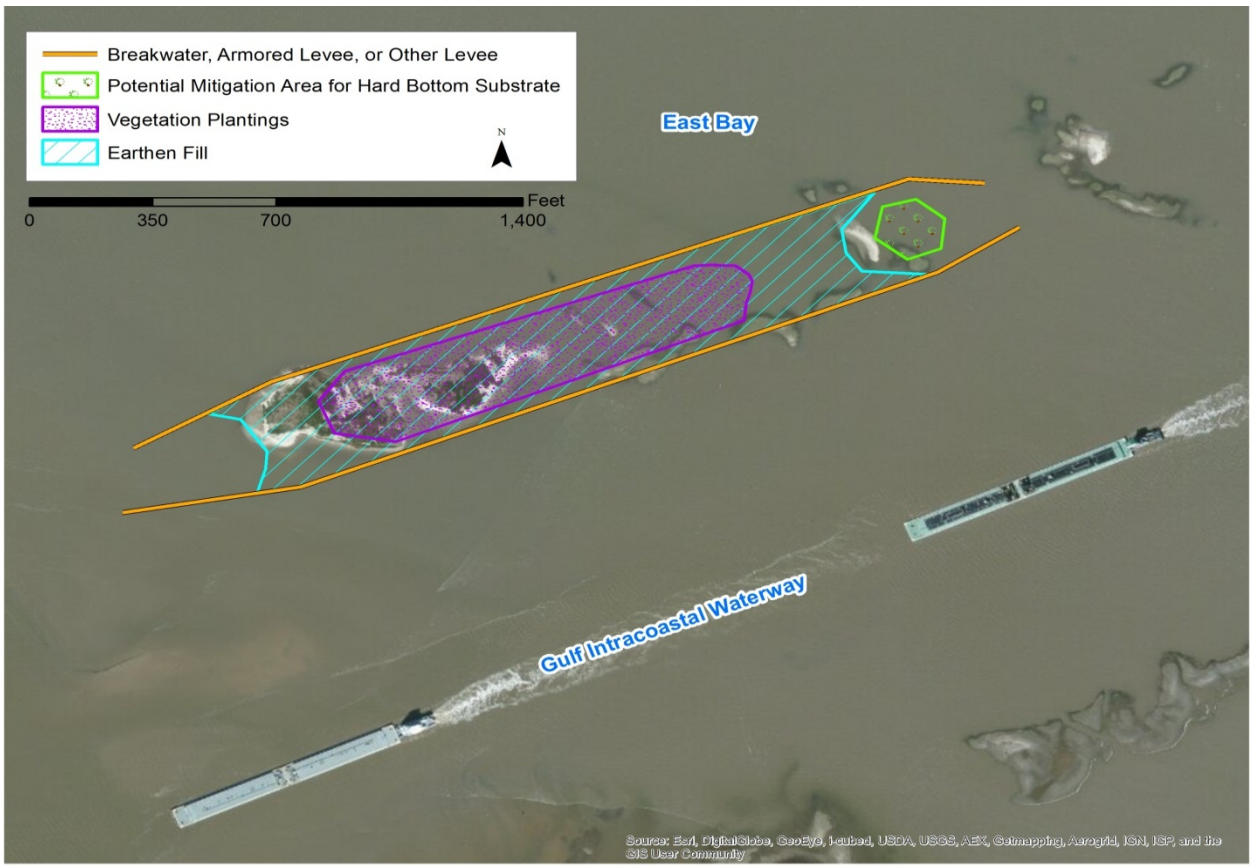
Rollover Bay Island is located north of the Gulf Intracoastal Waterway (GIWW) within Rollover Bay, a sub-bay of East (Galveston) Bay near Rollover Pass. Rollover Pass is a tidal connection from East Bay to the Gulf of Mexico. The natural pass was deepened and enlarged to enhance migration of fisheries resources between the bay and the Gulf. Over time, several dredged material placement islands (approximately 11 islands) were created adjacent to the GIWW during excavation and maintenance of the GIWW. Erosion and subsidence have decreased the size of Rollover Bay Island from greater than 5 acres in 1982 to less than 2 acres in 2013. In 2013, the erosion to Rollover Bay Island was so severe that 30% of the island was lost in one year. The island supports limited colonial waterbird nesting and little species diversity due to its diminishing size and habitat loss. Limited to no nesting took place during 2013 and 2014 on what remains of the island (Hackney and Woodrow, pers. comm. 2014). Historically, the island supported multiple nesting bird species, including brown pelican, wading birds, laughing gulls, and terns.

Based on evaluation of on-site conditions and review of aerial imagery, most of the chronic erosion appears to be the result of northerly winds associated with the passage of seasonal cold fronts and the long fetch from East Bay. However, tropical storm events have adversely affected the island in the past, during overwash events with Hurricane Alex in July 2010 and Hurricane Ike in September 2008. The

engineering design phase of the island will evaluate tidal and wave actions in the area to ensure that forces associated with tropical storms, the East Bay fetch, GIWW traffic, and Rollover Pass are considered. This will also include protecting the island from the effects of relative sea level rise. The proposed restoration and protection measures will restore the island's size and elevation such that it will provide sufficient area and height to support colonial nesting birds.

After construction is completed, the island footprint will be approximately 10 acres. To accomplish this, permanent- armored and temporary levees will be constructed to contain clean fill material. The restored island will be protected by approximately 4,500 feet of armored levees along its vulnerable sides. About 4 acres of the restoration area will be planted with native scrub-shrub vegetation. The island will be sloped into the tidal zones at both ends of the island to provide water access for juvenile colonial waterbirds. Restoration and protection of Rollover Bay Island will require the placement of material on the submerged bay bottom, which may impact hard shell substrate, a valued benthic substrate in Galveston Bay. Any impacts incurred after avoidance and minimization measures are taken will be fully mitigated by restoring an equal or greater amount of submerged hard substrate. The conceptual drawing is shown in Figure 5-4.

Figure 5-4. Conceptual drawing of the proposed Rollover Bay Island restoration, illustrating the footprint of the breakwater/levee, fill, and vegetation planting area



5.1.2.1.3 Smith Point Island

Smith Point Island is located just west of the Smith Point peninsula that reaches into Galveston Bay between Trinity Bay and East Bay. The island targeted for restoration was a natural oyster reef island shown on maps as far back as 1921. The island was significantly enhanced in 1950 when the Channel to Smith Point was created. It may have received additional material from dredged material excavated for the navigation channel in 1972. The island has eroded and subsided since 1995, when it was greater than 9 acres and supported almost 4 acres of vegetated habitat. The island was also included as a beneficial use component of a dredging project to improve the Channel to Smith Point in 2002. A breakwater was constructed adjacent to the island between 2003 and 2004 that has provided some protection by reducing erosion. The existing breakwater will be incorporated into the design of the restored island.

In 2013, the island was approximately 4 acres in size and supported approximately 0.6 acres of vegetation. Historically, 21 species of colonial waterbirds have used the island for nesting. At its peak, several thousand nesting pairs used the island each year. In 2012, the island supported only three species totaling about 30 pairs. The island is currently composed of shell and shell hash that was left behind after the lighter dredged sediments eroded away with little surface soils present. Harsh environmental conditions have limited the presence of vegetation to only a few salt cedar (*Tamarix* sp.) and limited herbaceous vegetation including sea purslane and seaside tansy which can tolerate the salinity exposure (Hackney pers. comm. 2014). The island supports limited colonial waterbird nesting and little species diversity due to changes in vegetation and habitat loss from erosion. The proposed design for the restoration and protection of Smith Point Island will take into consideration methods to protect to the island from future land loss associated with erosion and relative sea level rise. Restoration and protection will also restore the island's size and elevation such that it will provide sufficient area and height to support colonial nesting birds.

After construction is completed, the island footprint will be approximately 6 acres. Temporary levees may be constructed to contain fill material. The restored island will be protected by approximately 250 feet of new breakwater and 2,000 feet of existing breakwater around three sides of its perimeter. The southern portion (2 acres) of the existing island will be improved by raising the elevation with shell material to build an emergent shell beach. About 3 acres of the island will be planted with native scrub-shrub vegetation. The conceptual drawing is shown in Figure 5-5.

Figure 5-5. Conceptual drawing of the proposed Smith Point Island restoration, illustrating the footprint of the breakwater, fill, and emergent shell substrate

The surface of Smith Point Island is currently covered with a layer of winnowed oyster shell (fossil) approximately 1 to 2 feet thick. The shell is constantly moved by wave energy which inhibits the accumulation of soil or fine shell material capable of supporting vegetation. As a result, the material provides an ideal nesting location for bare ground nesting birds. Despite this ideal nesting substrate, its elevation is currently so low that nesting birds experience nest failure with high tide events. To maintain island habitat for ground-nesting birds, material consistent in structure and composition to the island's existing shell hash will be placed on about 2 acres of the current island to increase its elevation. This shell beach will have an elevation that will support ground nesting species of colonial waterbirds. It will also provide a small wave break on the channel side of island. This shell beach and its associated intertidal shell material will protect the island on its southern side from wave induced erosion. The shell

material used will be similar to the shell hash present in structure, form, and mineral composition (calcareous).

5.1.2.2 East Matagorda Bay Rookery Island

East Matagorda Bay contains a number of small islands and one large island that supports colonial waterbirds. The larger island, Dressing Point Island, is part of the Big Boggy National Wildlife Refuge. It supports a diverse and abundant suite of colonial waterbirds. The only other islands that are similar are 40 miles to the west at Chester's (Sundown) Island and 40 miles to the east at West Bay Bird Islands (Old and New). Significant foraging habitat lies within the adjacent areas to support colonial waterbirds.

Restoration and protection of Dressing Point Rookery Island in East Matagorda Bay supports the needs or goals of multiple conservation plans. These plans include but are not limited to the following national, state and regional planning documents:

- Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1 (Kushlan et. al. 2002);
- Southeast United States Regional Waterbird Conservation Plan (USFWS and North Carolina Audubon Society 2006);
- Strategic Plan: The Coastal Program Stewardship of Fish and Wildlife Through Voluntary Conservation Regional Step-Down Plan Region 2 (Texas) Part 2 of 3 FY 2006-2010 (USFWS 2006);
- Gulf Coast Joint Venture Conservation Planning for Reddish Egret (Vermillion and Wilson 2009);
- Texas Conservation Action Plan 2012 – 2016: Gulf Coast Prairies and Marshes Handbook (TPWD 2012);
- Texas Mid-Coast Initiative Area Fact Sheet (Gulf Coast Joint Venture 2012);
- Comprehensive Conservation Plan and Environmental Assessment – Texas Mid-Coast National Wildlife Refuge Complex (USFWS 2013b); and
- Reddish Egret Conservation Action Plan (Wilson et. al. 2014).

The information provided in each of the planning documents listed above may be for a specific species or may target a group or guild of waterbirds. Actions or recommendations in each may be directly related to the restoration of Dressing Point Island; typical nesting islands, or they may emphasize the need of a species that will benefit from the East Matagorda Bay rookery island.

5.1.2.2.1 Dressing Point Island

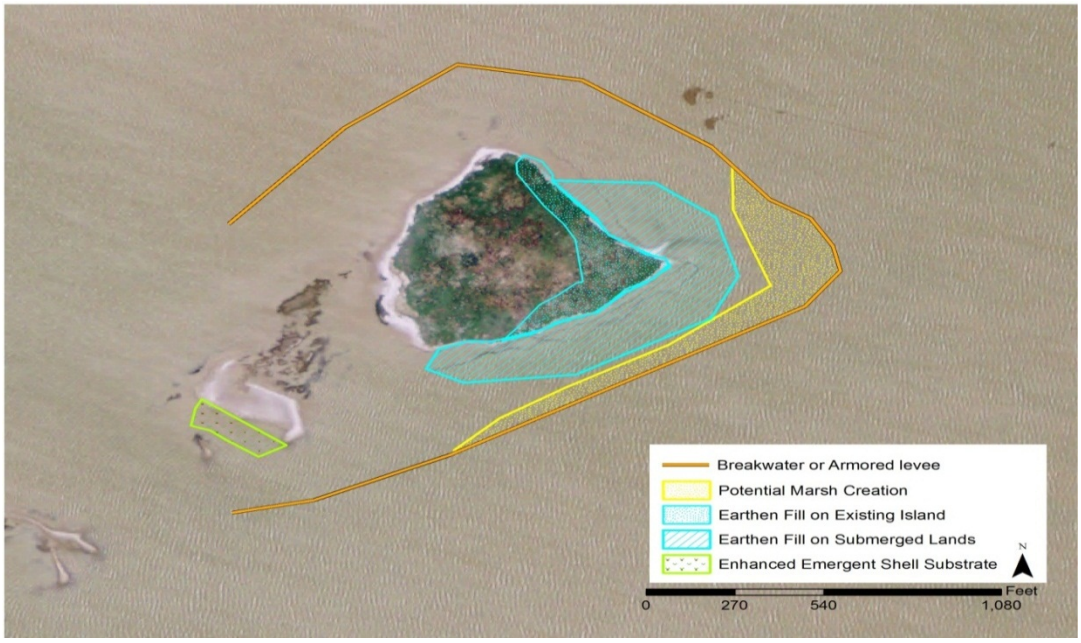
Dressing Point Island is a natural island located in East Matagorda Bay and is part of the Big Boggy National Wildlife Refuge. Dressing Point Island currently includes 7 acres of vegetated island and intertidal shell beach as well as shell hash berms along parts of its shoreline. Erosion and subsidence have decreased the area of the island from about 13 acres in 1984 to about 7 acres in 2011. The design for the restoration and protection of Dressing Point Island will take into consideration methods to protect the island from future land loss associated with erosion and relative sea level rise. Waterbird use of the island has declined as its size has decreased. During the early 1970s to late 1980s the mean

number of nesting pairs was about 10,000 pairs. Between the early 1990s and the present, the number of nesting pairs has declined to an average of about 5,000 pairs. Despite these declines, Dressing Point Island is currently an important colonial rookery island on the upper coast of Texas. The island supports nesting of brown pelicans, wading birds, laughing gulls and terns.

A shell knoll adjacent to the island has some scattered winnowed oyster shell (fossil). These areas have been surveyed, identified and mapped. The shell is constantly moved by wave energy which prevents the accumulation of soil or fine shell material capable of supporting vegetation. As a result the material provides an ideal nesting location for bare ground nesting birds. Despite this ideal nesting substrate, its elevation is currently so low that nesting birds can experience nest failure with high tide events. To enhance the existing shell knoll, material consistent in structure and composition will be placed southwest of the island to increase the elevation.

After construction is completed, the island footprint will be approximately 12 acres, which includes about 5 acres of existing island that will be avoided during construction. Fill will be placed on 2 acres of existing island and on 5 acres on submerged lands between the constructed breakwater and existing island. Temporary berms will be constructed, if needed, to contain fill material. The restored island will be protected by approximately 5,000 feet of breakwater. About 7 acres of the restoration area will be planted with native scrub-shrub vegetation. Approximately 2,500 cubic yards of shell material will be placed and integrated with the existing shell knoll (emergent shell substrate) southwest of the island. This added material will raise the elevation to support ground nesting species of colonial waterbirds. It will also provide a small wave break and protect a portion of the island from wave induced erosion. The conceptual drawing is shown in Figure 5-6.

Figure 5-6. Conceptual drawing of the proposed Dressing Point Island restoration, illustrating the footprint of the breakwater/levee, fill, and emergent shell substrate



A potential component of the restoration and protection of Dressing Point Island includes a constructed marsh located adjacent to the breakwater. Should dredging be required to provide access for vessels during construction, the project design will allow for the beneficial use of the dredge material, using best management practices (BMPs), to backfill the channel and use any excess material to create intertidal marsh. The decision to construct the marsh will be made by the Implementing Trustees[1] for the Texas Rookery Islands project and only after it has been determined that there are enough remaining funds available from the funding provided for the Texas Rookery Islands project.

5.1.3 Evaluation Criteria

The Texas Rookery Islands project falls within the project type "Restore and Protect Birds," which was evaluated under the Preferred Alternative in the Final Phase III ERP/PEIS, and meets the evaluation criteria established by OPA and the Framework Agreement. The intent of the project is to increase the size of available rookery island habitat in order to increase the number of nesting colonial waterbirds. The project has a clear nexus to the Spill (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement). The Spill injured avian resources throughout the northern Gulf through a variety of mechanisms, including but not limited to exposure to oil, disturbance from response activities, cleaning in rehabilitation facilities, and degradation of habitat. Numerous dead and oiled brown pelicans, terns, wading birds and gulls were collected during and following the Spill. The project will stabilize and protect rookery island shorelines, restore land mass and elevations, and restore vegetation. The enhancements of the islands will increase the amount and longevity of bird nesting habitat, by providing nesting habitat which will otherwise not exist into the future.

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).

Potential environmental effects are analyzed under applicable environmental regulations in Section 5.2. That analysis indicates that adverse effects from the project will largely be minor, localized, and often of short duration. In addition, any BMPs and measures to avoid and minimize impacts that are identified during the permitting process or during consultations and reviews with natural resource agencies will be implemented. As a result, collateral injury will be avoided and minimized during project implementation (construction, operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Project 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). These past colonial waterbird projects include Evia Island, North Deer Island, New West Bay Bird Island, Dickinson Bay Island I, St. Mary's Island, and Shamrock Island. Other past projects using

[1] U.S. Department of the Interior and the Texas Trustees (Texas Commission on Environmental Quality, Texas General Land Office, and Texas Parks and Wildlife Department).

similar construction techniques for different conservation goals include Jumbile Cove, Delehide Cove, Starvation Cove and Bird Island Cove. These projects included the participation of restoration experts from federal, state, business, and non-profit entities, as well as the services of professional coastal engineers. The required coastal construction methods were similar to those included in this proposed early restoration project. When proposed, all of the past projects referenced were reviewed by the public and met all environmental conditions and requirements. As a result, the Texas Rookery Islands project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

5.1.4 Performance Criteria and Monitoring

The performance of the project will be assessed using both qualitative and quantitative performance criteria related to the project objectives. The need for corrective actions and/or adaptive management will be determined by evaluation of the project over time using the specified performance criteria. Successful implementation of this project will be determined by the presence and numbers of targeted species of colonial nesting birds (e.g., brown pelicans, terns, wading birds and gulls) within the restored/enhanced rookery islands. A full monitoring plan for the project is found in Appendix B (Texas Rookery Islands Project Monitoring Plan).[2]

Monitoring will occur for 5 years following completion of the restoration actions. Updates and additional details concerning the monitoring activities (i.e. the status of the construction activities, status of vegetation plantings, and/or number of nesting pairs) for this project will be summarized in annual summary reports.

5.1.5 Offsets

For purposes of negotiating Offsets with BP in accordance with the Framework Agreement, the Trustees used a Resource Equivalency Analysis to estimate bird Offsets. Bird Offsets (expressed in Discounted Bird Years)[3] were estimated for the islands by calculating additional brown pelican, gull, tern, and wading bird production expected over time compared to a no-action scenario. The Trustees and BP agreed that if this restoration is selected for implementation, BP will receive the following Offsets:

- For brown pelicans, NRD Offsets are 6,743 Discounted Bird Years in the Gulf of Mexico. These Offsets are only applicable to brown pelican injuries in the Gulf States and in the Gulf of Mexico, as determined by the Trustees' total assessment of injury for the Oil Spill.

- For gulls, NRD Offsets are 87,904 Discounted Bird Years in the Gulf of Mexico. These Offsets are only applicable to gull injuries in the Gulf States and in the Gulf of Mexico, as determined by the Trustees' total assessment of injury for the Oil Spill.

[2] BP and the Trustees agreed to work together to develop the monitoring plans for this project. The monitoring plan included in Appendix B has been updated and is the final plan developed with BP.

[3] Discounted Bird Years are expressed in present value 2010 discounted bird years.

- For terns, NRD Offsets are 27,447 Discounted Bird Years in the Gulf of Mexico. These Offsets are only applicable to sandwich and royal tern injuries in the Gulf States and in the Gulf of Mexico, as determined by the Trustees' total assessment of injury for the Oil Spill.

- For wading birds, NRD Offsets are 11,128 Discounted Bird Years in the Gulf of Mexico. These Offsets are applicable to great blue heron, roseate spoonbill, reddish egret, great egret, snowy egret, tricolored heron, and black-crowned night heron injuries in the Gulf States and in the Gulf of Mexico, as determined by the Trustees' total assessment of injury for the Oil Spill.

The "Discounted Bird Years" calculation uses a discounting rate to convert the number of bird years to a common base year. Offsets were estimated for brown pelicans, gulls, terns, and wading birds as articulated above because these species, in particular, are expected to benefit from the restoration actions. Factors used to develop bird Offsets included site-specific estimates of nesting density, typical number of fledglings per nest, expected longevity of the project, tropical storm frequency, the percent of each island area used for nesting, and the time for vegetation to become established. These Offsets would, in the future, be credited against the Trustees' final assessment of total injury to these bird species resulting from the Spill.

5.1.6 Estimated Cost

The total estimated cost to implement this Project is $20,603,770. 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 estimated cost includes provisions for planning, engineering and design, construction, monitoring, and contingencies.

5.2 Texas Rookery Islands Project: Environmental Assessment

The Texas Rookery Islands project would restore and protect three rookery islands in Galveston Bay and one rookery island in East Matagorda Bay using coastal engineering techniques (Figure 5-1). Restoration actions at each proposed rookery island would increase the amount of available nesting habitat by expanding the size of the island and enhancing the quality of habitat for nesting birds. Habitat longevity would be increased by raising the island elevation and constructing protective features, such as breakwaters or armoring levees.

5.2.1 Introduction and Background, Purpose and Need

This project is proposed as part of Phase IV of the Early Restoration program. This EA tiers from the programmatic portions of the Final Phase III ERP/PEIS. This EA qualifies for tiering from the Final Phase III ERP/PEIS in accordance with U.S. Department of the Interior regulations (43 C.F.R. §46.140, Using tiered documents) under "b" and "c". This project is consistent with the project type, "Restore and Protect Birds," which was included in the Preferred Alternative "Contribute to Restoring Habitats and Living Coastal and Marine Resources and Recreational Opportunities." By tiering, this EA provides the requisite additional detail for a project-level NEPA analysis that considers potential site specific impacts anticipated from implementation of the proposed action and the no action alternative. See Chapter 1.3 for information on the Final Phase III ERP/PEIS and tiering of the Phase IV proposed projects.

The Texas Rookery Islands project is consistent with the Final Phase III ERP/PEIS' Preferred Alternative as described in the October 2014 ROD) and the Trustees find that the conditions and environmental effects described in the broader Phase III ERP/PEIS (with updates as described in Chapter 2 of this document) are still valid. Specifically, the EA for the proposed Texas Rookery Islands project tiers from the analyses found in the following sections of the PEIS:

- Chapter 5: Proposed Early Restoration Programmatic Plan: Development and Evaluation of Alternatives: Descriptions of Alternatives 2 (Section 5.5.3 Contribute to Restoring Habitats and Living Coastal and Marine Resources), including Section 5.3.3.8 Restore and Protect Birds, and 4 (Section 5.3.7 Preferred Alternative: Contribute to Restoring Habitats, Living Coastal and Marine Resources and Recreational Opportunities);

- Chapter 6: Environmental Consequences, Section 6.3.8, Project Type 8: Restore and Protect Birds, and 6.4, Alternatives 2 (and 4): Human Uses and Socioeconomics.

- Chapter 6.8: Potential Cumulative Impacts

This EA incorporates by reference the analysis found in those sections of the Final Phase III ERP/PEIS. This EA also incorporates by reference all introductory, process, background, and Affected Environment information and discussion related to Early Restoration provided in the Final Phase III ERP/PEIS (Chapters 1 through 6).

The proposed Texas Rookery Islands project is analyzed and described in subsequent sections as one EA comprised of two sections. Subsections within island descriptions are, in many cases, very similar in regards to the potential impact to physical, biological, and socioeconomic resources. These similarities make it possible to analyze the four islands of the proposed project in two sections based on geography. Each section includes detailed discussion of resources potentially involved with the proposed project. The two sections of the proposed project EA are 1) the Galveston Bay rookery islands and 2) the East Matagorda Bay rookery island.

5.2.1.1 Background

The Spill injured avian resources throughout the northern Gulf through a variety of mechanisms, including but not limited to exposure to oil, disturbance from response activities, cleaning in rehabilitation facilities, and degradation of habitat. Numerous dead and oiled brown pelicans, terns, wading birds and gulls were collected during and following the Spill. This project would stabilize and protect rookery island shorelines, restore land mass and elevations, and restore vegetation. These enhancements of the islands would increase longevity of the islands and increase the amount of waterbird nesting habitat.

Preliminary engineering has been completed for the Dickinson Bay II and Dressing Point Islands. The plans developed for Smith Point and Rollover Bay islands are currently conceptual in design. Refined design and construction specification packages for each of the islands would be developed by PE(s) with coastal restoration experience. Table 5- 1 (Section 5.1.2) summarizes the preliminary construction tasks based on current planning efforts for each island.

5.2.1.2 Purpose and Need

The proposed action falls within the scope of the programmatic purpose and need for early restoration as described in the Final Phase III ERP/PEIS because it would accelerate meaningful restoration of injured natural resources and their services resulting from the Spill. The proposed project's purpose is to begin to restore and protect birds injured as a result of the Spill. The project is needed to restore colonial waterbird nesting habitat in Galveston and East Matagorda Bays. Restoration actions at each rookery island would increase the amount of available nesting habitat by expanding the size of the island and enhancing the quality of habitat for nesting birds. Habitat longevity would be increased by raising the island elevation and constructing protective features, such as breakwaters or armoring levees. Increasing the amount of available nesting habitat, enhancing the quality of habitat, and increasing the protection of the habitat from erosion and sea level rise would result in an increase in the numbers of nesting colonial waterbirds.

5.2.2 Scope of the Environmental Assessment

This project is proposed as part of Phase IV of the Early Restoration program. The broader environmental analyses of these types of actions as a whole are discussed in the Final Phase III ERP/PEIS from which this EA is tiered. The information and analyses in this document supplement the programmatic analyses with site-specific information. This EA provides NEPA analysis for potential

impacts for site-specific issues and concerns anticipated from implementation of the proposed actions and the no action alternative.

Under NEPA, federal agencies must consider the environmental effects of their actions that include, among others, impacts on social, cultural, and economic resources, as well as natural resources. This project is proposed under OPA and thus meets the level of federal agency involvement to require review. The following sections describe the affected resources and environmental consequences of the project.

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

For purposes of this document, impacts are characterized as minor, moderate or major, and temporary or long-term. The analysis of beneficial impacts focuses on the duration (short- or long-term), without attempting to specify the intensity of the benefit. The definition of these characterizations is consistent with that used in the Final Phase III ERP/PEIS, and can be found in Appendix D. As discussed above, the EA for the Texas Rookery Islands project is split into two geographic areas: the islands in Galveston Bay and the island in East Matagorda Bay. Section 5.2.4 addresses the Galveston Bay rookery islands, which include Dickinson Bay Island II, Rollover Bay Island, and Smith Point Island. Section 5.2.5 addresses the rookery island in East Matagorda Bay, Dressing Point Island.

5.2.3 Project Alternatives

Both OPA and NEPA require consideration of the No Action alternative. For this section, there are two alternatives, No Action and the Proposed Actions of the Texas Rookery Island project.

5.2.3.1 No Action

For this Phase IV proposed project, the No Action alternative assumes that the Trustees would not pursue the actions comprising the Texas Rookery Islands project as part of Phase IV Early Restoration.

Under No Action, the existing conditions described for the bird rookery islands resources in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

Section 1502.14(d) of the CEQ Regulations requires the alternatives analysis to "include the alternative of no action." CEQ states that in some cases "no action" is "no change" from current management direction or level of management intensity. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Projected impacts of proposed actions would be compared to those impacts projected for the existing actions. In this case,

the existing rookery islands would continue to diminish and nesting habitat for colonial waterbirds would continue to degrade. Therefore, the No Action alternative would result in fewer pairs of nesting colonial waterbirds on Texas rookery islands.

5.2.3.2 Proposed Actions

The Proposed Actions would implement the restoration and protection of all four Texas Rookery Islands:

- Dickinson Bay Island II,
- Rollover Bay Island,
- Smith Point Island, and
- Dressing Point Island.

5.2.3.3 Other Alternatives Considered but Not Analyzed

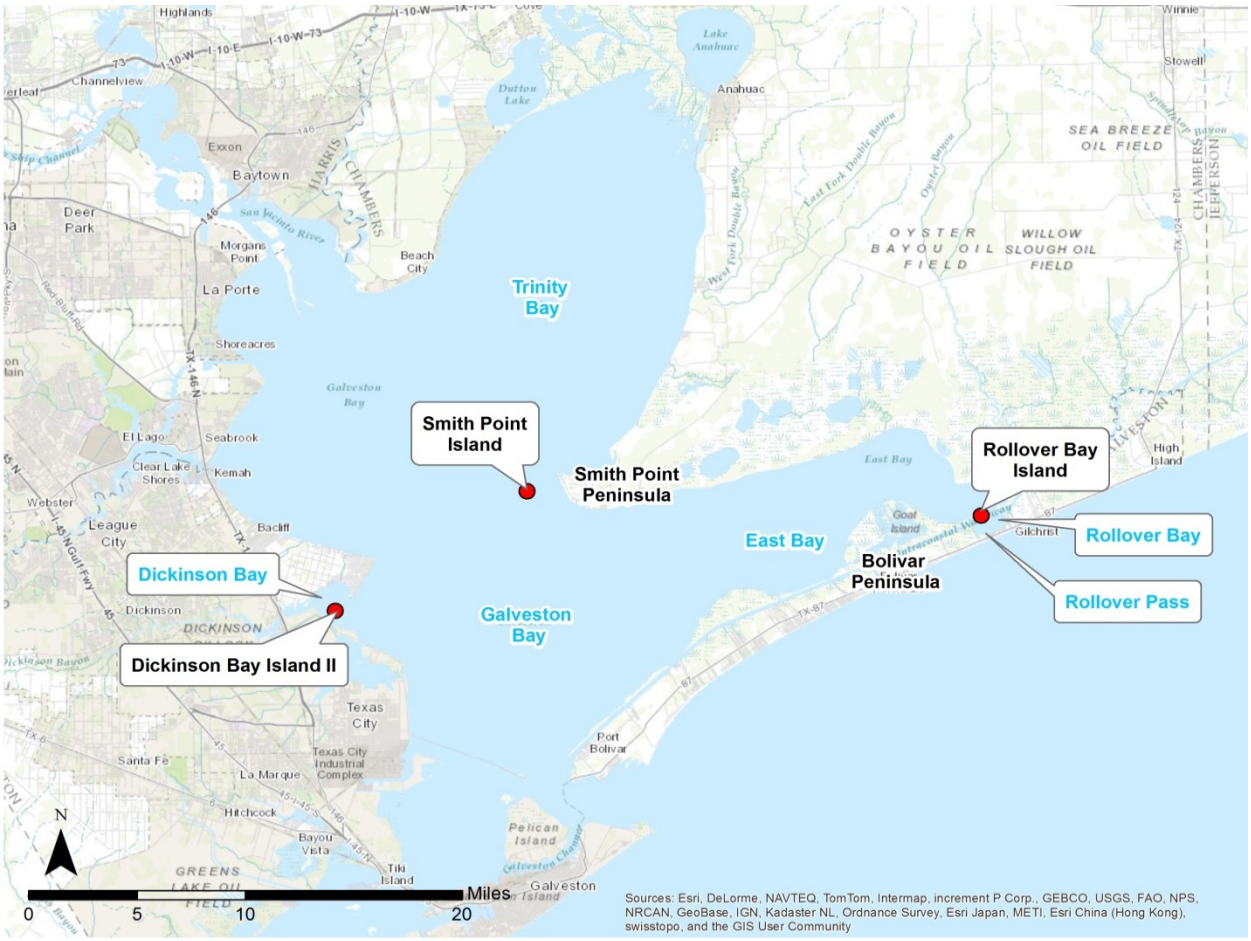
The Trustees' Early Restoration project selection process is described in Section 2.1 of the Final Phase III ERP/PEIS. As described there, potential projects evolve from public scoping, ongoing public input through internet-accessible databases, review of current federal and state management plans and programs, and Trustee expertise and experience. From this broad list of project ideas, the Trustee's Early Restoration project selection process initially results in a set of proposed projects that, consistent with the Framework Agreement, were submitted to BP for review and consideration. One area considered for Early Restoration included restoration for injured birds.

The Trustees considered a range of techniques for the restoration of birds. To be consistent with the Final Phase III ERP/PEIS, the Trustees focused on restoration techniques identified for the project type "Restore and Protect Birds". To evaluate each of the available restoration techniques, the Trustees considered the magnitude of the benefits that would be provided by the restoration, the cost-effectiveness of the techniques, and the overall likelihood that the Trustees would be able to successfully implement the effort as 'early restoration.' Secondary considerations included administrative efficiency, availability of existing partnerships, and strength of local support. The Trustees are pursuing the creation/enhancement of bird nesting and/or foraging habitat through the Texas Rookery Islands project, because the project is feasible at this time given the constraints of the Framework Agreement.

5.2.4 Galveston Bay Rookery Islands

This section provides the background and description for the proposed actions in Galveston Bay, which includes the restoration and protection of Dickinson Bay Island II, Rollover Bay Island, and Smith Point Island (Figure 5-7). The location, scope, construction and installation, as well as operations and maintenance for these three islands are discussed in the following subsections.

Figure 5-7. Location of Galveston Bay Rookery Islands



5.2.4.1 Galveston Bay Rookery Island Locations

Galveston Bay is composed of many interconnected bays, including Trinity Bay, Galveston Bay, East Bay, West Bay, and Christmas Bay. These bays are bordered by four counties (Brazoria, Chambers, Galveston, and Harris) and are partially separated from the Gulf of Mexico by two prominent coastal barriers, the Bolivar Peninsula and Galveston Island.

5.2.4.1.1 Dickinson Bay Island II

Dickinson Bay Island II is under half of a mile from the mainland and is located at the mouth of Dickinson Bay in Galveston Bay, Galveston County, Texas. Specifically it is located in Dickinson Bay near 29.464394˚ N, 94.936601˚ W; NAD83. There are two locations currently proposed to replace a lost rookery island (Figure 5-2). Dickinson Bay Island II may be constructed in either a northern location or a southern location. The area that may be directly or indirectly affected is about 15 acres and includes the

footprint of the construction and staging areas around the island, breakwater, armored levee, or other structure, vegetation plantings, and earthen fill. The borrow area is not included in this footprint estimate because it has not yet been identified. A navigation channel, approximately 7 feet deep is located between the two potential project sites. Areas not within the navigation channel are approximately 4 feet deep. The nearby boat dock at April Fool Point, which is approximately 1 mile away, may be used to load and transport materials. The Texas General Land Office (TGLO) has identified places to access coastal waterways at http://txcoasts.com/. Information specific to Galveston County access points and available activities is located at http://txcoasts.com/.

5.2.4.1.2 Rollover Bay Island

Rollover Bay Island is situated within the Galveston Bay system, Galveston County, Texas. Specifically it is located in Rollover Bay which lies in East (Galveston) Bay at 29.521548˚ N, 94.505693˚ W; NAD83. The area that may be directly or indirectly affected is about 25 acres and includes the footprint of the construction and staging areas around the island, breakwater, armored levee, or other structure, vegetation plantings, and earthen fill. The borrow area is not included in this footprint estimate because it has not yet been identified. The island is near the GIWW which has depth of about 10 feet. The surrounding area is around 4 feet deep. The nearby boat dock at Dr. Lloyd K. Lauderdale Public Boat Ramp, which is about a half mile away, may be used to load and transport materials with small motorboats. Large equipment and materials moved by barges or other vessels would use the established interconnected waterways and larger commercial docking facilities. TGLO has identified places to access to coastal waterways at http://txcoasts.com/. Information specific to Galveston County access points and available activities is located at http://txcoasts.com/

5.2.4.1.3 Smith Point Island

Smith Point Island lies approximately 1.25 miles southwest of the Smith Point peninsula and is approximately 1.4 miles from the James Robbins Park boat ramp on the peninsula. The island is located between Trinity Bay and East Bay within Galveston Bay near 29.5363˚ N, 94.8087˚ W; NAD83. The area that may be directly or indirectly affected is about 28 acres and includes the footprint of the construction and staging areas around the island, breakwater, armored levee, or other structure, vegetation plantings, earthen fill, and emergent shell substrate. The borrow area is not included in this footprint estimate because it has not yet been identified. The depths near the island are relatively shallow ranging to a depth of approximately 3 feet in the surrounding area and up to 5 feet in the adjacent navigation channel. The nearest dock to the project site is located on Smith Point peninsula and may be used to load material for transport to the project area. The site can be accessed using the Channel to Smith Point which connects Smith Point to the Houston Ship Channel (National Oceanic and Atmospheric Administration [NOAA] navigational charts for Galveston/Houston: http://xpda.com/nauticalcharts/).

5.2.4.2 Galveston Bay Rookery Islands Project Scope

The general conceptual approach and design for the restoration and protection of the rookery islands would use coastal engineering techniques to expand the area of the island, raise its elevation, plant native species of vegetation, and protect the island from erosion. Specifics for each island are provided below.

5.2.4.2.1 Dickinson Bay Island II

The proposed island locations are on submerged bay bottom that is owned by the State of Texas. Appropriate lease(s) or modifications to existing leases would be obtained prior to implementing the proposed restoration actions. The navigation channel would be utilized to transport supplies to the project area. The design currently under consideration for Dickinson Bay Island II would include the construction of an island at a height protective of high tide events during the nesting season. The island is currently in the preliminary engineering design stage (HDR 2014). One of two potential sites would be chosen for construction of Dickinson Bay Island II (Figure 5 -2).The following description for each of the construction elements is based on engineering and biological considerations. The preliminary plan contains the following elements:

- Construct 4 island acres by placing clean fill over submerged land;
- Construct 2,000 feet of armored levees to protect the restored island;
- Build 0.8 acres of submerged levee; and
- Plant 3.5 island acres with native scrub-shrub vegetation.

5.2.4.2.2 Rollover Bay Island

The proposed island restoration is located on submerged and emergent land that is owned by the State of Texas. Appropriate lease(s) or modifications to existing leases would be obtained prior to implementing the proposed restoration actions. The GIWW navigation channel would be utilized to transport supplies to the project area. The conceptual design for the restoration and protection of Rollover Bay Island includes several components that would improve nesting habitat on the island and increase its longevity. The conceptual plan is shown in Figure 5-4 and contains the following elements:

- Construct 10 island acres by placing clean fill over submerged land or existing land (if present);
- Construct 4,500 feet of armored levees to protect the restored island; and
- Plant 4 island acres with native scrub-shrub vegetation.

Restoration and protection of Rollover Bay Island requires the placement of material on the submerged bay bottom, which may impact hard shell substrate, a valued benthic substrate in Galveston Bay. Any impacts incurred after avoidance and minimization measures are taken would be fully mitigated by restoring an equal or greater amount of hard substrate.

5.2.4.2.3 Smith Point Island

The proposed island restoration is partially located on submerged and emergent land. Appropriate lease(s) or modifications to existing leases would be obtained prior to implementing the proposed restoration. Previous restoration activities by the USACE in 2002 near the area of Smith Point Island created infrastructure which can be used to facilitate the restoration of the island. There is an existing breakwater in the project area. This feature would be incorporated into the design of the restored island. The conceptual design for the restoration and protection of the island includes several components that would improve nesting habitat on the island and increase its longevity. The conceptual plan is shown in Figure 5- 5 and contains the following elements:

- Construct 6 island acres by placing clean fill over submerged land;
- Enhance 2,000 feet of existing breakwater to protect the restored and existing island;
- Construct 250 feet of new breakwater to protect the restored and existing island;
- Raise the elevation on 2 acres within the footprint of the existing island with shell material to build an emergent shell beach; and
- Plant 3 island acres with native scrub-shrub vegetation.

5.2.4.3 Galveston Bay Rookery Islands Construction and Installation

Preliminary engineering has been completed for Dickinson Bay Island. The plans developed for Smith Point and Rollover Bay islands are currently conceptual in their design. Refined design and construction specification packages for each of the islands would be developed by PE(s) with coastal restoration experience. Construction and implementation strategies would be similar for each rookery island. Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental and cultural resource impacts. The following descriptions for each of the island construction elements are preliminary and based on current planning efforts and resource agency experience with similar projects within Galveston Bay and should be considered typical.

Construction may require temporary channels to access the restoration and borrow sites. The need for temporary channels will be determined during the engineering and design stage for each island. All temporary channels would be backfilled upon completion of construction work. Fill material would be sourced from either beneficial use of dredged material (likely from a navigation channel project), direct dredging from a nearby *in situ* borrow site, an existing dredged material placement area, or from an upland borrow site. The direct dredge borrow source areas would be no more than 5 feet below grade. All sources of borrow material would be assessed for suitability from an engineering perspective and would be evaluated for environmental conditions to ensure there are no significant impacts to cultural and sensitive resources. The target elevation for the restored island would place the crown at least 4 feet above mean tide level post-settlement sloping to existing grades. Temporary berms would be created, if needed, to contain any dredged material. Higher elevations of each island would be planted with native scrub-shrub vegetation. Plants used would consist of species found at similar island sites and would be propagated from stock from the upper Texas coast. Breakwaters or armored levees will

be used to protect the islands from erosional forces and may be enhanced to provide containment of fill material based on engineering considerations.

Methods and tools would be approved by the PE and the project team that includes Trustee representatives prior to implementation. Environmental considerations, BMPs, and legal and permit requirements must be met regardless of methods and tools chosen. These would be outlined in the bid specification package developed by the PE and contracting officers. This specification package would ensure that the contractor is made aware of not only the engineering specifications but the additional obligations they would incur associated with federal and state laws governing the activities associated with the project. It would also provide the project related approvals needed by the project manager and the PE to conduct the project.

In general, construction would require the use of barges, small watercraft, large track hoe excavators, earth moving equipment, hydraulic or clamshell dredges, and a dockside staging area. Equipment and materials for the construction activities would be transported via roads and marine waterways. Large equipment and materials moved by barges would use the established interconnected waterways. This may include the GIWW, the Houston Ship Channel and/or other navigation channels (NOAA navigational charts for Galveston/Houston: http://xpda.com/nauticalcharts/). The TGLO has identified places to access to coastal waterways at http://www.glo.texas.gov/texas-beach-access/beach_bay.html. Information specific to Galveston County is located at http://www.glo.texas.gov/texas-beach-access/pdf/beach-bay/Galveston.pdf.

5.2.4.3.1 Island Fill and Borrow Site

Uncontaminated earthen fill material would be used to raise elevations. Fill material would be sourced from a nearby navigation channel, a nearby *in situ* borrow site, an existing dredged material placement area, or from an upland borrow site depending on availability of material, its engineering properties, and distance. Additionally, borrow sites would be evaluated for environmental conditions to ensure that any cultural and/or sensitive resources are avoided or properly addressed. The location would be based on several factors including the absence of sensitive resources (e.g. oyster reef, seagrasses), geotechnical and sediment quality, nearby commercial and/or recreational activities, and lateral extent of available material (avoiding a deep borrow site). The site would have an optimal footprint in order to keep the depth modified by the removal of material as shallow as possible, which would prevent impacts to water quality, scouring, or the development of deep pockets in a naturally shallow bay system. Ideally, the borrow site would be situated in the bay to receive sediments carried by currents so it can be replenished with sediments quickly, increasing the rate of recovery to the level of the adjacent bay bottom.

For any of these borrow sites, the material would be mixed with some *in-situ* water as it is placed, requiring a settlement period and the controlled discharge of decant water from within the restoration area. The height of any temporary or permanent structure and construction methods required to contain the earthen fill would be determined by the type of material used and its estimated water content. Location of the structures would ensure containment and settlement of the fill materials, using

BMPs. The volume of earthen fill material for each island is listed below and is the maximum amount of material estimated to be needed:

- Dickinson Bay II – 76,000 cubic yards
- Rollover Bay – 80,000 cubic yards
- Smith Point – 70,000 cubic yards

Material from a direct dredge source area would be mechanically excavated or hydraulically dredged. Excavators used may include a dragline or long-arm excavator to place material on barges for transport to the island site. Hydraulic dredge would be a cutter-head design because it does not pose a risk to pelagic aquatic organisms. If hydraulic dredging is used, the dredge pipe will avoid disturbance to sensitive resource areas such as oyster reefs and seagrass beds. The pipe would be routed to avoid laying on top of these resource areas and any equipment will avoid them as well. Any areas containing such resources in the construction and transport area of each project site will be visibly marked prior to start of construction. Material would be transported to the island via a hydraulic dredge pipeline or by barge if a mechanical dredge is used. Pipeline or hydraulic dredges, because they are not known to take sea turtles, will be used, if possible (NOAA 2007).

A form or method of beneficial use of dredged material is to mine existing USACE material placement areas that are associated with federally maintained navigation channels. These placement areas are maintained and operated as part of the GIWW federal project. Material would be mined using mechanical or hydraulic excavation techniques. Mechanically excavated material would be placed on barges and transported to the islands.

Screening for potential chemical contaminants will be conducted on a case-by-case basis. For sediments from federally-maintained navigation channels or associated dredged material placement areas, previously collected contaminant analysis and bio-assay data will be obtained from the USACE Galveston District - Operations Branch records. For bay bottom borrow sites, local and regional knowledge of historical industrial activities as well as regulatory documentation on past and existing facilities in the vicinity of potential sediment borrow sources will be used to determine the likelihood and type of contaminants that might be expected to be encountered during construction. Based upon this information, USACE and state and federal resource agency personnel will be consulted to determine the amount of sampling and the type of chemical analyses that may be needed.

All environmental reviews required for the placement of the material obtained as part of a beneficial use disposal process would be completed by the other project (e.g. a navigation improvement project). If an *in situ* borrow area is used, the borrow area would be located as near the island as feasible and would use surface bay bottom sediments. If earthen fill material is obtained from a more distant borrow area such as upland site, the material would meet engineering requirements and the site would be reviewed and approved by resource agencies for cultural and sensitive resources including at-risk species, wetlands, contaminants, and cultural resources. To date, the source of the fill material has not been identified for any of the three Galveston Bay rookery islands.

Measures to control turbidity caused by construction activities, decant water, and sediment movement would be in place to ensure sensitive habitats are protected, water quality standards are met, and sensitive resources are not affected. These measures may include appropriate water control structures to decant water, as well as the installation of silt fences, hay bales, filter-fabric, and/or temporary levees to control sediments and avoid negative impacts associated with the fill placement. The nearby presence of oyster reefs, other hard structure reef resources, and seagrass beds near some islands would require the use of significant control measures during project implementation.

5.2.4.3.2 Breakwater/Armored Levee

Breakwaters or armored levees would be installed to protect the island from erosional forces. However, they could be modified or enhanced as part of this project to act as containment for the earthen fill. Graded stone, typically limestone, would be used to construct the breakwaters or armoring. The amount, grading, and size of rock used would be dependent on several factors determined in the final design. These include wave and current energy expected, as well as whether the breakwaters or armored levees would be used for containment and dewatering of sediments or only for erosion protection. Breakwaters and levees used for containment are typically higher in elevation and larger than those used solely for erosion protection. These considerations along with physical data from the site would be evaluated by a qualified coastal PE and the project team prior to selection of design. The project team would include individuals from TPWD, USFWS, and participating partners. The source of the material is expected to be from known and existing limestone quarries used for coastal construction projects across the western Gulf of Mexico meeting standards specified for the project.

5.2.4.3.3 Submerged Levee

Only Dickinson Bay Island II would have a submerged levee as part of its design. The submerged levee incorporated into the design serves to create a water/shore interface that would facilitate the use of the island by avian species. The calm water/shore interface is an important component used by nesting birds and their fledged young. The exact design specifications have yet to be determined by the project team. However, a cap of protective cultch or rock material would be deployed over the submerged levee to provide long-term protection. The submerged levee may be exposed during low tide events but its elevation would be within the normal intertidal range.

5.2.4.3.4 Vegetation Planting

Once the earthen fill has dewatered and sediments have settled, the higher elevation portions of the restored islands would be planted with native scrub-shrub vegetation to help promote desired vegetation establishment. Each island site would have a targeted number of acres for vegetative plantings: Dickinson Bay Island II, 3.5 acres; Smith Point Island, 3 acres; and Rollover Bay Island, 4 acres. Plants used would be species documented from similar island sites and be propagated from stock located on the upper Texas coast. Species under consideration include, but are not limited to, those shown in Table 5-2. A Vegetation Planting Plan modified from and based on the Natural Resources Conservation Service (NRCS) Publication NRCS-TX-612 would be developed prior to implementation

(NRCS 2013). This plan would provide specifications for the species of native vegetation to be used; acceptable source stock; planting densities and locations on the island for planting; survival targets and adaptive management strategies. Expected plant survival is approximately 60% at the end of the 5-year monitoring period. Protective measures may include trunk collars or wire exclusion cages to protect saplings from herbivory or trampling during the first few years after planting. Time of year as well as substrate salinity would determine the timing for planting. It is anticipated that this would take place approximately one year after construction, depending on environmental conditions.

Table 5-2. Examples of native scrub-shrub species proposed for transplanting

Common Name	Scientific Name
Colima	*Zanthoxylum fagara*
Bumelia	*Sideroxylon lanuginosa*
Prickly Pear Cactus	*Opuntia sp.*
Texas Swamp Privet	*Forestiera augustifolia*
Huisache	*Acacia farnesiana*
Jerusalem Thorn	*Parkinsonia aculeata*

5.2.4.3.5 Shell Beach Enhancement

Shell beach habitat on Smith Point Island would be enhanced to support ground nesting birds by placing material similar to the existing shell hash on top of the existing substrate. Approximately 5,000 cubic yards of material similar to the existing shell is anticipated to be deposited on Smith Point Island raising the elevation approximately 1.5 feet. The final elevation of the improved island would be such that it would be suitable for shell and bare ground nesting species. The wave energy would maintain a portion of the island free from vegetation and ideal for shell and bare ground nesting birds.

Rollover Bay Island was created through the placement of dredge material. Erosive forces have winnowed the lighter sediment and concentrated fossil mollusk shell and shell fragments leaving a surface layer of hard shell substrate. This shell material is not part of accreting reefs dominated by living eastern oysters and does not have commercial fisheries value; however, the shell reef is an important ecological habitat in Galveston Bay. Therefore any unavoidable impacts to hard shell substrate caused by the placement of material for the island restoration may require compensation after consultations with natural resource agencies.

Material placed onto Rollover Bay and Smith Point Islands would be added in a manner that it emulates shell berms observed in nearby areas. The source of this material would be similar to the shell hash present on these islands in structure, form, and mineral composition (calcareous) and be either from current shell sources, limestone, or a mixture of limestone and shell, or material similar in size shape, density, etc. This material would be obtained from commercially available sources.

5.2.4.3.6 Construction Schedule

Currently, Dickinson Bay Island II does not exist; therefore, there is no nesting habitat present and construction could occur anytime during the year. If it appears that birds will nest on Rollover Bay and Smith Point Islands, construction would avoid the nesting season, which is usually February 1 through August 15. However, some field activities that pose minimal disturbance to nesting birds may be acceptable during this time. Any such activities would be coordinated with state and federal agency biologists and with non-governmental organization (NGO) partners prior to initiation of field work. The final engineering and design for all the islands is estimated to be completed in 12 months for Dickinson Bay Island II and 18 months for Rollover Bay and Smith Point Islands. Activities associated with construction are not expected to take longer than 6 months for Dickinson Bay Island II and Smith Point Island and 12 months for Rollover Bay Island. The timing of contracting awards and weather conditions could impact the construction schedule. To prevent disturbance to nearby residential communities near Rollover and Smith Point, construction activities that produce significant noise or require precision, such as moving or placing rock, would be limited to daylight hours.

5.2.4.4 Galveston Bay Rookery Islands Operations and Maintenance

The Galveston Bay Foundation leases a previously restored island in Dickinson Bay from the TGLO. Audubon Texas manages Rollover Bay Island through a lease for the island and submerged lands with the TGLO and Smith Point Island through a lease for the island and submerged lands with the Chambers-Liberty Navigation District. Appropriate lease(s) or modifications to existing leases would be obtained prior to implementing the proposed restoration actions. Maintenance activities on Dickinson Bay Island II would likely be managed by the Galveston Bay Foundation or another stakeholder and maintenance at Smith Point and Rollover Bay Islands would likely be managed by Audubon Texas or another stakeholder. As members of the Texas Colonial Waterbird Society, they participate in the annual waterbird surveys and work collectively to support waterbird conservation.

As members of the project teams for the respective islands, both Galveston Bay Foundation and Audubon Texas would participate in project development and be cognizant of obligations related to long-term management. Activities on the islands by both organizations include monitoring, predator control, and educational signs to reduce disturbance.

5.2.5 Galveston Bay Rookery Islands Affected Environment and Environmental Consequences

This section provides the affected environment and environmental consequences for the proposed actions in Galveston Bay, which includes the restoration and protection of Dickinson Bay Island II, Rollover Bay Island, and Smith Point Island.

According to the CEQ Regulations for Implementing NEPA (§§ 1502.1 and 1502.2) agencies should “focus on significant environmental issues” and for other than significant issues there should be “only enough discussion to show why more study is not warranted.” After preliminary investigation, some resource areas were determined to be either unaffected or minimally affected by the proposed action. These

resources are not discussed in further detail below. Only those resource areas with potential, adverse impacts are discussed in detail below.

The programmatic analysis looked at a series of resources as part of the biological, physical, and socioeconomic environment. As appropriate in a tiered analysis, the evaluation of each project focuses on the specific resources with a potential to be affected by the proposed project. To avoid redundant or unnecessary information, resource areas that are not expected to be adversely impacted are not evaluated further under given proposed actions. Resource areas that are not analyzed in detail are listed below with a brief rationale for non-inclusion:

- Socioeconomics/Environmental Justice: 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. Any 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. 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. Commercial fishing (shrimp, crab and oyster fisheries) occur in Galveston Bay. Of particular concern are the oyster leases in the vicinity of Smith Point Island. Prior to construction and during the engineering and design, the Implementing Trustees would work with the commercial fisheries community to prevent impacts to adjacent submerged lands used to harvest oysters.

  The Trustees find that the rookery islands do not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. In addition, the islands are uninhabited by humans and restoration of the islands would not be directly affecting any residents. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed action.

- Infrastructure: There are no pipelines near Rollover Bay Island. Pipelines near Dickinson Bay Island II and Smith Point Island are not in the construction footprint and would be avoided during construction. The proposed action is anticipated to have no impact to infrastructure, since new infrastructure would not be built and existing infrastructure in the area would be avoided.

- Land and Marine Management: The rookery islands include submerged bay bottom in their construction footprints. Appropriate leases or modifications to existing leases would be obtained prior to construction. Audubon Texas currently manages Rollover Bay Island for nesting colonial waterbirds through a lease with TGLO. Audubon Texas currently manages Smith Point Island for nesting colonial waterbirds through a lease with the Chambers-Liberty Navigation District. The proposed action is anticipated to have no impact to land and marine management, since projects would be consistent with the prevailing management, practices,

plans, and direction governing the use of the areas where the island restoration would take place.

- Land and Marine Transportation: The proposed action is anticipated to have no impact to land and marine transportation. Shipping routes would need to be properly identified prior to the selection of borrow sites for dredge and fill material to prevent any impacts to marine transportation. Activities related to construction would require coordination with the users of the waterway. While the Dickinson Bay Navigation Channel, Channel to Smith Point, or GIWW would be used to transport equipment and materials, barges would be staged adjacent to the island site and not within the approved waterway. It is expected that activities would not interrupt the channel traffic to any significant degree. Most of the commercial traffic takes place on a routine schedule and construction activities would be timed to reduce any interference with commercial operators.

5.2.5.1 Physical Environment

Galveston Bay is about 30 miles long, 17 miles wide, 6 to 12 feet deep, and has a surface area of 600 square miles. Galveston Bay was formed during the end of the last glacial period when world sea levels rose in response to melting glaciers (Anderson 2007). Formerly a river valley during the Pleistocene, sediments accumulated in the valley as the sea rose and formed the bay during the Holocene. The Galveston Bay geologic substrates are comprised of clay and silt with some sand. Most of the sand component is delivered from the Gulf by tidal forces. The main sources of sediments entering the system include the Trinity and San Jacinto River systems and to a lesser degree the many small streams and bayous that enter the system. Significant subsidence has occurred as the result of the withdrawal of underground fluids. This has resulted in significant changes to the shorelines of the bay as well as islands formed naturally or by man. Most of the islands in the bay system were created during the construction of waterways by the side casting of dredged material along the newly created channel. The description of the physical environment of Galveston Bay is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

5.2.5.1.1 Geology and Substrates

Affected Resources

Dickinson Bay Island II

Dickinson Bay Island II would be built over submerged sediments in subtidal habitat. Sediment cores were taken and the substrate was analyzed. The substrate was defined as sandy lean clay with shell fragments or clayey sand with shell fragments. Detailed substrate profiles are in Appendix A of the Alternatives Analysis. A navigation channel, approximately 7 feet deep is located between the two potential project sites. Areas not within the navigation channel are approximately 4 feet deep.

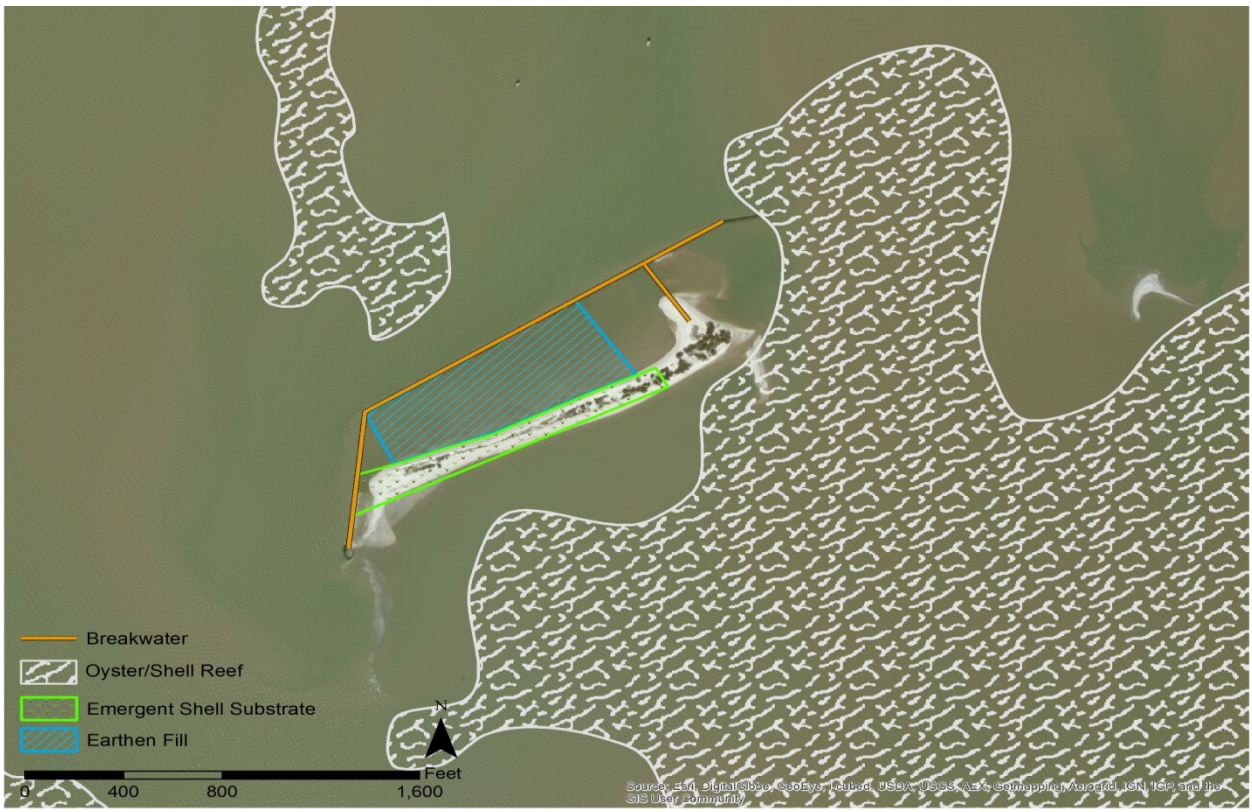
Rollover Bay Island

Several dredged material placement islands (approximately 11 islands) were created in Rollover Bay during excavation and maintenance of the GIWW. The site chosen for the restoration is associated with one of the five remaining islands. The material excavated was composed primarily of clays and silts with some sand containing fossil shell and shell fragments. The Galveston County Soil Survey identifies the island soils as Ijam Soil Series. These soils form in materials dredged from bays and waterways. The island is near the GIWW which has depth of about 10 feet. The surrounding area is around 4 feet deep.

Smith Point Island

Smith Point Island was likely a natural reef island associated with a suite of reef islands mapped in 1921 (NOAA 1921). In 1950, material was added to the islands current location when the Channel to Smith Point was constructed. The island may have received additional material in 1972. The island is currently comprised of winnowed oyster shell that was left behind after the lighter dredged sediments eroded away. The submerged bay bottom surrounding the island is primarily composed of clays with some silt. The area contains considerable active oyster reef, oyster leases, and hard bottom substrate (Figure 5-8)). The depths surrounding the island are relatively shallow from approximately 3 feet to 5 feet in the nearby navigation channel.

Figure 5-8. Location of oyster reefs in the vicinity of Smith Point Island



Borrow Area

Fill material may be obtained from an *in situ* borrow area, a more distant area (which could include an upland site), or from a project that would be dredging materials and is looking for beneficial use of dredged material. Borrow sites determined to be suitable would be evaluated for environmental conditions to ensure that any cultural and/or sensitive resources are fully addressed. Location of a specific borrow site(s) would be based on several factors including the absence of sensitive resources (e.g. oyster reef or other hard bottom substrate), geotechnical and sediment quality, nearby commercial and/or recreational activities, and lateral extent of available material (avoiding a deep borrow site). See Section 5.2.4.3.1 for additional details on the borrow area.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to geology and substrates would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in adverse impacts to the rookery islands as they would continue to erode and lose elevation. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.1 and 6.7.1.1 of the Final Phase III ERP/PEIS describe the impacts to geology and substrates from early restoration projects intended to restore and protect birds.

Restoration and enhancement of the rookery islands in Galveston Bay would affect substrates at the placement and borrow sites. Substrates within the footprint of the project would be affected through the placement of clean fill and hard, structural material. The Galveston Bay rookery islands would have minor impacts on substrates geology. Adverse impacts would be minor and local. Long-term benefits would occur to the bottom substrates due to stabilization of sediments protection from erosion.

Mitigation measures to minimize adverse impacts to geology and substrates could include:

- Employment of standard BMPs for construction to reduce erosion and loss of sediments.
- Evaluations of potential borrow sites for environmental conditions as well as cultural and sensitive resources concerns.
- Selection of a borrow site with an optimum footprint and sediment accretion to minimize impacts and expedite rate of recovery at the borrow site.

5.2.5.1.2 Hydrology and Water Quality

Affected Resources

There are three tidal inlets into Galveston Bay, but only two are of major importance with regard to flow. Bolivar Roads (Houston Ship Channel), between Galveston Island and Bolivar Peninsula, accounts for the majority of the tidal exchange between the bay and the Gulf of Mexico. San Luis Pass, between the western end of Galveston Island and Follets Island, is an unaltered inlet that supplies a lesser amount of the bay's tidal exchange. Rollover Pass is by comparison a small enhanced tidal connection through Bolivar Peninsula connecting East Bay with the Gulf of Mexico. Overall, the natural depth of the bay is relatively shallow, 6 to 12 feet. Tides in Galveston under normal conditions are very small in amplitude, usually less than 3 feet between low and high tide. Wind speed and direction within Galveston Bay plays an important role in affecting tide elevation. It can dampen or enhance the height of waves as well as their potential energy. Prevailing winds are from the southeast, with occasional strong northerly winds that are associated with passing cold fronts. Winds combined with seasonal tide events can greatly exacerbate the tidal range as well as move the range up or down by 1 or 2 feet. Tropical storm tides during Category 4 or 5 hurricanes could be as high as 23 feet above normal water levels (GBEP 2011).

Dickinson Bay Island II

Dickinson Bay is a small estuarine bay fed by Dickinson Bayou on the western shoreline of Galveston Bay. Conditions within Dickinson Bay are influenced predominately by the larger Galveston Bay. Flows in Dickinson Bayou may become significant with rainfall events and thus lower the salinity within Dickinson Bay. The hydrology of the area is affected by tidal actions and the location of the nearby navigation channel. The conceptual design and orientation of the island would account for hydrological pressures in the area. The recent construction of Dickinson Bay Island I, located just northwest of the proposed island would be used as a model for how to deal with hydrology related concerns.

Rollover Bay Island

The hydrology of the surrounding areas of this island is affected by tidal actions between East Bay and the Gulf of Mexico through Rollover Pass and currents associated with GIWW traffic. Tidal currents are fairly strong as water moves between the neighboring waterbodies. These conditions would be evaluated during the engineering design phase of the project to ensure that forces associated with the East Bay fetch, GIWW traffic, and Rollover Pass currents are considered.

Smith Point Island

The Smith Point Island area is associated with Smith Point peninsula. The hydrology of the area is affected by tidal actions and by freshwater inflows from the Trinity and San Jacinto Rivers. Tidal currents are fairly strong as water moves between Trinity Bay and East Bay. High flow pulse events occur associated with the river's discharge can overwhelm tidal currents.

Water Quality

According to the water quality index, Galveston Bay received a poor rating. Galveston Bay is rated fair for dissolved inorganic nitrogen concentrations and rated poor for dissolved inorganic phosphorus concentrations. Thirteen percent of the estuarine area was rated poor for dissolved inorganic nitrogen concentrations, whereas 68% of the estuarine area was rated poor for dissolved inorganic phosphorus concentrations. Expectations for water clarity are similar to those for normally turbid estuaries, with water clarity rated poor at a sampling site if light penetration at 1 meter was less than 10% of surface illumination. Dissolved oxygen conditions in Galveston Bay are rated good (U.S. Environmental Protection Agency 2007). As of August 2015, there are two human health consumption advisories in Galveston Bay for certain seafood species due to high levels of dioxins, polychlorinated biphenyls (PCBs) and organochlorine pesticides (http://www.dshs.state.tx.us/seafood/advisories-bans.aspx). Within the restoration project areas, the advisory is limited to all species of catfish due to high levels of dioxin and PCBs. Additional information can be found at: https://tpwd.texas.gov/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to hydrology and water quality would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.2 and 6.7.2.1 of the Final Phase III ERP/PEIS describe the impacts to hydrology and water quality from early restoration projects intended to restore and protect birds. For these islands, impacts to hydrology and water quality were analyzed adequately within the PEIS. The PEIS determined that "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."

No impacts to floodplains or hydrology would occur. Temporary, local, and minor impacts to water quality would result from increased turbidity during dredging activities and placement of fill material. Long-term benefits would also occur from the breakwater/armored levee protection of the islands.

Measures to control turbidity and sediment movement would be in place to ensure water quality standards are met and sensitive resources are not affected. These measures may include appropriate water control structures to decant water, as well as the installation of silt fences, hay bales, filter-fabric,

and/or temporary levees to control sediments and avoid negative impacts associated with the fill placement.

5.2.5.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

Air Quality

The islands are located in 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 (http://www.tceq.state.tx.us/airquality/sip/hgb/hgb-status).

Greenhouse Gas (GHG) Emissions

GHGs are chemical compounds found in the Earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The principal GHGs emitted to the atmosphere through human activities are CO2, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, with CO2 accounting for the largest quantity GHG emitted.

Criteria air pollutants and GHG emissions are largely generated by electricity production, vehicular movements, and commercial and residential buildings using electricity. GHG emissions would result from both the implementation and operation of the proposed project from the use of vessels during construction and monitoring activities. Engine exhaust from barges, boats, excavators, and equipment would contribute to an increase in GHG emissions. BMPs would be employed to reduce the release of GHG during project implementation.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to air quality and GHGs would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.3 and 6.7.3.1 of the Final Phase III ERP/PEIS describe the impacts to air quality and greenhouse gas emissions from early restoration projects intended to restore and protect birds. For these islands, impacts to air quality and greenhouse gas emissions were analyzed adequately within the PEIS. The PEIS determined that "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. 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."

Project implementation would require the use of 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, sediments deposited would be mixed with water, keeping airborne particles to a minimum. Adverse impacts to air quality would be minor, local, and temporary, only occurring during active construction activities.

Based on the assumptions described above, and the small-scale and short duration of the construction portion of the project, predicted GHG emissions would be temporary and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

5.2.5.1.4 Noise

Affected Resources

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. The timing of noise producing activities would be planned to minimize disturbance to nesting birds. The majority of construction activities would occur outside of the nesting season. Construction noise would also create a potential nuisance to visitors in areas adjacent to project construction activities. To prevent disturbance to nearby residential communities near Rollover and Smith Point, construction activities that produce significant noise or require precision, such as moving or placing rock would be limited to daylight hours. Construction noise would be temporary and the construction period is not anticipated to last more than 12 months.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts due to noise would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.4 and 6.7.4.1 of the Final Phase III ERP/PEIS describe the impacts caused by noise from early restoration projects intended to restore and protect birds. For these islands, impacts caused by noise were analyzed adequately within the PEIS. The PEIS determined that "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."

The proposed Galveston Bay rookery islands would create a minor, localized, and temporary increase in noise.

5.2.5.2 Biological Environment

The Galveston Bay system contains a variety of habitat types, ranging from open water areas to wetlands to upland prairie. Wetlands, seagrass meadows, and oyster reefs are three important habitat types in Galveston Bay. A wide variety of fish, wildlife, plant, and invertebrate populations either reside in or periodically utilize Galveston Bay and its associated habitats, including oysters, finfish, shrimp, crab, birds, sea turtles, and marine mammals (GBEP 2011). The biological environment is divided into two sections: living coastal and marine resources, and protected species.

5.2.5.2.1 Living Coastal and Marine Resources

Affected Resources

Dickinson Bay Island II

Currently the rookery island does not exist. Based on surveys of the submerged bay bottom performed in May 2013, there are no seagrasses or oyster reefs/shell pads at either the north or south site (See pages 4-8 of the Alternatives Analysis by HDR [2014] for further details). Additionally, no seagrasses have been reported by resource agency biologists working in the area.

Rollover Bay Island

The previously deposited dredged material was composed primarily of clays and silts with some sand containing fossil shell and shell fragments. What remains of the original island would be classified under the Cowardin classification system as Estuarine Intertidal Reef and Emergent or Scrub-Shrub wetland. As the island eroded the associated shell from the dredging operation remained and provides Intertidal and Subtidal Reef substrate habitat. Shell material would be avoided during construction, when possible. This shell material is not part of an accreting reef dominated by living eastern oysters and does not have commercial fisheries value; however, the shell reef is an important ecological habitat in

Galveston Bay. Existing shell material, tidal and subtidal, would be enhanced by the placement of shell material in order to compensate for any unavoidable collateral injury to hard substrate. In the areas which vegetation exists, it is primarily comprised of common reed (*Phragmites australis*), high tide bush (*Iva frutescens*), sea oxide daisy (*Borrichia frutescens*), and sea purslane (*Sesuvium* sp.).

While nesting activity of colonial waterbirds has seriously declined in recent years, birds continue to use Rollover Bay Island for staging, loafing, roosting, and possible nesting sites. Non-colonial waterbirds, primarily the American oystercatcher (*Haematopus palliates*) and eastern willet (*Catoptrophorus semipalmatus)*, may use the existing island for nesting as well. The island supports limited colonial waterbird nesting and little species diversity due to its diminishing size and habitat loss. Limited to no nesting took place during 2013 and 2014 on what remains of the island (Hackney and Woodrow, pers. comm. 2014).

Smith Point Island

Smith Point Island was likely a natural reef island associated with a suite of reef islands mapped in 1921 (NOAA 1921). Over time, much of the sediment has eroded. Currently, the island is a long, narrow piece of land that is rapidly eroding and is now mainly comprised of winnowed oyster shell that was left behind after the lighter dredged sediments eroded away. The shell is continually moved by wave energy which inhibits the accumulation of soil or fine shell material and therefore limits the extent of vegetation establishment. Harsh environmental conditions have limited the presence of vegetation to only a few salt cedar (*Tamarix* sp.) and limited herbaceous vegetation including sea purslane and seaside tansy which can tolerate the salinity exposure (Hackney pers. comm. 2014).

Smith Point Island has intertidal and supratidal habitat and there is emergent habitat between the island and the breakwater. The island is currently classified under the Cowardin classification system as Estuarine Intertidal Reef. Surrounding the island are large areas of Estuarine Subtidal Reef (i.e. oyster/shell reef) habitat. Located near the island are significant accreting Eastern oyster reefs, oyster leases, and hard bottom substrate. Due to the highly productive nature of these reefs and their accreting conditions, measures would be employed to avoid impacts to these resources. Surveys delineating the presence, type and extent of reef and bottom substrates would be completed prior to finalizing full project elements and design. Eastern oyster reefs would be avoided during construction and are not within the footprint of the proposed action.

While nesting activity of colonial waterbirds has declined in recent years, birds continue to use Smith Point Island for staging, loafing, roosting, and possible nesting sites. The island supports limited colonial waterbird nesting and little species diversity due to changes in vegetation and habitat loss from erosion. Non-colonial waterbirds, primarily the American oystercatcher and the eastern willet, may use the existing island for nesting as well.

All Three Islands

Seagrasses are not expected at any of these islands and sea grasses were not identified using the TPWD seagrass viewer (http://tpwd.texas.gov/gis/seagrass/). However, any seagrasses encountered during any surveys would be documented and measures would be taken to avoid and minimize any impacts.

There are a number of aquatic species found in the island restoration areas. Fish species include sand seatrout, spotted or speckled seatrout, red drum, tonguefish, flounders, Atlantic bumper, and porgys. Benthic organisms include bivalves, gastropods and other mollusks, amphipods, annelids, and brown and white shrimp.

Water dependent birds may use the open bay to forage and roost. These would include loons, bay ducks, gulls, terns, and pelicans. Non-avian terrestrial wildlife has not been observed at either existing island (Rollover Bay and Smith Point Islands). Texas diamondback terrapins (*Malachlemys terrapin)* may use the existing islands and surrounding waters.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to living coastal and marine resources would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in the continued degradation of the nesting habitat and adverse impacts to colonial waterbirds. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.5, 6.3.8.6, 6.7.5, and 6.76 of the Final Phase III ERP/PEIS describe the impacts to habitats and living coastal and marine resources from early restoration projects intended to restore and protect birds. The PEIS determined that "Creating and enhancing bird habitat would create long-term benefits from increasing stability and resiliency of barrier islands and beaches."

The PEIS also found that "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:

- Dredged sediment removed the bay bottom could impact local benthic organisms on or near the borrow site from increased turbidity, substrate disturbances or siltation, which could locally increase mortality and inhibit activities in the short-term until the site recovered.
- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb 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.

- Birds using the sites as roosting and/or loafing areas would be forced to other parts of the island or other surrounding areas during construction activities. This would be temporary, however, and once the project was completed, the project would have long-term benefits to birds for these uses.

- Any breeding birds using the islands would be avoided by restricting construction to the non-nesting period.

Dredging from a direct dredge aquatic borrow site would change substrate topography, indirectly impacting benthic and other aquatic organisms using this habitat. Depending on the depth-of-cut, dredging could result in low dissolved oxygen in bottom waters. The depth-of-cut is planned to be as shallow as is feasible. 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 fish and wildlife resources would occur during the construction phase of the project. Mobile aquatic animals including birds 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 and recolonize quickly. Any adverse impacts to marine and estuarine fauna (fish, shell beds, benthic organisms) are expected to be temporary, localized, and minor as those species that would be affected are likely numerous in the area.

The potentially impacted areas, including the borrow area and island construction areas, would be surveyed prior to construction for the presence of sensitive resources. Seagrasses are not expected at any of these islands. However, any seagrasses encountered during the surveys would be documented and measures would be taken to avoid and minimize any impacts. Of primary concern is the presence of oyster reef habitats and oyster leases on or near Smith Point Island (Figure 5-8 and Figure 5-9). Once mapped, construction activities would be designed and coordinated to avoid any impacts to oyster leases and other significant oyster reefs. Hard substrate composed of winnowed shell material may also be present at the construction sites. BMPs would be used to avoid and minimize potential impacts and may include alternative construction methods as appropriate. Any impacts incurred after avoidance and minimization measures are taken would be fully mitigated by restoring an equal or greater amount of hard substrate.

Figure 5-9. Location of oyster reefs and commercial oyster leases in the vicinity of Smith Point Island

The project would provide overall long-term benefits to marine species by providing additional structural fish habitat and increased hard substrate productivity. Over the life of the project, the quality of aquatic habitat would increase. The construction of an intertidal or subtidal breakwater or armored levee would provide long-term benefits to marine species by providing additional hard structure (including crevices and interstitial voids) habitat. Additionally, reducing erosion could benefit oyster populations that can be adversely affected by excessive sediment in nearshore waters.

The shoreline length of each of the islands would increase from what it is today. The new shoreline areas would be gradually slopped into the water creating sufficient tidal fringe to support wetlands. The breakwater would also protect both existing and created shoreline from erosion and reduce wetland loss from erosion.

Construction activities would cause temporary impacts to wildlife due to the presence of people and use of heavy equipment on the island. These impacts would last for the duration of construction, which is estimated to be a maximum of 12 months. Permanent impacts result from alterations to the island and associated habitat would provide long-term benefit to nesting birds. Natural colonization would occur

which would provide grassy substrate in addition to the vegetative plantings of scrub-shrub vegetation, both of which could be used by the colonial nesting birds.

To prevent invasive exotic species from inhibiting nesting activities the islands would be monitored for the presence of undesirable exotic species. If they negatively impact nesting activities, appropriate treatment methods would be used to remove them.

5.2.5.2.2 Protected Species

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the USFWS or the National Marine Fisheries Service (NMFS). Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act.

Affected Resources

Threatened or Endangered Species

Five species of endangered or threatened species of sea turtles were identified as possibly being present in Galveston Bay and at each of the island restoration sites: loggerhead, green, hawksbill, leatherback, and Kemp's ridley sea turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. The island restoration sites and their project areas have not been designated as critical habitat for any of the sea turtle species. Sea turtle nesting activities are not expected to occur here since there is no beach habitat; however, sea turtles could be encountered in the open water.

West Indian Manatee has been documented in Galveston Bay, although sightings are extremely rare. The manatee feeds on vegetation, is slow moving, and somewhat intolerant of cold water temperatures. There is the possibility that it may be present during construction activities.

Two species of threatened bird species are identified as possibly occurring in the construction areas: piping plover and red knot. The piping plover is a migrant and winter resident on the Texas coast and occurs in Galveston County. Piping plovers are not expected to occur at either Rollover Bay Island or Smith Point Island where construction activities would occur because typical habitats, beach and bayside tidal flat habitats, for the species are not present. Rollover Bay Island is located near (approximately 0.5 miles) critical habitat for the piping plover. All equipment, vessels, and people will avoid piping plover critical habitat. The GIWW, which is a major marine transportation corridor, is situated between the project area and the critical habitat. Any activities related to implementation of the project will not take place in the area considered critical habitat. The red knot is primarily migratory in Galveston County. However, there are no documented records of red knots on Rollover Bay Island. Migration of the red knot has been observed during the Smith Point Hawk Watch, approximately 1.5 miles from Smith Point Island. Red knots are not expected to occur in the construction area because typical habitats, beach and

bayside tidal flat habitats, for the species are not present. Individual piping plovers or red knots could rest at Rollover Bay or Smith Point Islands during their migration. No proposed island sites are located within critical habitat for these species. However, Rollover Bay Island is located near (approximately 0.5 miles) critical habitat for the piping plover. All equipment, vessels, and people would avoid piping plover critical habitat.

Essential Fish Habitat (EFH)

EFH in the project's area of effect is identified and described for various life stages of 12 managed fish and shellfish (Gulf of Mexico Fisheries Management Council 2005). The Galveston Bay rookery islands are located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish (Table 5-3 and Table 5-4). No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

Table 5-3. EFH for estuarine habitats within the vicinity of the Galveston Bay rookery islands proposed area of effect

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Estuarine Emergent Marsh							
Red Drum			●	●	●	●	
Gray Snapper						●	
Brown Shrimp				●			
White Shrimp				●			
Estuarine Oyster Reef							
Brown Shrimp				●			
Estuarine Sand and Shell Bottom							
Red Drum			●		●	●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
Estuarine Mud/Soft Bottom							
Red Drum		●	●	●	●	●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
White Shrimp				●			

(● indicates habitat type designated as EFH for species' life stage)

Table 5-4. Highly migratory species EFH designations within the proposed area of effect

Species Common Name	Life Stage Within Estuarine Waters
Scalloped Hammerhead Shark	Neonate & Juvenile
Blacktip Shark	Neonate, Juvenile & Adult
Bull Shark	Neonate, Juvenile & Adult
Lemon Shark	Neonate
Spinner Shark	Neonate & Juvenile
Bonnethead Shark	Neonate, Juvenile & Adult
Atlantic Sharpnose Shark	Neonate, Juvenile & Adult

Marine Mammals

The bottlenose dolphin and the West Indian Manatee (manatees are protected under the Endangered Species Act) are the only marine mammals known to occur in the Galveston Bay system. Manatees are extremely rare in Texas waters with sightings less than one per year on average across the entire Texas coast. Due to the relatively shallow depth of the surrounding areas of the islands, less than 6 to 12 feet, and the established ranges and depths that the majority of the cetaceans occupy, additional marine mammals would not be expected to enter the construction area.

Bald and Golden Eagles

There are eagle home ranges or established territories within the rookery island areas. Eagles have been observed at Smith Point during the fall migration Hawk Watch. Bald eagles may be found in the vicinity of Dickinson Bay since nests have been documented in near inland sites surrounding Galveston Bay. No eagles are nesting within 660 feet of any of the islands. Golden eagles have been documented at the Smith Point Hawk Watch during fall migration, however they have occurred in limited numbers and their presence is temporary.

Migratory Birds

Dickinson Bay Island II

Dickinson Bay Island II does not currently exist. The two currently proposed locations provide habitat for migratory birds that use open bay habitat for fishing, staging and roosting purposes.

For non-breeding migratory birds, the open water site currently supports roosting and foraging use. The different bird taxonomic guilds and use activities are listed below:

Loons and Grebes – This group of birds may use waters surrounding the site locations during the fall, winter, and spring to forage. Presence in the area would be based on available forage fish and invertebrates. Construction activities may cause the birds to move to other foraging areas; however, no take is anticipated.

Waterfowl – Surrounding bay waters are used by several species of wintering waterfowl, primarily bay ducks. This group may be affected by construction activities. The temporary nature of construction and this bird group's use of other available waters nearby will avoid take.

Pelicans and Cormorants – These would use the open bay to forage. Construction activities would cause the birds using the area to move to other locations in the bay. Acclimation to construction activities may take place.

Terns and Gulls – These species would use the open bay habitat to forage. These birds would move to other nearby sites in the bay system to forage.

The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide more opportunity for many of the above listed bird groups as well as other guilds during the non-nesting season.

Rollover Bay Island

Rollover Bay Island provides some habitat for use by migratory birds. The island supports limited colonial waterbird nesting and little species diversity due to its diminishing size and habitat loss. Limited to no nesting took place during 2013 and 2014 on what remains of the island (Hackney and Woodrow, pers. comm. 2014). It does however support staging, resting, and roosting habitat for those species that used the site historically for nesting (Table 5-5). Non-colonial waterbirds, primarily the American oystercatcher and eastern willet, may use the existing island for nesting as well.

Table 5-5. Historical nesting use of Rollover Bay Island by colonial waterbird species

Common Name	Scientific Name
Brown Pelican	*Pelicanus occidentalis*
Neotropic Cormorant	*Phalacrocorax brazilianus*
Great Egret	*Ardea alba*
Great Blue Heron	*Ardea herodias*
Snowy Egret	*Egretta thula*
Tricolored Heron	*Egretta tricolor*
Reddish Egret	*Egretta rufescens*
Cattle Egret	*Bubulcus ibis*
Black-crowned Night Heron	*Nycticorax nycticorax*
Roseate Spoonbill	*Platalea ajaja*
White Ibis	*Eudocimus albus*
Laughing Gull	*Leucophaeus atricilla*
Forster's Tern	*Sterna forsteri*
Black Skimmer	*Rynchops niger*

For non-breeding migratory birds the island currently supports roosting and limited foraging use. The different bird taxonomic guilds and use activities are listed below:

Loons and Grebes – This group of birds may use surrounding waters during the fall, winter, and spring to forage. Presence in the area would be based on available forage fish and invertebrates. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Waterfowl – Waterfowl use of the island is limited. Surrounding bay waters are used by several species of wintering waterfowl, primarily bay ducks. However, the existing activity of the area (GIWW and recreational fishing) would limit the presence of this group of birds, primarily bay ducks. This group would use nearby bayside shallow waters adjacent to the shoreline north of the GIWW. These locations are distant from the project site. This group may be affected by construction activities. The temporary nature of construction and this bird group's use of more undisturbed waters nearby will avoid take.

Pelicans and Cormorants – These would significantly use the existing island for resting, staging and or roosting during the fall, winter and spring. Construction activities would cause the birds using the island to move to other sites. Acclimation to construction activities may take place.

Wading Birds – These heron and egret species may use the existing island to some degree for resting and may use the shallow intertidal zone to feed. This use would be limited. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Terns and Gulls – These species would use the island site significantly for resting, staging and or roosting. Foraging areas would constantly change depending on the presence of forage fish, currents, etc. and thus may or may not be proximal to the site. These birds would move to other nearby sites in the bay system to use for these purposes.

Shorebirds – Significant numbers of shorebirds migrate through the Texas coast in the fall and spring and there is limited forage habitat within the intertidal zone of the island. Construction activities may limit the use of the island by these birds. The tidal flats which lay south of the GIWW that border the bayside of Bolivar peninsula provide significant habitat for shorebirds. Shorebirds would be present in this area. Construction activities would avoid this area used by shorebirds by restricting activities to the GIWW and the area identified for island construction north of the GIWW.

The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide more foraging and resting opportunity for many of the above listed bird groups as well as other guilds during the non-nesting season.

Smith Point Island

Smith Point Island is an important site for migratory birds. While nesting activity of colonial waterbirds has declined in recent years, waterbirds that used the site historically for nesting continue to use Smith Point Island for staging, loafing, roosting, and possible nesting sites (Table 5-6). The island supports limited colonial waterbird nesting and little species diversity due to changes in vegetation and habitat

loss from erosion. Non-colonial waterbirds, primarily the American oystercatcher and the eastern willet, may use the existing island for nesting as well. By the time construction begins, the island may no longer exist to support any avian use. However, the project location would still provide habitat for migratory birds that use open bay habitat for fishing, staging and roosting purposes.

Table 5-6. Historical nesting use of Smith Point Island by colonial waterbird species

COMMON NAME	SCIENTIFIC NAME
Brown Pelican	*Pelicanus occidentalis*
Neotropic Cormorant	*Phalacrocorax brazilianus*
Double-crested Cormorant	*Phalacrocorax auritus*
Great Egret	*Ardea alba*
Great Blue Heron	*Ardea herodias*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Tricolored Heron	*Egretta tricolor*
Reddish Egret	*Egretta rufescens*
Cattle Egret	*Bubulcus ibis*
Black-crowned Night Heron	*Nycticorax nycticorax*
Roseate Spoonbill	*Platalea ajaja*
White Ibis	*Eudocimus albus*
White-faced Ibis	*Plegadis chihi*
Laughing Gull	*Leucophaeus atricilla*
Gull-billed Tern	*Gelochelidon nilotica*
Royal Tern	*Thalasseus maxima*
Sandwich Tern	*Thalasseus sandvicensis*
Forster's Tern	*Sterna forsteri*
Least Tern	*Sternula antillarum*
Black Skimmer	*Rynchops niger*

For non-breeding migratory birds the island currently supports roosting and limited foraging use. The different bird taxonomic guilds and use activities are listed below:

Loons and Grebes – This group of birds may use surrounding waters during the fall, winter, and spring to forage. Presence in the area would be based on available forage fish and invertebrates. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Waterfowl – Waterfowl use of the island is limited. Surrounding bay waters are used by several species of wintering waterfowl, primarily bay ducks. This group may be affected by construction activities. The temporary nature of construction and this bird group's use of more undisturbed waters will avoid take.

Pelicans and Cormorants – These would significantly use the existing island for resting, staging and or roosting during the fall, winter and spring. Construction activities would cause the birds using the island to move to other sites. Acclimation to construction activities may take place.

Wading Birds – These heron and egret species may use the existing island to some degree for resting and may use the shallow intertidal zone to feed. This use would be limited. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Terns and Gulls – These species would use the island site significantly for resting, staging and or roosting. Foraging areas would constantly change depending on the presence of forage fish, currents, etc. and thus may or may not be proximal to the site. These birds would move to other nearby sites in the bay system to use for these purposes.

Shorebirds – Significant numbers of shorebirds migrate through the Texas coast in the fall and spring and these may use the intertidal zone to forage. Several species overwinter as well and may use the intertidal areas of the existing island to forage. Construction activities may limit the use of the island by these birds. There are other sites nearby that would serve similar uses.

The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide more foraging and resting opportunity for many of the above listed bird groups as well as other guilds during the non-nesting season.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to protected species would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in the continued degradation of the nesting habitat and adverse impacts to colonial waterbirds. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.5, 6.3.8.6, 6.7.5, and 6.76 of the Final Phase III ERP/PEIS describe the impacts to habitats and living coastal and marine resources from early restoration projects intended to restore and protect birds. The PEIS determined that “Creating and enhancing bird habitat would create long-term benefits from increasing stability and resiliency of barrier islands and beaches.”

The PEIS also found that “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:

- Sea turtle and marine mammal individuals may be present in project areas where dredging or underwater use of equipment is occurring. They could be subjected to temporary increased noise, turbidity, and water quality changes. These activities could temporarily displace individuals or prey during construction and could result in short-term, minor impacts. Consultation with appropriate agencies would be required prior to final design and project

implementation. Guidelines provided by NOAA and USFWS to avoid and minimize potential impacts to sea turtles or marine mammals will be followed.

- Piping plover and red knot may be present at Smith Point and/or Rollover Bay Islands. However, their presence is very unlikely since their preferred habitat is not present at these sites. Rollover Bay Island is located near critical habitat for the piping plover. Specific BMPs would be incorporated to cover all activities associated with the project to ensure that construction activities are planned to avoid individual birds and critical habitat during project activities and that no adverse impacts would occur. If individuals are present and disturbed by the noise, they would have access to nearby habitat that is within their normal flying distances for daily foraging movement. Upland excavation activities will not occur in habitat used by piping plovers or red knots.

- 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 levels 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. Best management practices to minimize both short-term construction impacts and long-term impacts to sensitive habitats, included in the EFH assessment, will be followed during 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. Consultation with appropriate agencies would be required prior to final design and project implementation.

- Birds using the sites as roosting and/or loafing areas would be forced to other parts of the island or other surrounding areas during construction activities. This would be temporary, however, and once the project was completed, the project would have long-term benefits to birds for these uses.

- Any breeding birds using the islands would be avoided by restricting construction to the non-nesting period.

Methods used to remove material from the borrow site would be with a cutter head dredge or a clamshell dredge both of which would have minimal impacts to pelagic species. Placement of fill material is a slow process allowing plenty of time for sea turtles to leave the area. Island construction activities are not expected to have impacts to protected marine species and their habitats in the areas where the materials would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed and must move to another area. Impacts to wildlife would be avoided via management guidelines and techniques as appropriate; therefore, restoration activities are not likely to adversely affect federally-listed sea turtles. Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Measures for Reducing Entrapment Risk to Protected Species

(NMFS 2012) would be followed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish.

NMFS concurred with the EFH assessment for the project, which determined that temporary and permanent impacts would occur to estuarine water column and underlying submerged estuarine soft bottom habitat categorized as EFH under provisions of the Magnuson-Stevens Fishery Conservation and Management Act (NMFS 2015). Project implementation would directly impact estuarine soft bottom EFH to create upland colonial waterbird nesting islands. Both dredging and fill placement locations would be sited to avoid sensitive estuarine habitats such as oyster reefs and seagrasses. Best management practices to minimize both short-term construction impacts and long-term impacts to sensitive habitats will be followed.

The Trustees initiated consultations pursuant to Section 7 of the Endangered Species Act with the NMFS' Protected Resources Division (initiated July 7, 2015) and the USFWS Texas Coastal Ecological Services Field Office (initiated August 28, 2015). The Trustees are coordinating with USFWS to determine if this project requires authorization under the Marine Mammal Protection Act. The Trustees have completed coordination and reviews with NOAA under the Marine Mammal Protection Act. The Trustees have also initiated review of the proposed project for impacts to bald eagles and migratory birds in accordance with the Migratory Bird Treaty Act as well as the Bald and Golden Eagle Protection Act.

Temporary and localized turbidity impacts during dredging and placement of fill for the construction of the island could impact EFH. The restoration of the islands would result in the permanent loss of 20 acres of submerged bay habitat designated as EFH for federally managed fish species through the filling of existing estuarine water column and the underlying estuarine mud/sand/shell substrates to convert these aquatic areas to uplands suitable for bird nesting. If dredging is required for site access or to obtain fill for island restoration that would also result in EFH impacts. To prevent adverse impacts to oyster reefs, locations proposed for dredging would avoid excavation of oyster reef habitat. Proposed dredge sites would also be located in slightly deeper open water habitat. Impacts to existing soft bottom benthic habitat at these dredging locations would be minor and temporary, as the benthic invertebrate communities would quickly re-establish. The proposed breakwaters would result in the permanent filling of EFH. However, the submerged side slopes of the breakwaters would provide hard substrate with interstitial spaces that would enhance foraging areas for fish as well as provide cover for juvenile fish and substrate for establishment of oyster habitat.

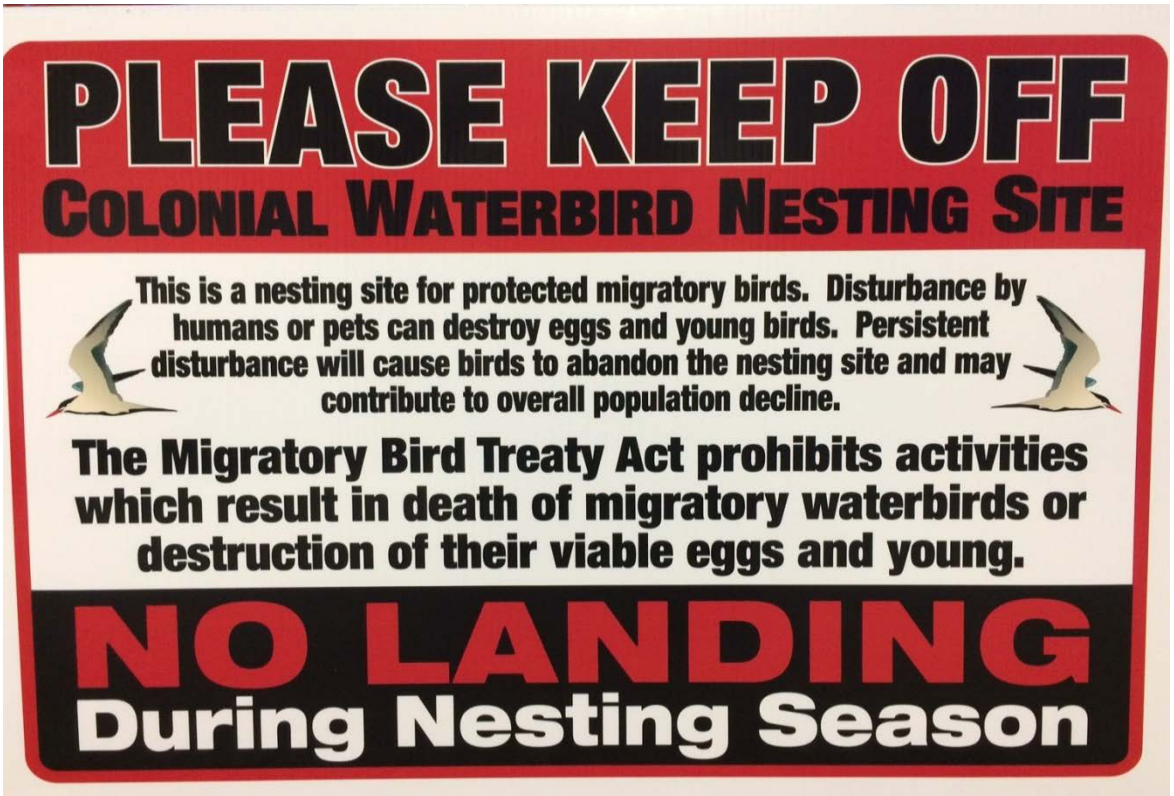
Any adverse impacts to marine and estuarine fauna (fish, shell beds, benthic organisms) are expected to be short in duration and minor as those species that would be affected are likely numerous in the area. The project would provide benefits to marine and estuarine fauna by providing additional structural fish habitat which would compensate for loss of benthic bay bottom habitat. Over the life of the project, the quality of aquatic habitat would increase.

The marine mammals that may use Galveston Bay (e.g. dolphins and manatees) would leave the area to avoid the construction activities and/or would generally avoid the area because optimal habitat does not exist. Manatees are extremely rare in Texas waters with sightings less than one per year on average

across the entire Texas coast. However, if marine mammals are sighted within 50 feet of the construction area, work would stop until the animals move away from the area under their own volition. Therefore, marine mammals would not be impacted during construction activities and no incidental take of marine mammals is anticipated.

Construction activities would be relatively short-term and for those island enhancement sites which support nesting at the time of project implementation, would occur outside of the nesting season period, and would therefore not affect any bird nesting activities. Birds using the site for loafing and resting during the construction window may use existing island features during construction if they become acclimatized to the activities. Birds using the nearby open water for foraging may also be displaced to sites more remote from the island or borrow site. Some minor and temporary displacement of local foraging and roosting birds could occur during operations. After completion of the island restoration and protection, disturbance during nesting could occur by recreational users. These can include anglers, boaters, and photographers that could approach too closely or disembark on the island. Signs would be placed on and adjacent to the island making users aware that nesting birds are present (Figure 5-10). Disturbing nests is a violation of the Texas Parks and Wildlife Code and the Migratory Bird Treaty Act. Any mortality to chicks would violate state and federal statutes.

Figure 5-10. Example of sign approved by the TGLO, TPWD Law Enforcement, and USFWS Law Enforcement to warn against disturbing nesting birds



The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide benefits for many of the above listed bird groups as well as other guilds during the non-nesting season.

5.2.5.3 Human Uses and Socioeconomics

Galveston Bay has supported economic growth in the region and is surrounded by intensive urban and industrial development. Resources in the Galveston Bay watershed have been utilized for construction, transportation, oil, gas and petrochemical production, water supply, fisheries, agriculture and recreational uses. Projected growth in population and economic activity would result in increasing use of the bay resources. Major expansions and management changes are in progress or proposed for the ports and navigation channels in the Galveston Bay system. More people would place more demands on water supply, roads and highways, and land for development (GEBP 2011). This section includes discussions of cultural resources, aesthetic and visual resources of the region, tourism and recreational use in the area, and a general characterization of public health and safety issues.

5.2.5.3.1 Cultural Resources

Affected Resources

Coordination under Section 106 National Historic Preservation Act has been initiated for all projects. Initial surveys for cultural resources have been conducted in the Dickinson Bay Island II area. However, since a specific site has not yet been chosen, the review under Section 106 of the National Historic Preservation Act has not yet been completed.

Currently, survey work for cultural resources has not been conducted at Rollover Bay Island or Smith Point Island.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to cultural resources would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

If any culturally or historically important resources are identified during project preparations or pre-deployment surveys, such areas would be avoided during construction. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or

mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

5.2.5.3.2 Aesthetics and Visual Resources

Affected Resources

The affected environment consists of the construction footprint of the islands and the borrow site. The landscape in the vicinity of the proposed islands is characterized by a mosaic of open water, coastline, and rookery islands. There are no designated protected viewsheds in the vicinity of the islands. Equipment and construction activities related to island restoration would be visible.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to aesthetics and visual resources would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.8 and 6.7.14 of the Final Phase III ERP/PEIS describe the impacts to aesthetics and visual resources from early restoration projects types, including restore and protect birds. For these islands, impacts to aesthetics and visual resources were analyzed adequately within the PEIS. The PEIS determined that "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 viewshed, they would detract from current user activities or experiences…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."

During construction, there would be temporary, minor adverse aesthetic and visual impacts for recreational boaters and fishermen due to the use of construction equipment in and around the project area. However, there would be a long-term beneficial impact to visual and aesthetic resources once the island restoration is completed.

5.2.5.3.3 Tourism and Recreational Use

Affected Resources

Approximately 5 million people live around Galveston Bay. The Galveston Bay rookery islands are considered an important resource area by the local communities. The area is heavily used by nature watchers and attracts a substantial number of visitors. While the rookery islands are located away from any land-based viewing areas; they can be viewed by the public using motorboats and paddle craft. Birds associated with the islands use surrounding habitats readily accessible from land based viewing opportunities. Galveston Bay is used by a wide range of tourists and recreational users. Commercial and recreational fishing, boating, and potentially wildlife viewing occurs in the open water areas. Recreational angling is significant and is primarily conducted from boats near the rookery islands.

Fisherman and boaters may use areas near Dickinson Bay Island II for recreational or commercial purposes and the navigation channel may be used by vessels for transportation.

The Rollover Bay and Pass area is heavily used by recreational anglers. The period of highest recreational use overlaps with the bird nesting season of February 1 through August 15. Recreational anglers may wade fish, use motorized boats or use paddling craft such as kayaks and/or canoes. Within Rollover Bay, most wade fishing takes place south of the GIWW since traffic and depth prevent waders crossing the GIWW. Recreational use impacts would be limited since much of the construction would occur outside of the period of highest recreational use and north of the GIWW, minimizing potential impacts to wading anglers.

The community of Smith Point located on Smith Point peninsula contains homes and structures, commercial facilities, recreational vehicle parks, docks and marinas, a local park (Robbins Park) and Candy Abshier Wildlife Management Area, as well as less than 200 residents. Most residents are associated with commercial fishing, ranching, and farming activities. The location has substantial number of recreational visitors that include fishing, paddling, and bird/nature watching. The Candy Abshier Wildlife Management Area hosts an annual hawk watch census during the fall which attracts many visitors. The local community considers the rookery island a valuable resource and as an important engine that creates bird resources important to maintain for tourism. There is navigation that takes place near Smith Point associated with commercial oyster activities. Consideration would be provided to established users and to occasional users through the use of public meetings and signage at the Smith Point dock facility.

Efforts would be made to avoid or minimize impacts to public boat launch facilities. Appropriate signage and buoys markers at the site and at boat ramps would be displayed. Postings in local media would also take place to ensure that efforts are made to inform recreational users. Due to the potential increased small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure that water related accidents and conflicts are minimized.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to tourism and recreational use would occur. However, the beneficial impacts to tourism and recreational use due to implementation of this project would not be realized. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.5 and 6.7.11 of the Final Phase III ERP/PEIS describe the impacts to tourism and recreational use from early restoration projects types, including restore and protect birds. For these islands, impacts to tourism and recreational use were analyzed adequately within the PEIS. The PEIS determined that "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 limit tourism and recreational uses accessibility and opportunities." Long-term beneficial impacts to tourism and wildlife viewing from this project type "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."

Recreational use would be adversely impacted during construction activities. The impacts are anticipated to be minor and temporary. In turn, restoration of these rookery islands is anticipated to increase the opportunity for bird watching and related tourism. 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. The project should result in beneficial impacts to tourism and recreational uses over the long-term.

Long-term beneficial impacts would be enhancement of waterbird populations locally, regionally, and Gulf-wide. Birds are an important component that supports nature based tourism. Galveston Bay is recognized internationally for the diversity and abundance of birds that depend on the system as part of their life cycles. Waterbirds play a significant role and support significant revenue associated with nature tourism. Texas ranks second in the nation for wildlife viewing impact and 16% of the national impact occurs in the Gulf of Mexico (USFWS 2013a).

5.2.5.3.4 Public Health and Safety

Affected Resources

Galveston Bay is used by commercial fisheries, industrial, and recreational users. Recreational angling is primarily conducted from boats for areas near the potential sites. Efforts would be made to avoid or minimize impacts to public boat launch facilities. Appropriate signage and buoy markers at the site and at boat ramps would be displayed. Postings in local media would also take place to ensure that efforts are made to inform recreational users. Due to the potential increased small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure that water related accidents and conflicts are minimized. In addition to signage and buoys during the construction period, the breakwaters and or shoreline armoring of each island would be permanently marked with signs and markers including possible radar reflectors, as determined through consultation with appropriate navigation entities.

Restoration and protection of the Galveston Bay rookery islands 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. The project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels. These are rookery islands, uninhabited by humans, and only the islands would be impacted by erosion.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of the Galveston Bay rookery islands would not be constructed and no impacts to public health and safety would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.9 and 6.7.15 of the Final Phase III ERP/PEIS describe the impacts to public health and safety, including flood and shoreline protection from early restoration projects types, including restore and protect birds. For these islands, impacts to public health and safety and shoreline protection were analyzed adequately within the PEIS. The PEIS determined that “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.”

Due to the nature and location of the Galveston Bay rookery islands, no impacts to public health and safety are anticipated as a result of project implementation. 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. BMPs 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 substances. 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. Due to the potential increase in small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure water related accidents and conflicts are minimized. No adverse effects to public health and safety are expected as a result of this project.

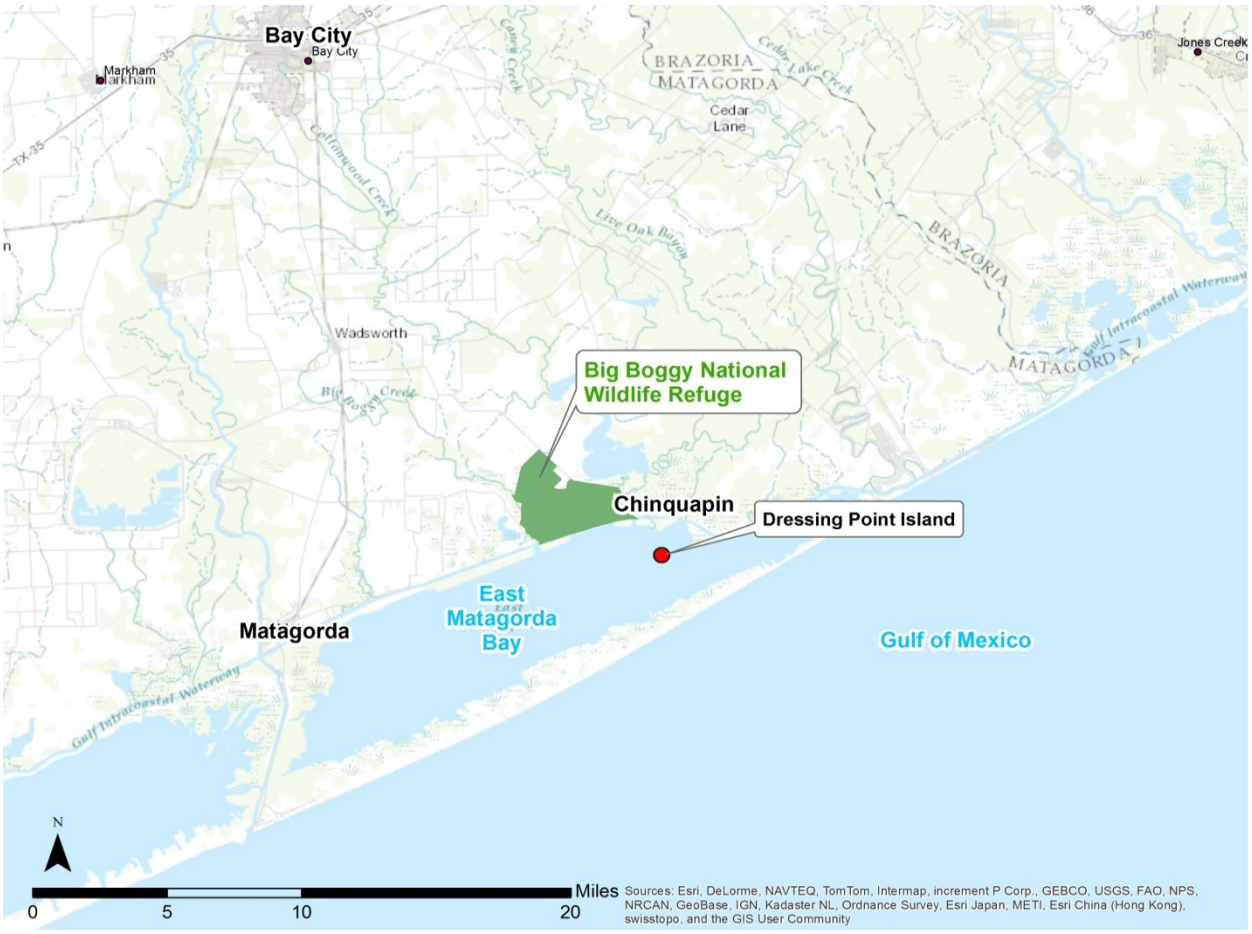
5.2.6 East Matagorda Bay Rookery Island

This section provides the background and description for the proposed actions in East Matagorda Bay, which includes the restoration and protection of Dressing Point Island. The location, scope, construction and installation, as well as operations and maintenance for Dressing Point Island are discussed in the following subsections.

5.2.6.1 East Matagorda Bay Rookery Island Location

Dressing Point Island is located in East Matagorda Bay, Matagorda County, Texas at 28.731386˚ N, 95.7606712˚ W; NAD83. It is part of the Big Boggy National Wildlife Refuge and is located 8 miles east of the community of Matagorda and 21 miles southeast of Bay City (Figure 5-11). The area that may be directly or indirectly affected is about 56 acres and includes the footprints of the construction and staging areas around the island, breakwater/levee, vegetation plantings, earthen fill, and shell knoll. The borrow area is not included in this footprint estimate because it has not yet been identified. Materials for the construction activities would need to be transported via roads and via marine waterways. Existing transportation networks and navigational channels would be utilized as much as possible. Large-scale equipment and supplies may enter East Matagorda Bay via the GIWW. Small boats could enter the bay via boat ramps from the community of Chinquapin, approximately 1.5 miles from Dressing Point Island.

Figure 5-11. Location of Dressing Point Island



5.2.6.2 East Matagorda Bay Rookery Island Project Scope

The proposed island restoration is located on submerged and emergent land. Appropriate lease(s) or modifications to existing leases would be obtained prior to implementing the proposed restoration actions. The preliminary design for the restoration and protection of the island, which is nearly completed, includes several components that would improve nesting habitat on the island and increase its longevity. The conceptual plan is shown in Figure 5-6 and contains the following elements:

- Construct 5 island acres by placing clean fill over submerged land;
- Place fill on 2 acres of existing island to raise elevation
- Construct 5,000 feet of breakwater to protect the restored and existing island;
- Raise the elevation of an existing shell knoll to build 0.35 acres emergent shell hash; and
- Plant 7 island acres with native scrub-shrub vegetation.

A potential component of the restoration and protection of Dressing Point Island includes a constructed marsh located adjacent to the breakwater. Should dredging be required to provide access for vessels during construction, the project design would allow for the beneficial use of dredge material, using BMPs, to backfill the channel and use any excess material to create intertidal marsh. The decision to construct the marsh would be made by the Implementing Trustees for the Texas Rookery Islands project and only after it has been determined that there are enough remaining material or funds available from the funding provided for the Texas Rookery Islands project.

5.2.6.3 East Matagorda Bay Rookery Island Construction and Installation

Preliminary engineering has been completed for Dressing Point Island. Refined design and construction specification packages for the island would be developed by PE(s) with coastal restoration experience. Construction and implementation strategies would be similar for each rookery island. Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental and cultural impacts. The following descriptions for each of the island construction elements are preliminary and based on current planning efforts and resource agency experience with similar projects and should be considered typical. Additional details describing the island construction methods can be found in Section 5.2.4.3.

In general, construction would require the use of barges, small watercraft, large track hoe excavators, earth moving equipment, hydraulic or clamshell dredges, and a dockside staging area. Equipment and materials for the construction activities would be transported via roads and marine waterways. Since water depths are shallow, temporary barge access channels may be needed to access the site. These channels would be backfilled upon completion of construction activities. Material would be transported to construction areas on deck barges (or similar, appropriate vessels). The weight loaded onto the deck barges would be based upon the depth of the waterway to minimize adverse impacts to the bay bottom. Smaller vessels that would need to use the channel or access canal could be used to bring in supplies and people. Impacts to submerged habitat would be minimized by limiting the use of spuds on the barge or tugs and limiting the use of a track-hoe (or similar equipment) to position and move the barge.

5.2.6.3.1 Island Fill

The maximum amount of earthen fill material estimated for Dressing Point Island is 70,000 cubic yards. To date, the source of the fill material has not been identified for Dressing Point Island. Additional details describing the island fill construction methods can be found in Section 5.2.4.3.1.

5.2.6.3.2 Breakwater

Breakwaters would be constructed to dampen wave energy and to help prevent erosion. A containment berm or other structure/method could also be used for containment and dewatering of the fill material. Graded stone, typically limestone, would be used to construct the breakwaters. Physical data from the site would be evaluated by a qualified coastal PE and the project team prior to selection of design. The amount, grading, and size of rock used would be dependent on several factors determined in the final

design. The project team would include individuals from TPWD, USFWS, and participating partners. Additional details describing the breakwater construction methods can be found in Section 5.2.4.3.2.

5.2.6.3.3 Vegetation Planting

Once the earthen fill has dewatered and sediments have settled, areas with raised elevations on the restore island (about 7 acres) would be planted with native scrub-shrub vegetation to help promote desired vegetation establishment. Plants used would be species documented from similar island sites and be propagated from stock located on the Texas coast. Species under consideration include, but are not limited to, those shown in Table 5- 2 in Section 5.2.4.3.4. Additionally, marsh plantings, if required, would include smooth cordgrass (*Spartina alterniflora*) and marshhay cordgrass (*Spartina patens*). A Vegetation Planting Plan modified from and based on the NRCS Publication NRCS-TX-612 would be developed prior to implementation (NRCS 2013). This plan would provide specifications for the species of native vegetation to be used; acceptable source stock; planting densities and locations on the island for planting; survival targets and adaptive management strategies. Expected plant survival is approximately 60% at the end of the 5-year monitoring period. Protective measures may include trunk collars or wire exclusion cages to protect saplings from herbivory or trampling during the first few years after planting. Time of year as well as substrate salinity would determine the timing for planting. It is anticipated that this would take place approximately one year after construction, depending on environmental conditions.

5.2.6.3.4 Shell Knoll Enhancement

To enhance habitat for bare ground nesting birds near the island, shell material would be placed and integrated with the existing shell knoll (emergent shell substrate) southwest of the island. Approximately 2,500 cubic yards of shell material similar to the shell hash present in structure, form, and mineral composition (calcareous) would be placed on the knoll. This added material would raise the elevation to support ground nesting species of colonial waterbirds. It would also provide a small wave break and protect a portion of the island from wave induced erosion.

5.2.6.3.5 Construction Schedule

Dressing Point Island is currently used for nesting by waterbirds. Therefore, construction activities would avoid the nesting season, which is usually February 1 through August 15. However, some field activities that pose minimal disturbance to nesting birds may be acceptable during this time. Any such activities would be coordinated with state and federal agency biologists and with NGO partners prior to initiation of field work. The final engineering and design for the island is estimated to be completed in 18 months. Activities associated with construction are not expected to take longer than 6 months. The timing of contracting awards and weather conditions could impact the construction schedule.

5.2.6.4 East Matagorda Bay Rookery Island Operations and Maintenance

Dressing Point Island is part of the Big Boggy National Wildlife Refuge. It was donated and added to the refuge system in 1988, and is now part of the USFWS' Texas Mid-Coast Refuge Complex. The island is an uninhabited and not open to the public but open water areas of the bay are used for commercial or recreational activities such as paddling, fishing, wildlife viewing, or transportation. As part of the Big Boggy National Wildlife Refuge, maintenance activities on Dressing Point Island would continue to be managed by the USFWS. Annual surveys colonial waterbirds surveys are conducted and submitted for collection. Routine assessment of the island is made by refuge biologists and managers. Once construction specifications and deliverables have been achieved, routine management would be the responsibility of refuge personnel.

5.2.7 East Matagorda Bay Rookery Island Affected Environment and Environmental Consequences

This section provides the affected environment and environmental consequences for the proposed actions in East Matagorda Bay, which includes the restoration and protection of Dressing Point Island.

According to the CEQ Regulations for Implementing NEPA (§§ 1502.1 and 1502.2) agencies should "focus on significant environmental issues" and for other than significant issues there should be "only enough discussion to show why more study is not warranted." After preliminary investigation, some resource areas were determined to be either unaffected or minimally affected by the proposed action. These resources are not discussed in further detail below. Only those resource areas with potential, adverse impacts are discussed in detail below.

The programmatic analysis looked at a series of resources as part of the biological, physical, and socioeconomic environment. As appropriate in a tiered analysis, the evaluation of each project focuses on the specific resources with a potential to be affected by the proposed project. To avoid redundant or unnecessary information, resource areas that are not expected to be adversely impacted are not evaluated further under given proposed actions. Resource areas that are not analyzed in detail are listed below with a brief rationale for non-inclusion:

- Socioeconomics/Environmental Justice: Dressing Point Island is not open to the public but open water areas of the bay are used for commercial or recreational activities such as paddling, fishing, wildlife viewing, or transportation. 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 project. These jobs would provide income, sales, and downstream economic activity in the region. Any 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. 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 Trustees find that the rookery island does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. In addition, the island is uninhabited by humans and restoration of the island would not be directly affecting any residents. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed action.

- Infrastructure: The nearest pipeline is over 3 miles from Dressing Point Island. The proposed action is anticipated to have no impact to infrastructure, since new infrastructure would not be built and existing infrastructure in the area would be avoided.

- Land and Marine Management: Dressing Point Island lies within the Big Boggy National Wildlife Refuge boundary. It is an uninhabited island that is not open to the public and managed by USFWS staff working on the Texas Mid-Coast Refuge Complex. The island includes submerged bay bottom in its construction footprint. The appropriate lease(s) or modifications to existing leases would be obtained prior to construction. The proposed action is anticipated to have no impact to land and marine management, since projects would be consistent with the prevailing management, practices, plans, and direction governing the use of the areas where the island restoration would take place.

- Land and Marine Transportation: The proposed action is anticipated to have no impact to land and marine transportation. Shipping routes would need to be properly identified prior to the selection of borrow sites for dredge and fill material to prevent any impacts to marine transportation. Activities related to construction would require coordination with the users of the waterway. It is expected that activities would not interrupt the channel traffic to any significant degree. Most of the commercial traffic takes place on a routine schedule and construction activities would be timed to reduce any interference with commercial operators.

5.2.7.1 Physical Environment

The description of the physical environment of East Matagorda Bay is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

5.2.7.1.1 Geology and Substrates

Affected Resources

East Matagorda Bay consists of very poorly drained, nearly level, clayey, saline soils. These soils have weakly convex relief and a water table at or near the surface. The relief is broken by standing ponds of water, small bayous, and small drains. This map unit is in coastal marshes and is commonly flooded. The soils are underlain by clayey and loamy sediments. These soils are poorly suited to uses other than wildlife habitat because of wetness, the hazard of flooding, salinity, and the clayey texture (U.S. Department of Agriculture 2001).

Dressing Point Island

Dressing Point Island is a natural island formed from the erosion of Dressing Point Peninsula (NOAA 1891 and 1909). According to the Matagorda County Soils Survey, the island and surrounding area are classified as either water or beaches. Beaches are low in elevation, frequently flooded, and slopes average less than 0.5 percent. The submerged lands surrounding the island are comprised of mud bottom, scattered shell, reef, and seagrasses. The scattered shell and seagrasses in the area are transient. Therefore, updated surveys would be conducted prior to construction to identify seagrasses and exact locations of reef boundaries that contain live oysters. Final designs would be modified to minimize impacts to seagrasses, productive reef, and scattered shell areas.

Borrow Area

Fill material may be obtained from an *in situ* borrow area, a more distant area (which could include an upland site), or from a project that would be dredging materials and is looking for beneficial use of dredged material. Borrow sites determined to be suitable would be evaluated for environmental conditions to ensure that cultural and/or sensitive resources are properly addressed. Location of a specific borrow site(s) would be based on several factors including the absence of sensitive resources (e.g. oyster reef or other hard bottom substrate), geotechnical and sediment quality, nearby commercial and/or recreational activities, and lateral extent of available material (avoiding a deep borrow site). See Section 5.2.4.3.1 for additional details on the borrow area.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to geology and substrates would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in adverse impacts to the rookery island as it would continue to erode and lose elevation. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.1 and 6.7.1.1 of the Final Phase III ERP/PEIS describe the impacts to geology and substrates from early restoration projects intended to restore and protect birds.

Restoration and enhancement of Dressing Point Island would affect substrates at the placement and borrow sites. Substrates within the footprint of the project would be affected through the placement of clean fill and hard, structural material. Restoration and protection of Dressing Point Island would have minor impact on substrates and geology. Adverse impacts would be minor and local. Long-term benefits would occur to the bottom substrates due to stabilization of sediments protection from erosion.

Mitigation measures to minimize adverse impacts to geology and substrates could include:

- Employment of standard BMPs for construction to reduce erosion and loss of sediments.
- Evaluations of potential borrow sites for environmental conditions as well as cultural and sensitive resources concerns.
- Selection of a borrow site with an optimal footprint and sediment accretion to minimize impacts and expedite rate of recovery at the borrow site.

5.2.7.1.2 Hydrology and Water Quality

Affected Resources

The depths surrounding the island are relatively shallow ranging to a depth of approximately 3 feet in the surrounding area. The hydrology of the area is affected by tidal actions and by freshwater inflows. The GIWW and Caney Creek are the major sources of inflow into the bay. The island is a remnant of an old peninsula projecting off the northeastern boundary of the bay. Over time, wind-driven waves have caused erosion, and converted this peninsula into an isolated nesting island, which has resulted in the existing colonial waterbird nesting island.

Water Quality

In general, water quality in East Matagorda Bay is good but over the past years (due to low rainfall) salinities have risen in the bay. There are no consumption advisories (http://www.dshs.state.tx.us/seafood/Survey.shtm#advisory).

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to hydrology and water quality would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.2 and 6.7.2.1 of the Final Phase III ERP/PEIS describe the impacts to hydrology and water quality from early restoration projects intended to restore and protect birds. For this island, impacts to hydrology and water quality were analyzed adequately within the PEIS. The PEIS determined that "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."

No impacts to floodplains or hydrology would occur. Temporary, local, and minor impacts to water quality would result from increased turbidity during dredging activities and placement of fill material. Long-term benefits would also occur from the breakwater/armored levee protection of the island.

Measures to control turbidity and sediment movement would be in place to ensure water quality standards are met and sensitive resources are not affected. These measures may include appropriate water control structures to decant water, as well as the installation of silt fences, hay bales, filter-fabric, and/or temporary levees to control sediments and avoid negative impacts associated with the fill placement.

Air Quality and Greenhouse Gas Emissions

Affected Resources

Air Quality

Dressing Point Island is located in Matagorda County, which is not listed as a nonattainment area for any pollutant by the EPA.

Greenhouse Gas (GHG) Emissions

GHGs are chemical compounds found in the Earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The principal GHGs emitted to the atmosphere through human activities are CO2, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, with CO2 accounting for the largest quantity GHG emitted.

Criteria air pollutants and GH emissions are largely generated by electricity production, vehicular movements, and commercial and residential buildings using electricity. GHG emissions would result from both the implementation and operation of the proposed project from the use of vessels during construction and monitoring activities. Engine exhaust from barges, boats, excavators, and equipment would contribute to an increase in GHG emissions. BMPs would be employed to reduce the release of GHG during project implementation.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to air quality and GHGs would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.3 and 6.7.3.1 of the Final Phase III ERP/PEIS describe the impacts to air quality and greenhouse gas emissions from early restoration projects intended to restore and protect birds. For this island, impacts to air quality and greenhouse gas emissions were analyzed adequately within the PEIS. The PEIS determined that "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. 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."

Project implementation would require the use of 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, sediments deposited would be mixed with water, keeping airborne particles to a minimum. Adverse impacts to air quality would be minor, local, and temporary, only occurring during active construction activities.

Based on the assumptions described above, and the small-scale and short duration of the construction portion of the project, predicted GHG emissions would be temporary and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

5.2.7.1.3 Noise

Affected Resources

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. The timing of noise producing activities would be planned to minimize disturbance to nesting birds. The majority of construction activities would occur outside of the nesting season. Construction noise would also create a potential nuisance to visitors in areas adjacent to project construction activities. Construction noise would be temporary and the construction period is not anticipated to last more than 6 months.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts due to noise would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.4 and 6.7.4.1 of the Final Phase III ERP/PEIS describe the impacts caused by noise from early restoration projects intended to restore and protect birds. For this island, impacts caused by noise were analyzed adequately within the PEIS. The PEIS determined that "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."

The proposed Dressing Point Island restoration would create a minor, localized, and temporary increase in noise.

5.2.7.2 Biological Environment

The biological environment is divided into two sections: living coastal and marine resources, and protected species.

5.2.7.2.1 Living Coastal and Marine Resources

Affected Resources

The submerged lands surrounding Dressing Point Island are comprised of clay, silt and sand bottom, scattered shell, reef, and/or seagrasses. Although past surveys have been conducted in the project area, seagrasses are transient and may not be present every year. Updated seagrass surveys would occur prior to construction. Exact locations of reef boundaries would be identified prior to construction. Since the scattered shell is not static in location, updated surveys would be conducted prior to construction to identify areas of scattered shell and reef substrate. Final designs would be modified to minimize impacts to seagrasses and reef and scattered shell areas.

Dressing Point Island is mapped as upland (www.fws.gov/wetlands/data/google-earth.html). However, the shoreline of the island has areas that would be considered wetland habitats subject to tidal influence. The TPWD Ecological Systems Classification has identified the habitat types in the Dressing Point Island area to be water, coastal salt and brackish high tidal marsh, coastal salt and brackish high tidal shrub wetland, and coastal salt and brackish low tidal marsh. The low tidal marsh community is

described as marshes frequently inundated by tides and often dominated by smooth cordgrass (*Spartina alterniflora*). Tidal shrub wetland may be dominated by species such as high tide bush (*Iva frutescens*) or eastern baccharis (*Baccharis halmifolia*). The high tidal marsh is irregularly flooded marsh dominated by graminoids such as marshhay cordgrass (*Spartina patens*), saltgrass (*Distichlis spicata*), and Gulf coast muhly (*Mulhlenbergia capillaris*). Some shoreline areas contain shell hash berms.

There are a number of aquatic species found in the island restoration areas. Fish species include sand seatrout, spotted or speckled seatrout, red drum, tonguefish, flounders, Atlantic bumper, and porgys. Benthic organisms include bivalves, gastropods and other mollusks, amphipods, annelids, and brown and white shrimp.

Significant avian use of Dressing Point Island takes place today. While nesting activity of colonial waterbirds has declined over the last four decades, the island maintains its relative importance with other nesting sites along the Texas coast. During the non-breeding season birds use the island as staging, loafing, and roosting areas. The American oystercatcher and the eastern willet, non-colonial nesting species, may use the island for nesting. Water dependent birds may use the open bay to forage and roost. These would include loons, bay ducks, gulls and terns, and pelicans. Non-avian terrestrial wildlife has not been observed at the island site. Texas diamondback terrapins may use Dressing Point Island and surrounding waters.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to living coastal and marine resources would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in the continued degradation of the nesting habitat and adverse impacts to colonial waterbirds. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.5, 6.3.8.6, 6.7.5, and 6.76 of the Final Phase III ERP/PEIS describe the impacts to habitats and living coastal and marine resources from early restoration projects intended to restore and protect birds. The PEIS determined that “Creating and enhancing bird habitat would create long-term benefits from increasing stability and resiliency of barrier islands and beaches.”

The PEIS also found that “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:

- Dredged sediment removed from the bay bottom could impact local benthic organisms on or near the borrow site from increased turbidity, substrate disturbances or siltation, which could locally increase mortality and inhibit activities in the short-term until the site recovered.

- Increased turbidity could limit available light necessary for photosynthesis, and disruption in the water column and surface water could disturb 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.

- Birds using the sites as roosting and/or loafing areas would be forced to other parts of the island or other surrounding areas during construction activities. This would be temporary, however, and once the project was completed, the project would have long-term benefits to birds for these uses.

- Any breeding birds using the islands would be avoided by restricting construction to the non-nesting period.

Dredging from a direct dredge aquatic borrow site would change substrate topography, indirectly impacting benthic and other aquatic organisms using this habitat. Depending on the depth-of-cut, dredging could result in low dissolved oxygen in bottom waters. The depth-of-cut is planned to be as shallow as is feasible. 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 fish and wildlife resources would occur during the construction phase of the project. Mobile aquatic animals including birds 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 and recolonize quickly. Any adverse impacts to marine and estuarine fauna (fish, shell beds, benthic organisms) are expected to be temporary, localized, and minor as those species that would be affected are likely numerous in the area.

The potentially impacted areas, including the borrow area and island construction areas, would be surveyed prior to construction for the presence of sensitive resources. Areas where seagrasses are encountered during the surveys would be documented and measures would be taken to avoid and minimize any impacts. Construction activities would be designed and coordinated to avoid any impacts to significant reef resources including hard shell substrate in the construction area that is not dominated by the eastern oyster. BMPs would be used to avoid and minimize potential impacts to this hard substrate and may include alternative construction methods as appropriate. Any impacts incurred after

avoidance and minimization measures are taken would be fully compensated by creating additional hard shell substrate habitat.

Some of the shoreline area considered wetland habitats subject to tidal influence would be impacted by placement of fill material. However, the shoreline length of the island would increase from what it is today. The new shoreline areas would be gradually slopped into the water creating sufficient tidal fringe to support wetlands. The breakwater would also protect both existing and created shoreline from erosion and reduce wetland loss from erosion.

The project would provide benefits to marine species by providing additional structural fish habitat and increased hard substrate available for estuarine organisms. Over the life of the project, the quality of aquatic habitat would increase. The construction of an intertidal or subtidal breakwater or armored levee would provide long-term benefits to marine species by providing additional hard structure (including crevices and interstitial voids) habitat. Additionally, reducing energy within the breakwater area should benefit seagrass populations in the area by reducing turbidity and wave energy.

Construction activities would cause temporary impacts to wildlife due to the presence of people and use of heavy equipment on the island. These impacts would last for the duration of construction, which is estimated to be a maximum of 6 months. Permanent impacts result from alterations to the island and supported habitat would provide long-term benefit to nesting birds. Natural colonization would occur which would provide grassy substrate in addition to the vegetative plantings of scrub-shrub vegetation, both of which could be used by the colonial nesting birds.

To prevent invasive exotic species from inhibiting nesting activities the islands would be monitored for the presence of undesirable exotic species. If they negatively impact nesting activities, appropriate treatment methods would be used to remove them.

5.2.7.2.2 Protected Species

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the USFWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act.

Affected Resources

Threatened or Endangered Species

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerhead, green, hawksbill, leatherback, and Kemp's ridley sea turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. This area has not

been designated as critical habitat for any of the sea turtle species. Sea turtle nesting activities are not expected to occur here since there is no beach habitat; however, sea turtles could be encountered in the open water.

Although highly unlikely, the West Indian Manatee could be found in East Matagorda Bay. The manatee feeds on vegetation, is slow moving, and somewhat intolerant of cold water temperatures. There is the possibility that it may be present during construction activities.

Four species of threatened or endangered bird species are identified as possibly occurring in the vicinity of the project activities: northern aplomado falcon, piping plover, red knot, and whooping crane. The proposed island site is not located within critical habitat for any of these species. The northern aplomado falcon could be present any time of year and whooping cranes could be present anytime during late fall through early spring. There is no habitat for the northern aplomado falcon or whooping crane at Dressing Point Island and within East Matagorda Bay waters. However, there is habitat on the mainland north of the bay and on Matagorda Island. If placement areas or upland borrow sites are used, there is a small probability that these species could be present using the area to forage. The whooping crane has been documented at Big Boggy NWR on the mainland and could possibly be present there anytime during late fall through early spring. It is unlikely that the whooping crane would use Dressing Point Island for any of its habitat needs. The piping plover is a migrant and winter resident on the Texas coast and occurs in Matagorda County. However, there are no documented records of piping plovers on Dressing Point Island. Piping plovers are not expected to occur in the construction area because typical habitats, beach and bayside tidal flat habitats, for the species do not exist. The red knot is primarily migratory in Matagorda County. However, there are no documented records of red knots on Dressing Point Island. Red knots are not expected to occur in the construction area because typical habitats, beach and bayside tidal flat habitat, for the species is not present.

Essential Fish Habitat (EFH)

EFH in the project's area of effect is identified and described for various life stages of 13 managed fish and shellfish (Gulf of Mexico Fisheries Management Council 2005). Dressing Point Island is located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish (Table 5-7 and Table 5-8). No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

Table 5-7. EFH for estuarine habitats within the vicinity of Dressing Point Island proposed area of effect

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Estuarine Emergent Marsh							
Red Drum			•	•	•	•	
Gray Snapper						•	

Species Common Name	Eggs	Larvae	Post Larvae	Early Juvenile	Late Juvenile	Adult	Spawning Adult
Brown Shrimp				●			
White Shrimp				●			
Estuarine Oyster Reef							
Brown Shrimp				●			
Estuarine Sand and Shell Bottom							
Red Drum			●		•	●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
Estuarine Mud/Soft Bottom							
Red Drum		●	●	●	•	●	
Gray Snapper						●	
Lane Snapper				●	●		
Brown Shrimp				●			
White Shrimp				●			

(● indicates habitat type designated as EFH for species' life stage)

Table 5-8. Highly migratory species EFH designations within the proposed area of effect

Species Common Name	Life Stage Within Estuarine Waters
Scalloped Hammerhead Shark	Neonate & Juvenile
Blacktip Shark	Neonate, Juvenile & Adult
Bull Shark	Neonate, Juvenile & Adult
Lemon Shark	Juvenile
Spinner Shark	Neonate & Juvenile
Bonnethead Shark	Neonate, Juvenile & Adult
Atlantic Sharpnose Shark	Neonate, Juvenile & Adult
Finetooth Shark	Neonate

Marine Mammals

The bottlenose dolphin and the West Indian Manatee (manatees are listed and protected under the Endangered Species Act) are the only marine mammals known to occur in East Matagorda Bay. Manatees are extremely rare in Texas waters with sightings less than one per year on average across the entire Texas coast. Due to the relatively shallow depth of the surrounding areas of the island and the established ranges and depths that the majority of the cetaceans occupy, additional marine mammals would not be expected to enter the construction area.

Bald and Golden Eagles

There may be eagle home ranges or established territories that would include the rookery island site, but no eagles are nesting within 660 feet of the island. Golden eagles near the coast would be an extremely rare occurrence.

Migratory Birds

Dressing Point Island is an important site for migratory birds. It currently supports multiple species of nesting colonial waterbirds (Table 5-9). It also supports non-colonial nesting by the American oystercatcher and eastern willet. The island is used to support development of fledged young until they are able to support themselves in foraging habitats in adjacent bay habitats. Water dependent birds may use the open bay to forage and roost. These would include loons, bay ducks, gulls and terns, and pelicans.

Table 5-9. Colonial waterbird species recorded nesting at Dressing Point Island

Common Name	Scientific Name
Brown Pelican	*Pelicanus occidentalis*
Great Egret	*Ardea alba*
Great Blue Heron	*Ardea herodias*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Tricolored Heron	*Egretta tricolor*
Reddish Egret	*Egretta rufescens*
Cattle Egret	*Bubulcus ibis*
Black-crowned Night Heron	*Nycticorax nycticorax*
Roseate Spoonbill	*Platalea ajaja*
White Ibis	*Eudocimus albus*
White-faced Ibis	*Plegadis chihi*
Laughing Gull	*Leucophaeus atricilla*
Caspian Tern	*Hydroprogne caspia*
Royal Tern	*Thalasseus maxima*
Forster's Tern	*Sterna forsteri*
Black Skimmer	*Rynchops niger*

For non-breeding migratory birds the island and surrounding waters currently supports roosting and foraging use. The different bird taxonomic guilds and types of use are listed below:

Loons and Grebes – This group of birds may use surrounding waters during the fall, winter, and spring to forage. Presence in the area would be based on available forage fish and invertebrates. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Waterfowl – Waterfowl use of the island is limited. Surrounding bay waters are used by several species of wintering waterfowl, primarily bay ducks. This group may be affected by construction activities. The temporary nature of construction and this bird group's use of other available waters nearby will avoid take.

Pelicans and Cormorants – These would significantly use the existing island for resting, staging and or roosting during the fall, winter and spring. Construction activities would cause the birds using the island to move to other sites. Acclimation to construction activities may take place.

Wading Birds – These heron and egret species may use the existing island to some degree for resting and may use the shallow intertidal zone to feed. This use would be limited. Construction activities may cause the birds to move out of nearby foraging areas; however, no take is anticipated.

Terns and Gulls – These species would use the island site significantly for resting, staging and or roosting. Foraging areas would constantly change depending on the presence of forage fish, currents, etc. and thus may or may not be proximal to the site. These birds would move to other nearby sites in the bay system to use for these purposes.

Shorebirds – Significant numbers of shorebirds migrate through the Texas coast in the fall and spring and these may use the intertidal zone to forage. Several species overwinter as well and may use the intertidal areas of the existing island to forage. Construction activities may limit the use of the island by these birds. There are other sites nearby that would serve similar uses.

The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide more foraging and resting opportunity for many of the above listed bird groups as well as other guilds during the non-nesting season.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to living coastal and marine resources would occur. However, the beneficial impacts from implementation of this project would not be realized, resulting in the continued degradation of the nesting habitat and adverse impacts to colonial waterbirds. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.3.8.5, 6.3.8.6, 6.7.5, and 6.76 of the Final Phase III ERP/PEIS describe the impacts to habitats and living coastal and marine resources from early restoration projects intended to restore and protect birds. The PEIS determined that “Creating and enhancing bird habitat would create long-term benefits from increasing stability and resiliency of barrier islands and beaches.”

The PEIS also found that "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:

- Sea turtle and marine mammal individuals may be present in project areas where dredging or underwater use of equipment is occurring. They could be subjected to temporary increased noise, turbidity, and water quality changes. These activities could temporarily displace individuals or prey during construction and could result in short-term, minor impacts. Consultation with appropriate agencies would be required prior to final design and project implementation. Guidelines provided by NOAA and USFWS to avoid and minimize potential impacts to sea turtles or marine mammals will be followed.

- Northern aplomado falcon and whooping crane may be present if an upland borrow site is used. These species, if disturbed, have access to nearby habitat that is within their normal flying distances for daily foraging movement. Any upland site proposed for borrow material would be surveyed for potential use by any of these species. Piping plover and red knot may be present at Dressing Point Island. However, their presence is very unlikely since their preferred habitat is not present at this site.

- 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 levels 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. Best management practices to minimize both short-term construction impacts and long-term impacts to sensitive habitats, included in the EFH assessment, will be followed during 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. Consultation with appropriate agencies would be required prior to final design and project implementation. Specific BMPs would be incorporated to cover all activities associated with the project to ensure that construction activities are planned to avoid individual birds and critical habitat during project activities and that no adverse impacts would occur. If individuals are present and disturbed by the noise, they would have access to nearby habitat that is within their normal flying distances for daily foraging movement. Upland excavation activities will not occur in habitat used by threatened or endangered species.

- Birds using the sites as roosting and/or loafing areas would be forced to other parts of the island or other surrounding areas during construction activities. This would be temporary, however, and once the project was completed, the project would have long-term benefits to birds for these uses.

- Any breeding birds using the islands would be avoided by restricting construction to the non-nesting period.

Methods used to remove material from the borrow site would be with a cutter head dredge or a clamshell dredge both of which would have minimal impacts to pelagic species. Placement of fill material is a slow process allowing plenty of time for sea turtles to leave the area. Island construction activities are not expected to have impacts to protected marine species and their habitats in the areas where the materials would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed and must move to another area. Impacts to wildlife would be avoided via management guidelines and techniques as appropriate; therefore, restoration activities are not likely to adversely affect federally-listed sea turtles. Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Measures for Reducing Entrapment Risk to Protected Species (NMFS 2012) would be followed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish.

NMFS concurred with the EFH assessment for the project, which determined that temporary and permanent impacts would occur to estuarine water column and underlying submerged estuarine soft bottom habitat categorized as EFH under provisions of the Magnuson-Stevens Fishery Conservation and Management Act (NMFS 2015). Project implementation would directly impact estuarine soft bottom EFH to create upland colonial waterbird nesting islands. Both dredging and fill placement locations would be sited to avoid sensitive estuarine habitats such as oyster reefs and seagrasses. Best management practices to minimize both short-term construction impacts and long-term impacts to sensitive habitats will be followed.

The Trustees initiated consultations pursuant to Section 7 of the Endangered Species Act with the NMFS' Protected Resources Division (initiated July 7, 2015) and the USFWS Texas Coastal Ecological Services Field Office (initiated August 28, 2015). The Trustees are coordinating with USFWS to determine if this project requires authorization under the Marine Mammal Protection Act. The Trustees have completed coordination and reviews with NOAA under the Marine Mammal Protection Act. The Trustees have also initiated review of the proposed project for impacts to bald eagles and migratory birds in accordance with the Migratory Bird Treaty Act as well as the Bald and Golden Eagle Protection Act.

Temporary and localized turbidity impacts during dredging and placement of fill for the construction of the island could impact EFH. The restoration of the islands would result in the permanent loss of 5 acres of submerged bay habitat designated as EFH for federally managed fish species through the filling of existing estuarine water column and the underlying estuarine mud/sand/shell substrates to convert these aquatic areas to uplands suitable for bird nesting. If dredging is required for site access or to obtain fill for island restoration that would also result in EFH impacts. To prevent adverse impacts to oyster reefs, locations proposed for dredging would avoid excavation of oyster reef habitat. Proposed dredge sites would also be located in slightly deeper open water habitat. Impacts to existing soft bottom benthic habitat at these dredging locations would be minor and temporary, as the benthic invertebrate communities would quickly re-establish. The proposed breakwaters would result in the permanent filling

of EFH. However, the submerged side slopes of the breakwaters would provide hard substrate with interstitial spaces that would enhance foraging areas for fish as well as provide cover for juvenile fish and substrate for establishment of oyster habitat.

Any adverse impacts to marine and estuarine fauna (fish, shell beds, seagrasses, benthic organisms) are expected to be short in duration and minor as those species that would be affected are likely numerous in the area. The project would provide benefits to marine and estuarine fauna by providing additional structural fish habitat which would compensate for loss of benthic bay bottom habitat. Over the life of the project, the quality of aquatic habitat would increase.

The marine mammals that could use East Matagorda Bay (e.g. dolphins and manatees) would leave the area to avoid the construction activities and/or would generally avoid the area because optimal habitat does not exist. Manatees are extremely rare in Texas waters with sightings less than one per year on average across the entire Texas coast. However, if marine mammals are sighted within 50 feet of the construction area, work would stop until the animals move away from the area of their own volition. Therefore, marine mammals would not be impacted during construction activities and no incidental take of marine mammals is anticipated.

Construction activities would be relatively short-term and occur outside of the nesting season period, and therefore not affect any bird nesting activities. Birds using the site for loafing and resting during the construction window may use existing island features during construction if they become acclimatized to the activities. Birds using the nearby open water for foraging may also be displaced to sites more remote from the island or borrow site. Some minor and temporary displacement of local foraging and roosting birds could occur during planting operations. After completion of the island restoration and protection, disturbance during nesting could occur by recreational users. These can include anglers, boaters, and photographers that could approach too closely or disembark on the island. Signs would be placed on and adjacent to the island making users aware that nesting birds are present (Figure 5-10). Disturbing nests is a violation of the Texas Parks and Wildlife Code and the Migratory Bird Treaty Act. Any mortality to chicks would violate state and federal statutes.

The disruptions caused by construction activities would be temporary and once completed the restored island would provide a greater range of habitats available for birds to use. Increased vegetation would improve habitats that are essential for nesting colonial waterbirds and provide a long-term benefit. The proposed actions would support the project goal to increase the number of nesting pairs of colonial waterbirds. The proposed actions would also provide more opportunity for many of the above listed bird groups as well as other guilds during the non-nesting season.

5.2.7.3 Human Uses and Socioeconomics

This section includes discussions of cultural resources, aesthetic and visual resources of the region, tourism and recreational use in the area, and a general characterization of public health and safety issues.

5.2.7.3.1 Cultural Resources

Affected Resources

Coordination under Section 106 National Historic Preservation Act has been initiated. However, consultations have not been completed at this time.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to cultural resources would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

If any culturally or historically important resources are identified during project preparations or pre-deployment surveys, such areas would be avoided during construction. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

5.2.7.3.2 Aesthetics and Visual Resources

Affected Resources

The affected environment consists of the construction footprint of the island and the borrow site. The landscape in the vicinity of the proposed island area is characterized by a mosaic of open water, coastline, and small islands. There are no designated protected viewsheds in the vicinity of the island. Equipment and construction activities related to island restoration would be visible.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to aesthetics and visual resources would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.8 and 6.7.14 of the Final Phase III ERP/PEIS describe the impacts to aesthetics and visual resources from early restoration projects types, including restore and protect birds. For this island,

impacts to aesthetics and visual resources were analyzed adequately within the PEIS. The PEIS determined that "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 viewshed, they would detract from current user activities or experiences…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."

During construction, there would be temporary, minor adverse aesthetic and visual impacts for recreational boaters and fishermen due to the use of construction equipment in and around the project area. However, there would be a long-term beneficial impact to visual and aesthetic resources once the island restoration is completed.

5.2.7.3.3 Tourism and Recreational Use

Affected Resources

Dressing Point Island is located in East Matagorda Bay and is part of the Big Boggy National Wildlife Refuge in Matagorda County. The island is not open to the public but open water areas of the bay are used for commercial or recreational activities such as paddling, fishing, wildlife viewing, or transportation. In existence since at least the 1940's the small recreational community, Chinquapin, is located north of Dressing Point Island. The community is mostly associated with commercial and recreational fishing along with ranching and farming activities. The area attracts a substantial number of recreational visitors that include fishing, hunting, paddling, and bird/nature watching. The local community considers the rookery island a valuable resource and as an important engine that creates bird resources important to maintain for tourism. Small boats could put in the water in the community of Matagorda or the community of Chinquapin. Large boats and barges would likely access the bay via the GIWW.

Efforts would be made to avoid or minimize impacts to public boat launch facilities. Appropriate signage and buoys markers at the site and at boat ramps would be displayed. Postings in local media would also take place to ensure that efforts are made to inform recreational users. Due to the potential increased small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure that water related accidents and conflicts are minimized.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to tourism and recreational use would occur. However, the beneficial impacts to tourism and recreational use due to implementation of this project would not be realized. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.5 and 6.7.11 of the Final Phase III ERP/PEIS describe the impacts to tourism and recreational use from early restoration projects types, including restore and protect birds. For this island, impacts to tourism and recreational use were analyzed adequately within the PEIS. The PEIS determined that "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 limit tourism and recreational uses accessibility and opportunities." Long-term beneficial impacts to tourism and wildlife viewing from this restoration project type "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."

Recreational use would be adversely impacted during construction activities. The impacts are anticipated to be minor and temporary. In turn, restoration of this rookery island is anticipated to increase the opportunity for bird watching and related tourism. 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. The project should result in beneficial impacts to tourism and recreational uses over the long-term.

Long-term beneficial impacts would be enhancement of waterbird populations locally, regionally, and Gulf-wide. Birds are an important component that supports nature based tourism. Waterbirds play a significant role and support significant revenue associated with nature tourism. Texas ranks second in the nation for wildlife viewing impact and 16% of the national impact occurs in the Gulf of Mexico (USFWS 2013a).

5.2.7.3.4 Public Health and Safety

Affected Resources

East Matagorda Bay is used by commercial fisheries, industrial, and recreational users. Recreational angling is significant and is primarily conducted from boats for areas near the potential site. Efforts

would be made to avoid or minimize impacts to public boat launch facilities. Appropriate signage and buoys markers at the site and at boat ramps would be displayed. Postings in local media would also take place to ensure that efforts are made to inform recreational users. Due to the potential increased in small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure that risk to water related accidents and or conflicts are minimized.

Restoration and protection of Dressing Point Island is 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. The project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels. This is a rookery island, uninhabited by humans, and only the island would be impacted by erosion.

Environmental Consequences

No Action

Under the No Action alternative, the proposed enhancements of Dressing Point Island would not be constructed and no impacts to public health and safety would occur. Because no action would take place, no mitigation measures would be necessary.

Proposed Actions

Sections 6.4.9 and 6.7.15 of the Final Phase III ERP/PEIS describe the impacts to public health and safety, including flood and shoreline protection from early restoration projects types, including protect and restore birds. For this island, impacts to public health and safety and shoreline protection were analyzed adequately within the PEIS. The PEIS determined that "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."

Due to the nature and location of Dressing Point Island in East Matagorda Bay, no impacts to public health and safety are anticipated as a result of implementation. 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. BMPs 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 substances. 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. Due to the potential increased in small boat traffic (construction related) in the area, appropriate safety measures would be employed to ensure water related accidents and conflicts are minimized. No adverse effects to public health and safety are expected as a result of this project.

5.2.8 Summary and Next Steps

The Trustees have started coordination and reviews under the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and Coastal Zone Management Act, National Historic Preservation Act, Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and other federal statutes, where appropriate. Implementing Trustees would adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase IV Early Restoration Plan and completed consultations/permits. Oversight would be provided by the Implementing Trustees. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended.

The Trustees initiated consultations pursuant to Section 7 of the Endangered Species Act with the NMFS' Protected Resources Division (initiated July 7, 2015) and the USFWS Texas Coastal Ecological Services Field Office (initiated August 28, 2015) and await the outcome of those consultations.

The EFH consultation, as specified in the Magnuson-Stevens Fishery Conservation and Management Act, was completed on June 5, 2015 (NMFS 2015). NMFS' Southeast Region's Habitat Conservation Division reviewed and concurred with the Trustees' EFH assessment and the determination for the project that temporary and permanent impacts would occur to estuarine water column and underlying submerged estuarine soft bottom habitat categorized as EFH under provisions of that Act and that project implementation would directly impact estuarine soft bottom EFH to create upland colonial waterbird nesting islands (NMFS 2015). Both dredging and fill placement locations would be sited to avoid sensitive estuarine habitats such as oyster reefs and seagrasses and best management practices will be followed to minimize both short-term construction impacts and long-term impacts to sensitive habitats..

The Trustees are coordinating with USFWS to determine if this project requires authorization under the Marine Mammal Protection Act. The Trustees have completed coordination and reviews with NOAA under the Marine Mammal Protection Act.

The Trustees have also initiated review of the proposed project for impacts to bald eagles and migratory birds in accordance with the Migratory Bird Treaty Act as well as the Bald and Golden Eagle Protection Act.

Pursuant to the Coastal Zone Management Act, the Federal Trustees submitted a consistency determination for this project to the TGLO on May 21, 2015. On July 10, 2015, the TGLO concurred with

the determination that the project would be implemented in a manner consistent with the Texas Coastal Management Program. The TGLO letter does not authorize the use of Coastal Public Land. No work may be conducted or structures placed on State-owned land until, the Trustees have obtained all necessary authorizations, including those required by TGLO and the USACE. Additional consistency review may also be required pursuant to federal regulations (see 15 C.F.R. Part 930) prior to project implementation, including incident to these authorization processes.

Pursuant to Section 106 of the National Historic Preservation Act, a complete review of this project is ongoing to identify any historic properties located within the project area and to evaluate whether the project would affect any historic properties. While the Section 106 review process is ongoing, an initial review of the project has not identified the presence of a historic property within the project area.

Permitting under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act will be addressed during the engineering and design stage of the islands.

The Trustees considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Public comments and Trustee responses are found in Chapter 15.

5.2.9 Overall Summary of the Texas Rookery Islands Project

The 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 from implementation of the four Texas Rookery Islands. Restoration and protection of the Texas Rookery Islands would increase the size of available rookery island habitat with the goal of increasing the number of nesting colonial waterbirds.

5.2.9.1 Summary of Impacts to the Physical Environment

Impacts to the physical environment from implementation of the Texas Rookery Islands project would include:

- Minor, adverse and local impacts to geology and substrates within the footprint of the project would be affected through the placement of clean fill and hard, structural material. Minor, adverse and local impacts to geology and substrates would occur at the borrow site as well. Long-term benefits would occur to the bottom substrates due to stabilization of sediments protection from erosion.

- No impacts to floodplains or hydrology would occur. Temporary, local, and minor impacts to water quality would result from increased turbidity during dredging activities and placement of fill material. Long-term benefits would also occur from the breakwater/armored levee protection of the islands.

- Minor short-term adverse impacts to air quality and GHG emissions from the use of construction equipment. Impacts would be localized and last only during the construction period.

- Minor short-term adverse impacts to noise from the use of construction equipment. Impacts would be localized and last only during the construction period.

5.2.9.2 Summary of Impacts to the Biological Environment

Impacts to the biological environment from implementation of the Texas Rookery Islands project would include:

- Seagrasses: Seagrasses would be surveyed prior to construction and avoided so there would be no impacts.

- Benthos, invertebrates and fish: Potential short-term minor adverse effects to benthic organisms, invertebrates, and fish may occur during construction activities due to placement of fill, construction of breakwaters/levees, and noise. Following construction, long-term benefits to marine species by providing additional hard structure (including crevices and interstitial voids) habitat.

- Oysters: Active oyster reefs would be surveyed prior to construction and avoided so there would be no impacts. Following construction, long-term benefits to oyster populations would be provided by reducing erosion and turbidity in nearshore waters.

- EFH: Potential short-term minor adverse effects to EFH could occur due to localized turbidity during dredging and placement of fill. Restoration of the islands and construction of breakwaters/levees would result in the permanent loss of over 20 acres of submerged bay habitat. The submerged side slopes of the breakwaters would provide hard substrate with interstitial spaces that would enhance foraging areas for fish as well as provide cover for juvenile fish and substrate for establishment of oyster habitat.

- Marine mammals: No impacts to marine mammals are expected because they would leave the area to avoid the construction activities and/or would generally avoid the area because optimal habitat does not exist. If present BMPs would be implemented to avoid impacts.

- Terrestrial species: Construction activities would cause temporary, minor adverse impacts to wildlife due to the presence of people and use of heavy equipment on the islands. Construction activities would be relatively short-term and occur outside of the nesting season period, and would therefore not affect any bird nesting activities. Permanent impacts result from alterations to the island and supported habitat would provide long-term benefit to nesting birds.

- Threatened and endangered species:

    - Potential short-term minor adverse impacts to sea turtles during construction. These species are all mobile and expected to avoid the project area during construction.

- No adverse impacts are expected to the northern aplomado falcon, whooping crane, piping plover, red knot, or eagles. If present, BMPs would be implemented to avoid impacts.

Overall, only minor (or less) adverse impacts are expected to occur to some resources while long-term beneficial impacts to avian resources are expected as a result of this project.

5.2.9.3 Summary of Impacts to Human Uses

Impacts to human uses from implementation of the Texas Rookery Islands project would include:

- Cultural Resources: A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area.

- Aesthetics and Visual Resources: The proposed action would result in minor, temporary visual impacts during construction. However, there would be a long-term beneficial impact to visual and aesthetic resources once the island restoration is completed.

- Tourism and Recreation: There would be short-term, minor adverse impacts to recreational activities in the area during construction. Following construction, there would be long-term benefits through the enhancement of waterbird populations locally, regionally, and Gulf-wide, which supports nature based tourism.

- Public Health and Safety: There would be no adverse public health and safety.

5.2.10 Cumulative Impacts of the Texas Rookery Islands Project

As discussed in Chapter 4, the CEQ NEPA regulations 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).

The proposed Texas Rookery Islands project cumulative impacts analysis tiers to the Final Phase III ERP/PEIS analysis of the programmatic Preferred Alternative, which evaluated the restoration project type and associated activities for the restoration and protection of birds. The Final Phase III ERP/PEIS analysis of cumulative impacts relevant to the proposed action is incorporated by reference into the following cumulative impacts analysis for the Texas Rookery Islands project. The following analysis focuses on the potential cumulative effects of the proposed Texas Rookery Islands project to the effects of past actions evaluated in the Final Phase III ERP/PEIS cumulative impacts analysis and the effects of some past, present, and reasonably foreseeable future actions not analyzed in the Final Phase III ERP/PEIS.

5.2.10.1 Site Specific Review and Analysis of Cumulative Impacts to Relevant Resources

This section describes past, present, and reasonably foreseeable future actions that were not discussed in the Final Phase III ERP/PEIS, but which are relevant to identifying any cumulative impacts the proposed Texas Rookery Islands project may have on a local scale. Context and intensity, defined in Section 5.2.2, are used to determine whether a potential significant cumulative impact from the Texas Rookery Islands project exists.

Past, present, and reasonably foreseeable other future actions relevant to this action, but not analyzed in the Final Phase III ERP/PEIS, were identified based on the best professional judgment of staff, from federal and state natural resource agencies, who have knowledge and experience working in coastal environments in the Gulf of Mexico. Actions that could be relevant to the proposed bird island project cumulative impacts analysis are defined here as those actions with similar scope, timing, impacts and/or location. The Texas Rookery Islands project locations are defined as the three rookery islands in Galveston Bay (Rollover Bay, Smith Point, and Dickinson Bay II Islands) and the rookery island in East Matagorda Bay (Dressing Point Island). Federal and state actions, other Phase IV proposed projects, and other restoration related to the Spill were considered.

For the Texas Rookery Islands project, specifically, the relevant affected resources analyzed in this EA are related to the Physical Environment (geology and substrates, hydrology and water quality and, air quality and GHG emissions, and noise); Biological Environment (living coastal and marine resources and protected resources); and Human Uses and Socioeconomics (cultural resources as well as tourism and recreational use).

The local action area is defined as Galveston Bay and East Matagorda Bay. Actions that would be relevant to the Texas Rookery Islands project cumulative impacts analysis are defined here as those with similar scope, timing, impacts or location.

5.2.10.1.1 Physical Environment

Galveston Bay and East Matagorda Bay have experienced changes to their physical environments in the past, present and would do so in the future. Changes to the bay shoreline margins and islands have occurred due to erosion and relative sea level rise. Outside of Louisiana, Galveston Bay is experiencing the highest relative sea level rise rate in the nation (http://tidesandcurrents.noaa.gov/). Dressing Point Island, a natural island, was once a peninsula and became an island between 1891 and 1909. Its areal extent has decreased substantially over the last 100 years. Islands created by construction of their associated navigation channels have also suffered severe erosion. While navigation traffic can contribute to erosion, the three Galveston Bay Islands (Dickinson Bay II, Rollover Bay, and Smith Point Islands) have experienced most of their land loss through the effects of subsidence, tropical storms and winter storm activity. The rate of relative sea level rise is approximately 2.17 feet per 100 years (http://tidesandcurrents.noaa.gov/). The loss of elevation has not only decreased the size of the island but exacerbated associated erosional wave energies with deeper water bodies. These erosional processes also affect water quality by increasing turbidity at sites during storms and high precipitation

events. Other habitats have been affected similarly such as intertidal wetlands. One of the most effective approaches to restoring these lost wetlands has been to use nearby fill material with breakwater features. While the efforts to restore wetlands are significant, the loss of habitat associated with the ground water induced subsidence of the late 1960s in Galveston Bay is considerable (GBEP 2011).

The project action would change trends associated with these sites in terms of increasing their size by using nearby bay sediments or importing sediments from nearby uplands. Impacts from this project with respect to geology and substrates are expected to be minor given potential changes that have occurred and are expected to occur. Water quality may be affected locally but would be temporary and minor considering other projects expected to occur. Air quality and noise are negligible given activities present today. Projects having similar effects in the future are not expected to be significant provided the current regulatory requirements and BMPs available. It is unlikely that the intertidal and above tidal habitats that have been lost would be replaced to their former extent.

5.2.10.1.2 Biological Environment

As stated in the previous section, substantial effects to these two bay systems have occurred due to relative sea level rise. These changes have affected biological resources of both bays. Overall there has been an increase in the aquatic estuarine environment and its depth. Significant losses to the extent of oyster reefs due to fossil reef mining and changes in bay salinity regimes have occurred. Tropical storms such as Hurricane Ike and Hurricane Carla impacted oyster reef and bay seagrass beds respectively. Changes in water quality have also affected these habitat resources as well as fisheries resources such as pollution and long-term contaminants. Avian resources were also affected by contaminants like DDT. Biological resources have been affected by reduced freshwater inflows due to drought and river withdrawals. Essential fish habitat has been changed by other restoration projects. This project would convert some open water estuarine habitat into coastal upland habitat. The amount of open water habitat in these bays is expected to increase in the future and the impacts of these projects are negligible. Hard substrates may be affected by this project, however, this habitat type is expected to increase over time as other sites and shorelines erode and by restoration projects targeting oyster reef habitat and those using limestone for armoring shorelines. This project would add a substantial hard substrate component in the form of breakwater or armoring.

The Texas coast currently supports many colonial waterbird nesting islands. Many of these sites were constructed in association with construction of navigation channels. While availability of nesting sites may not be the sole factor that limits the numbers of colonial nesting birds, it can play a significant role since foraging habitat does not appear to be a limiting factor for most species. Current rates of erosion and relative sea level rise have generated concerns in the conservation community given the current rate of change that appears to be taking place. Some sites are no longer used by birds because they have suffered significant land loss, changes to the vegetation, have been continually disturbed by predators or people, or are no longer of sufficient elevation to avoid overwash events. Actions to restore and protect rookery island habitat have occurred at some sites; however, there are a significant

number of sites that need restoration support. It is likely that other rookery island projects would be developed, planned, and implemented that would complement the Texas Rookery Islands project. Funding for this type of activity is limited since most public funding sources target wetland restoration and water quality improvements, neither of which directly supports island restoration and protection. These combined factors only emphasize the importance of this project in order to maintain and protect waterbird populations. The diversity of species and the great numbers that are a supported by highly productive systems make the upper Texas coast a prime international birding destination. These birding and nature tourists provide significant revenue of funding into local communities and businesses (USFWS 2013a).

5.2.10.1.3 Human Use and Socioeconomics

The human population associated with the upper Texas Coast is expected to increase substantially in the next 50 years (Texas Water Development Board 2012). This overall increase would result in more natural resource users that include nature watchers, anglers, hunters, and water sports enthusiasts. The increased numbers of users would impact living resources along the coast. Commercial industries associated with these activities including the commercial seafood industry would benefit by this increase in population if estuarine resources are sustained. The temporary impacts associated with users of the bay from this project would be negligible. The level of activities by other bay related projects and this project would preclude opportunities recreational users in other parts of both bay systems. Impacts to commercial users are not expected to be significant in the near term. The long-term impacts from the projects would be positive for recreational and commercial users of the bay.

5.2.10.2 Potential Cumulative Impacts When Evaluated with Other DWH Restoration Funds Projects

DWH restoration funds projects include other Phase IV Early Restoration Projects and Gulf Environmental Benefit Fund (GEBF) projects. Due to the nature of this proposed project, the proposed Texas Rookery Islands project is not anticipated to contribute to potential adverse cumulative impacts in combination with other Phase IV projects. The Texas Rookery Island project could contribute to cumulative benefits to resources through the following GEBF projects: Oyster Reef Restoration in East Bay, Anahuac National Wildlife Refuge Coastal Marsh Acquisition, and Dollar Bay-Moses Lake Shoreline Enhancement and Restoration. The Oyster Reef and Rookery Islands projects will benefit benthic habitat in Galveston Bay. When the Dollar Bay-Moses Lake Shoreline Enhancement and Restoration project is implemented (currently GEBF funding is for data collection, geotechnical analysis and engineering/design development only), the Dollar Bay, Anahuac, and Rookery Island projects would benefit avian resources and benthic habitat.

5.2.10.3 Summary of Cumulative Impacts of the Proposed Action

Overall, the cumulative impacts of the proposed Texas Rookery Islands project when considered with respect to past, present, and reasonably foreseeable future actions would result in beneficial impacts over the long-term and negligible short- or long-term adverse impacts. This project would contribute

not only to the restoration and protection of colonial nesting waterbirds but help ameliorate potential future adverse impacts associated with past, present and future changes expected for the upper Texas coast.

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