SKAUBAY/BERGE BANKER OIL SPILL

Final Restoration Plan/ Environmental Assessment

Prepared for:

The Skaubay/Berge Banker Natural Resources Trustee Restoration Council:

National Park Service
U. S. Fish and Wildlife Service
Texas Commission on Environmental Quality
Texas General Land Office
Texas Parks and Wildlife Department

August 2003



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ABSTRACT

As part of the restoration planning process, this Restoration Plan/ Environmental Assessment (RP/EA) presents information to the public regarding the affected environment, the determination of natural resource injuries, and possible restoration actions to compensate for natural resource injuries and lost recreational use caused by the February 5, 1995, Skaubay/Berge Banker oil spill. The oil spill adversely affected natural resources and recreational use along the Texas coast from the Matagorda Peninsula south to the Padre Island National Seashore (PAIS).

The purpose of restoration planning is to evaluate the magnitude of actual and potential injuries to natural resources and natural resource services and to use that information to determine the need for, and scale of, restoration actions. Natural resource services are the ecological and public services that natural resources provide, such as foraging and nesting habitat for bird populations, nature photography, fishing, swimming, hiking, or similar recreational or educational services. Restoration planning provides the link between injury and restoration and has two basic components: injury assessment and restoration selection.

Restoration for each of the injured natural resources will be accomplished by implementing several restoration projects at specific locations at PAIS and throughout the Texas state beaches. The Trustees have evaluated the various restoration projects and have selected the following projects:

Restoration Alternative	Selected Projects
Bird Restoration and Enhancement	Mustang Island Acquisition/Preservation
Dune and Vegetation Restoration	Dune Restoration/ Preservation (Gulf Side)
Lost and Diminished Recreational Use of State Parks (Texas State Beaches)	Restroom/Shower Facility Beach Pavilion at Fish Pass Master Plan for Mustang Island Shade Shelters and Picnic Tables
Lost and Diminished Recreational Use of National Parks (PAIS)	Auditorium and First Aid Station Expansion

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ACRONYMS AND ABBREVIATIONS

ANWR	Aransas National Wildlife Refuge
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
cy	cubic yards
CZMA	Coastal Zone Management Act
°F	degrees Fahrenheit
DO	Director's Order
DOI	Department of Interior
ea	each
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
ft	foot/feet
GLO	(Texas) General Land Office
MBVC	Malaquite Beach Visitor Center
MISP	Mustang Island State Park
MOA	Memorandum of Agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRD	Natural Resource Damage
NRDA	Natural Resource Damage Assessment
OPA	Oil Pollution Act
OSPRA	(Texas) Oil Spill Prevention and Response Act
OSPR	Oil Spill Prevention and Response Program
PAIS	Padre Island National Seashore
RP/EA	Restoration Plan and Environmental Assessment
sq ft	square feet

TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TNC	The Nature Conservancy
TPWD	Texas Parks and Wildlife Department
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION

1.1 Overview of Incident

On February 5, 1995, two tankers, the M/V Berge Banker and the M/T Skaubay, collided in the Galveston Lightering Area in the Gulf of Mexico while preparing to transfer crude oil. The collision caused the Berge Banker to discharge approximately 845 barrels of Bunker C oil into the water. A combination of wind, ocean, and tidal currents began to move the oil across the Gulf of Mexico, and an offshore cleanup operation was implemented. Much of the oil sank below the surface of the water before it could be contained. The submerged oil migrated more than 150 miles before it was subsequently deposited as tar balls and mats on the beaches of Matagorda Peninsula, Mustang Island, and Padre Island (Figure 1).

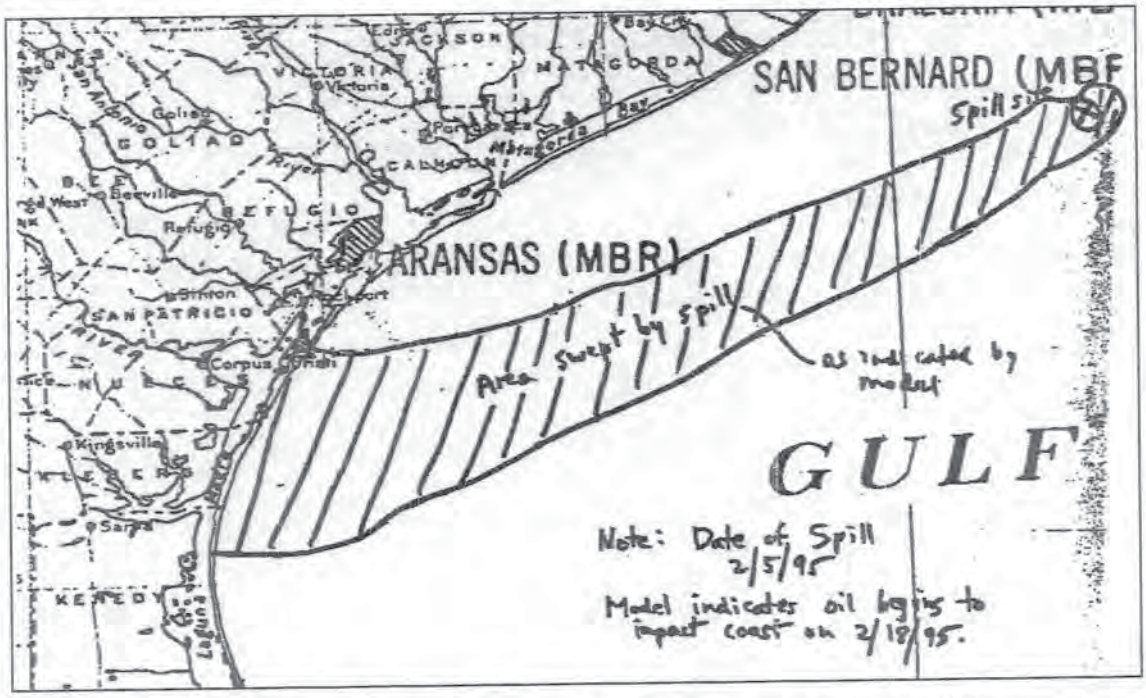


Figure 1. Area Swept by Spill as Indicated by Modeling Efforts

These publicly owned beaches comprise portions of Matagorda Island National Wildlife Refuge, Matagorda Island State Park, Mustang Island State Park (MISP), and Padre Island National Seashore (PAIS) (Figure 2).

Oil spill response organizations and contractors conducted on-water and shoreline cleanup actions.

The National Oceanic and Atmospheric Administration (NOAA) was notified of the incident on February 5, 1995, and was asked for dispersant and in situ burning recommendations. Bunker C is a persistent oil that does not readily dissipate, dissolve, or evaporate. This oil causes physical coating because only a small fraction is water-soluble. Since the source of the release was so far offshore, there was no shallow water to concentrate water-soluble fractions. In addition, Bunker C sheens less

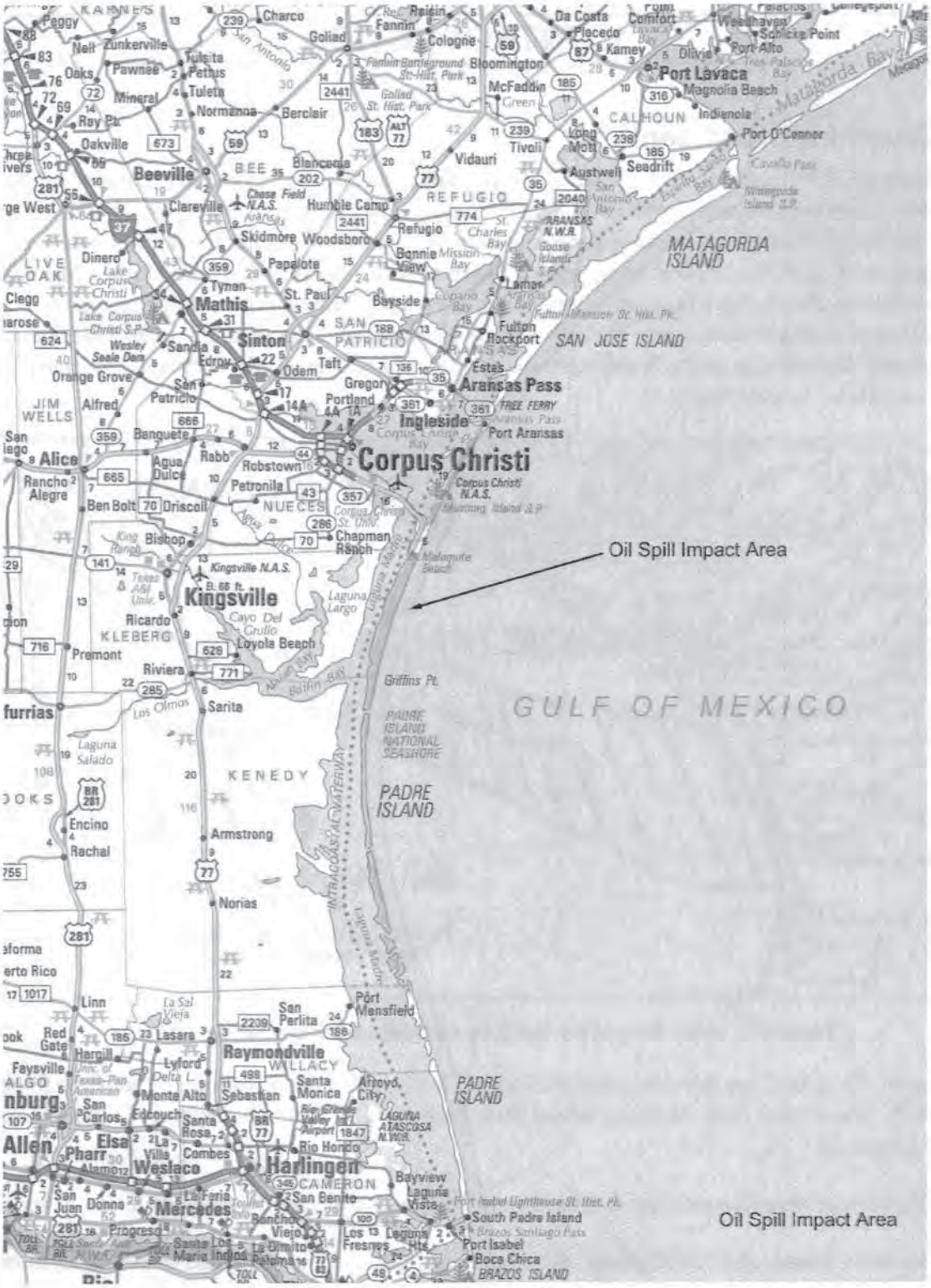


Figure 2. Vicinity Map Identifying the Impacted Shoreline Area

than other types of oil when spilled, making it less visible from the air, although it does break into droplets due to wave action. Because of its high viscosity, Bunker C develops relatively large droplets, so that the tarballs initially remained buoyant around the lightering area. Once distributed by wind and currents, tarballs were extremely difficult to see by airborne observers, so the oil seemed to disappear and the slick was lost from sight for several days. The NOAA scientific support coordinator determined that dispersant use was not appropriate because of the heaviness of the product and there was no plan in place for dispersant application. The option of burning was also rejected because of the product type and the weather. During the initial response, NOAA provided information on the resources at risk, the behavior of the oil, and a trajectory and arranged to have satellite-transmitting buoys sent for deployment on the oil slick (NOAA, 1995).

On-water cleanup actions included attempts at offshore skimming and other measures that were considered but not attempted because of the type and behavior of the oil. Two response vessels were immediately contracted to attempt offshore skimming, but because of adverse weather, only five barrels were recovered and the ships were demobilized on February 8, 1995.

Tarballs from a persistent oil can travel hundreds of miles virtually unobserved. Transported by winds and currents, they may be overwashed by waves and actually spend some fraction of the time under water (typically in the upper few meters of the water column). Should the oil reach a natural collection area such as a beach, the tarballs can coalesce into a contiguous slick. Such events in the past have led to reports that oil has somehow mysteriously sunk in one area, moved subsurface as a single patch, and then refloated hundreds of miles away, which is what happened in this spill. On February 16, 1995, tarballs from this spill began coming ashore 140 miles away, on the beaches on the Gulf side of Matagorda Island, and continued to impact beaches until March 3, 1995, when small tarballs were reported on Port Isabel city beaches. Scattered along the shoreline are inlets and overwash areas that lead to extensive salt marsh environments. These salt marshes are very sensitive to oiling, which will heavily coat most vegetation and animal life it comes in contact with. Protective booming was put in place in these areas and around areas where sea turtles feed (NOAA, 1995).

The predominant shoreline along the impacted area of the Texas coast is sand beaches. Almost no oil penetrated the sediments; the oil was stranded on the beach and then buried by sand. Recovery operations were labor intensive; hundreds of contract workers picked up the tarballs with shovels. Some of the less contaminated sand was used to rebuild damaged dunes.

Management of the spill response operations was directed by an Incident Command System, which included the United States Coast Guard (USCG), Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), Texas Commission on Environmental Quality (TCEQ), and NOAA.

1.2 Purpose and Need

This Restoration Plan and Environmental Assessment (RP/EA) presents information to the public regarding the affected environment, the determination of natural resource injuries, and possible restoration actions to compensate for natural resource injuries and lost recreational use caused by the February 5, 1995, Skaubay/Berge Banker oil spill.

1.2.1 Purpose

The Trustee Representatives have a responsibility to manage, preserve and protect the cultural and natural resources and to provide outdoor recreation opportunities for the use and enjoyment of present and future generations. The Skaubay/Berge Banker oil spill injured some of those natural resources. The purpose of this RP/EA is to develop and implement restoration actions that will return the injured natural resources and services to baseline and to compensate for the interim losses of those natural resources and/or services pending recovery.

Additionally, this RP/EA is intended to comply with the Oil Pollution Act (OPA) of 1990, 33 USC 2701, et seq. This document also serves as the Trustee agencies' compliance with the National Environmental Policy Act (NEPA), 42 USC 4321–4370d; the Texas Oil Spill Prevention and Response Act (OSPRA), §40.00 et seq. of the Texas Natural Resource Code; Texas Natural Resource Damage Assessment rules, 31TAC §20.00 et seq.; Public Resources Code §§ 21000–21178.1; and their implementing regulations, to the extent that they apply.

1.2.2 Need

The Skaubay/Berge Banker oil spill adversely affected natural resources and lost recreational use along the Texas coast from the Matagorda Peninsula south to Padre Island. The adverse impacts affected several natural resource categories, including bird habitats, sand dunes, and public beach use. Because of the adverse impacts, restoration actions are needed to compensate for the interim losses of natural resources and/or services pending recovery.

Restoration planning is needed to evaluate the magnitude of actual and potential injuries to natural resources and natural resource services and to use that information to determine the need for, and scale of, restoration actions. Natural resource services are the ecological and public services that natural resources provide, such as foraging and nesting habitat for bird populations or nature photography, fishing, swimming, hiking, or like recreational or educational services. Restoration planning provides the link between injury and restoration and has two basic components: injury assessment and restoration selection.

The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services, thereby providing a factual basis for evaluating the need for, type of, and scale of restoration actions. Consistent with the OPA, the goal of the restoration actions presented in this RP/EA is to make the environment and the public whole for injuries to, or lost use of, natural resources and services resulting from the Skaubay/Berge Banker oil spill. This will be accomplished through the restoration, rehabilitation, replacement, or acquisition, collectively referred to as restoration, of equivalent natural resources and services. The specific goals for this action are to restore the following natural resources affected by the oil spill: bird populations, water quality, sandy shorelines, sand dunes, and intertidal habitat. In addition, the restoration plan calls for implementation of restoration projects to compensate for the lost use of public areas and public services. Supplemental permitting and other environmental compliance may be required prior to actual implementation of the projects described herein.

Restoration actions for each of the injured natural resources will be accomplished by implementing several restoration projects at specific locations at PAIS and throughout the Texas state beaches. The replacement of lost recreational use services will be accomplished by enhancing the experience

and use of natural resources at public parks. This RP/EA provides a description of each of the restoration projects that were evaluated, including the objectives, success criteria, monitoring, and environmental consequences of each project, and identifies the projects selected for implementation.

1.3 Issues/Impact Topics

Issues and impact topics were identified and form the basis for environmental analysis in this RP/EA. A brief rationale is provided for each issue or topic that is analyzed in the environmental consequences section of each project identified. Issues and topics considered but not addressed in this document also are identified.

Shoreline

The shoreline and dunes were identified as injured resources. The construction activities associated with the implementation of identified projects could impact the shorelines and/or dune areas.

Birds

Shorebirds, wading birds, and waterfowl were identified as injured resources. Since habitat for the threatened piping plover (*Charadrius melodus*) and endangered brown pelican (*Pelecanus occidentalis*) occurs in the area where projects may be implemented, the potential impacts to these habitats and bird species are evaluated.

Fish, Mammals, Amphibians, Reptiles and Other Animals

Although a number of threatened and endangered mammal and reptile species occur within the spill area, all the identified projects under consideration would be performed on land, so only the impacts to the nesting sea turtles are evaluated.

Recreation Use

Recreation uses in the spill area were identified as injured resources. The proposed projects could provide additional educational and informational opportunities as well as providing facilities to attract additional visitors to the parks to compensate for lost recreational use due to the oil spill.

1.3.1 Issues Eliminated from Further Consideration

Other issues and topics were considered as described below but not addressed in this document.

Air Quality

Construction activities related to some of the project alternatives would produce exhaust that may degrade the air quality on the site. However, the frequency and duration of these activities would be limited.

Other Aquatic Habitats

The Skaubay/Berge Banker Oil Spill only affected beach and oceanic habitats. The major regional aquatic habitats that were eliminated from further discussion include the riverine, salt marsh, algal mat, seagrass beds, oyster reefs, and open bay bottom habitats.

Socioeconomics

The proposed projects would not result in a significant change the socioeconomics of the area. Projects enhancing recreation opportunities would replace existing recreation use facilities. Any additional recreation or tourist use is discussed under the Recreation Use Services section of the environmental analysis.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, requires all federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The projects would not result in significant changes in the socioeconomic environment of the area, so they are expected to have no direct or indirect impacts on minority or low-income populations or communities.

Cultural Resources

No cultural or historic resources would be significantly impacted by the projects.

1.4 Natural Resource Trustees and Authorities

Both federal and Texas statutes establish liability for natural resource damages to compensate the public for the injury, destruction, and loss of such resources and their services resulting from oil spills. Natural resource Trustees are authorized to act on behalf of the public under federal and state statutes to assess and recover natural resource damages and to plan and implement actions to restore natural resources and resource services injured or lost as a result of a discharge of oil. The Trustees for the Skaubay/Berge Banker oil spill are the U.S. Department of the Interior (DOI), represented by NPS and USFWS; and the state of Texas, represented by TPWD, GLO, and TCEQ. These agencies formed the Trustee Restoration Council, hereafter referred to as the Trustees, to work cooperatively and evaluate natural resource injuries, assess damage, and identify the restoration actions presented in this document. The Trustees are following guidance concerning restoration planning and implementation contained in the following:

- Oil Pollution Act (OPA) of 1990 (33 USC 2701 et seq.)
- Natural Resource Damage Assessment Regulations under the OPA(15 CFR Part 990)
- National Park System Resource Protection Act (16 USC, Section 19jj)
- Texas Oil Spill Prevention and Response Act (OSPRA) (§40.00 et seq.)
- State of Texas Natural Resource Damage Assessment rules (31 TAC §20.00 et seq.)
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR 300.600)
- Executive Order (EO) 12777 (implements Section 311 of the Water Pollution Control Act of 1972 and OPA)

The Trustees Representatives prepared this RP/EA jointly. The Trustees entered into a Memorandum of Agreement (MOA) on January 21, 2000, to ensure coordination and cooperation in restoring natural resources injured as a result of the oil spill. The names of the Trustees Representatives and contact information are listed in Section 7 of this document.

1.5 Coordination and Settlement with Responsible Parties

The OPA NRDA regulations provide for Trustees to invite the Responsible Parties to participate in the natural resource damage assessment process. Although the Responsible Parties may contribute to the process in many ways, final authority to make determinations regarding injury and restoration rests solely with the Trustees. The Trustees determined and identified the injuries, as per 15 CFR 990.51, and entered into settlement negotiations with the Responsible Parties on July 22, 1997.

The United States and state of Texas entered into a Consent Decree that resolved claims asserted by both governments on November 18, 1999, with the Responsible Parties. The terms of the settlement are set forth in that Consent Decree entered by the U.S. District Court for the Southern District of Texas, Houston Division (a copy is located in the Administrative Record). The settlement covered claims for oil spill response costs, natural resource damage assessment costs, civil penalties, damages for injuries to birds, shoreline and aquatic habitats, and lost recreational use of natural resources. The Consent Decree was subject to public review and comment during and prior to being entered by the Court on December 30, 1999.

An MOA was entered into on January 21, 2000, between the Trustees to ensure coordination and cooperation in applying the damages jointly recovered from the Responsible Parties.

1.5.1 Projects Completed by Responsible Parties

As part of the Consent Decree commitments, the Responsible Parties completed several projects as an extension of spill cleanup and response. These projects included replacing the removed sand at PAIS, installing sand fencing to promote natural accretion of sand, and repairing the parking lot used during the cleanup actions at PAIS. A subtotal of $79,336 out of the total original funding was spent on these initial restoration projects.

1.6 Settlement of Natural Resources Claims

The Consent Decree requires the Trustees to develop a Restoration Plan for the natural resources and resource services that were adversely impacted by the oil spill and to provide an opportunity for public input on key elements of the restoration planning process. A total of $1,568,077 was awarded to the Trustees under the Consent Decree for the design, implementation, permitting, monitoring, and oversight of restoration projects. Of the $1,568,077 awarded to the Trustees, $187,126 was awarded for primary restoration, and the remaining $1,380,951 was awarded for compensatory restoration. In accordance with the settlement Consent Decree, settlement funds are to be allocated towards the restoration resource categories injured as a result of the oil spill (Table 1).

Primary restoration is action taken to return injured natural resources and services to baseline conditions (NOAA, 1996). Primary restoration actions associated with this incident included:

- Replacing 28,000 cubic yards of sand at North Beach in PAIS

Table 1. Original Funding Allocations

Resource Category	Status	Restoration Type	Available Funds
Bird Restoration	Pending	Primary	$122,082
Dune/Vegetation Injury	Pending	Compensatory	$115,000
Lost and Diminished Recreational Use (Texas State Beaches)	Pending	Compensatory	$890,893
Lost and Diminished Recreational Use (PAIS)	Pending	Compensatory	$205,766
Parking Lot Repair	Completed	Primary	$25,000
Beach Ecological Services	Completed	Compensatory	$14,292
Dune/Vegetation Injury	Completed	Primary	$40,044
Environmental Planning	In Progress	Compensatory	$155,000
		Total Original Funds	$1,568,077

- Rebuilding the impacted dune area at PAIS by selective mounding of sand on 0.3 miles of the 13-mile beach road
- Mulching sand mounds created by rebuilding identified above
- Placing bollards, cable, and signs and instituting active law enforcement patrols to keep visitors out of the areas to be restored (identified above)
- Three years of monitoring of the rebuilt dune area
- Paying for incidental costs such as permitting, surveys in the project area, design and contracting costs and restoration planning/NEPA compliance costs
- Replacing the damaged portions of the Malaquite parking area
- Replacing impacted bird resources

Compensatory restoration is action taken to compensate for the interim losses of natural resources and/or services pending recovery (NOAA, 1996). This RP/EA documents the evaluation of potential compensatory restoration projects.

1.7 Public Participation

Public review is an integral aspect of the OPA restoration planning process (33 USC §2706 [C][5]). The NRDA regulations, which implement the Trustee provisions of OPA, provide for the Trustees of a damaged site to solicit the public to comment on a Draft RP/EA and consider the comments during the preparation of a Final RP/EA (15 CFR 990.55[c]). In addition, public review of an RP/EA is consistent with NEPA as amended (42 USC 4321 et seq.) and its implementing regulations (40 CFR Parts 1500–1508). The public is invited to comment on proposed projects or suggest alternative projects.

Public review of the Draft RP/EA ran from June 16 to July 14, 2003 (30 days). A Responsiveness Summary is presented as Appendix A of this RP/EA. No public comments were received during

this time period. Figure 3 presents a timeline of the restoration planning process, which identifies each stage of public involvement in this planning process.

Before work on the RP/EA was begun, a scoping process was initiated. Notice to the Public was issued in the Corpus Christi *Caller Times* on September 5, 2002. The Trustees prepared a Public Scoping document that described injuries associated with the oil spill and summarized the potential restoration projects that were identified. The document was presented at a public meeting held on September 10, 2002, in Corpus Christi. Additionally, the three resource categories and the associated funding available for project implementation were presented. During this meeting, the Trustees were available to answer questions and discuss the Scoping Document with the public. The Public Scoping document was used as a tool to solicit input from both the public and other interested parties who could provide additional expertise and perspective to the planning process. All comments made by interested parties during this meeting and during the public review period were considered during the development of the Final RP/EA, including the incorporation of potential restoration projects that were submitted by the public during the Public Scoping process.

1.8 Restoration Plan Implementation

Once the RP/EA is finalized, two possible outcomes are outlined in NEPA. The first outcome is that a Finding of No Significant Impact (FONSI) will be issued and the selected restoration projects will be implemented if the results of the environmental assessment indicate that the projects will not make a significant environmental impact. The Trustees would issue a demand for funds and project implementation would begin. If during the environmental assessment, it is determined that the proposed projects would cause significant environmental impacts, the second outcome is that an Environmental Impact Statement (EIS) would be developed. Through the EIS process, the Trustees would carefully evaluate which proposed alternatives would be selected and what measures would be implemented to mitigate the potentially significant environmental impacts. A Record of Decision (ROD) would then be issued to implement the selected alternatives. Were an EIS required, there would be additional opportunities for the public to comment on the documents during the required 30-day public comment periods for both the EIS and the ROD.

1.9 Administrative Record

Under Subpart D (§ 990.45), OPA regulations require that if trustees decide to proceed with restoration planning, they must open a publicly available administrative record to document the basis for their decisions pertaining to restoration. Depending on the nature and extent of the incident and assessment, the administrative record should include documents relied upon during the assessment, such as:

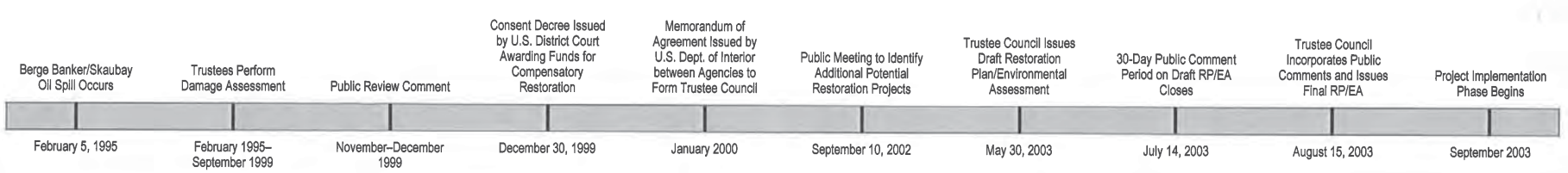
- Any notices, draft and final restoration plans, and public comments
- Any relevant data, investigation reports, scientific studies, work plans, quality
- Assurance plans and literature
- Any agreements, not otherwise privileged, among the participating trustees or with the Responsible Parties

Furthermore, the regulations direct federal trustees to maintain the administrative record in a manner consistent with the Administrative Procedure Act, 5 USC 551-59, 701-06. The Trustees have established an Administrative Record that contains documents relied upon by the council in identifying, evaluating, selecting, and implementing restoration projects.

Comments received during the public review period for the Public Scoping document, Draft RP/EA, Final RP/EA, Consent Decree, and other restoration planning process documents are part of the Administrative Record. Appendix B is a list of the documents contained in the Administrative Record. The Administrative Record can be viewed at the PAIS Visitor Center located at Malaquite Beach. Please contact Arlene Wimer as follows to view copies of the documents contained in the Administrative Record:

Arlene Wimer
National Park Service
Padre Island National Seashore
P.O. Box 181300
Corpus Christi, TX 78480-1300
361-949-8173, ext. 224
Arlene_Wimer @nps.gov

Figure 3. Skaubay/Berge Banker Oil Spill
Restoration Plan and Environmental Assessment Timeline



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2. THE AFFECTED ENVIRONMENT

This section describes the physical environment, biological resources, federal and state endangered and/or threatened species, protected areas, and historic and cultural resources affected, or within the area affected by, the Skaubay/Berge Banker oil spill. The description of these resources focuses primarily on the natural resources and services that are relevant to the discussion of injuries and restoration projects presented in this document.

The physical environment addressed in this section consists of the open water and estuarine habitats of the Gulf of Mexico from the Matagorda Peninsula (Matagorda County) to South Padre Island (Kenedy County). The physical environment section describes the open water, sandy beaches, sand dunes, and washover areas that are present in the affected area. The biological resources section describes a variety of seabirds, shorebirds, commercially and recreationally important fish and shellfish, terrestrial and marine mammals, and other organisms that live in the Texas coastal habitats. Federal and state recognized threatened and endangered species residing in the south Texas coast region include such species as the whooping crane (*G. americana*), brown pelican (*P. occidentalis*), and the Kemp's ridley sea turtle (*Lepidochelys kempii*).

The areas impacted by the spill included the beaches of Matagorda Peninsula, Matagorda Island, Mustang Island, and Padre Island. These beaches comprise one unit of the NPS system, PAIS, and two state parks, Mustang Island State Park (MISP) and Matagorda Island State Park. The affected area also includes beaches of the Matagorda Island National Wildlife Refuge, operated jointly by TPWD and USFWS. Matagorda Island National Wildlife Refuge is a sub-unit of the Aransas National Wildlife Refuge (ANWR). Collectively, beaches extending from Matagorda Peninsula on the north to South Padre Island were at least intermittently oiled by the spill.

2.1 Physical Environment

The area impacted by the Skaubay/Berge Banker oil spill is geologically and biologically diverse. Barrier islands and peninsulas that create miles of sandy beaches almost continuously fringe the Texas Gulf coast. Matagorda, Mustang and Padre Islands are three of the major barrier islands located along the Texas Gulf Coast. The islands are bound by the waters of San Antonio Bay, Aransas Bay, Corpus Christi Bay, and Laguna Madre to the west and northwest and by the Gulf of Mexico to the east and southeast. Aransas Pass, Pt. Mansfield Pass, and Brazos Santiago Pass connect the bay and lagoon systems to the Gulf of Mexico. Figure 1 is a map of the area swept by the spill and Figure 2 is a vicinity map identifying the impacted shoreline area.

The Laguna Madre, a 125-mile-long narrow coastal saline lagoon with an average depth of 3 feet, stretches from Corpus Christi south almost to the mouth of the Rio Grande River near Brownsville. With no major rivers flowing into the Laguna Madre, salinity values can reach 45 parts per thousand during certain periods of hot, dry weather.

PAIS encompasses the northern portion of Padre Island and extends 70 miles from southeast of the city of Corpus Christi to the Port Mansfield Channel, which is an impassable channel that separates the northern portion from the southern, developed portion of Padre Island. Padre Island is the longest remaining continuous section of undeveloped barrier island in the world and has more than

65 miles of Gulf beach. MISP, on Mustang Island, has 5 miles of beach. Matagorda Island State Park and the associated wildlife management area are located on another barrier island to the north that borders the Gulf coast and occupies nearly 44,000 acres.

South Texas barrier islands lie within a climate classified as subtropical. The mean annual precipitation normally ranges between 30 and 32 inches per year. Rainfall steadily decreases from north to south. Droughts are not uncommon. Prevailing winds typically range from 5 to 25 miles per hour. Water temperatures along the coastal beaches typically range from 78°F to 81°F during the summer months. Mean annual ambient air temperatures are 74°F on Padre Island.

Natural features on and near Mustang, Matagorda, and Padre islands include beaches, vegetated dunes and barrier flats, active dunes and blowouts, tidal flats, storm-washover areas, marshes, marine grassflats, and bay-margin sands and shoals. Not all of these features were affected by the spill. These environments are affected by a variety of active processes and hazards, including waves and longshore currents, tidal currents, eolian processes, tropical storms and hurricanes, and subsidence and sea level rise. Winds play an extremely important role in shaping and modifying island environments. Although onshore southeasterly winds prevail during most of the year, they are replaced periodically by strong and dominant north winds associated with frontal passages during winter months. Along Padre Island's northern and southern halves, for example, winds drive oceanic currents, from the northeast and southeast. These winds converge and deposit sands from the nearby Rio Grande, Colorado, and Brazos rivers. Padre Island is in a constant state of change, and beaches, dunes, tidal flats, and grasslands are continuously being shaped and re-shaped (White, 1978).

The physical environment of the Texas coast consists of open water and coastal shoreline habitats. The shoreline affected by the oil spill is a high-energy environment that experiences nearly constant wind, intense wave action, salt spray, and erosional processes. These forces limit the distribution of plants and animals to only those relatively few species capable of withstanding the harsh conditions and unstable substrates. Habitat types of the barrier islands affected by the oil spill are described below.

2.1.1 Open Water Habitat

Open water areas include the offshore Gulf coast and deep and shallow estuarine channels associated with the Gulf of Mexico. Waters tend to be more turbulent in these areas because of currents. The nearshore Gulf coast provides feeding and spawning areas for several species of commercially and recreationally important finfish, shrimp, and other invertebrates. The open water of the Gulf of Mexico provides habitat for numerous species of resident fish, marine mammals, and sea turtles.

2.1.2 Sandy Beaches

Sandy beaches that almost continuously fringe the Texas coast, including the impacted area, are dynamic landforms altered by wind and waves in a continual process of accretion and erosion. Seasonal cycles of sand deposition and loss dramatically affect the appearance of beaches from summer to winter. In summer they are wide and gently sloping; in winter they become steep and narrow. Violent storm waves can erode a beach overnight. Sand removed from winter beaches is deposited in offshore sandbars and is returned to the beach during the summer months by gentle

swells that push the sand to the exposed shore. The source of 80 to 90 percent of beach sand is river sediment. Gulf beaches are composed of white sand and are usually firmly packed. Beach widths are generally less than 100 feet (White, 1978). An estimated 186 miles of sandy beach habitat were affected by the spill.

Because beaches are zones of high energy, vegetation is typically not present. The beaches, however, are habitat for a variety of marine benthic invertebrates commonly found along stretches of the surf zone. Beach habitat is preferred by several species of birds, such as plovers and sandpipers. Sea turtles use beaches to lay eggs along several areas of the Texas coast.

2.1.3 Sand Dunes

Sand dunes help protect other barrier island resources and the mainland against storms by serving as the major line of defense against storm surge and flooding, dissipating wave and current energy, and providing the highest elevations on the island. In addition to offering storm protection, sand dunes help trap and store windblown sand, maintain and nourish beaches by being a source of sediment, serve as habitat for flora and fauna, and add to the recreational and aesthetic appeal of the barrier island (White, 1978).

Sand dune complexes will form when certain combinations of sand availability and wind patterns occur. Offshore sandbars and sediment from rivers are the most important sources of sand for dune building. Longshore currents carry sediments until they are trapped and deposited on the beach by wave actions, and winds blow the sand into dunes. Sand dune contours shift over time until hardy dune plants take hold in the drifting sand and create a stable landform. However, dunes can change form quickly by erosion or accretion as a result of storm waves and wind or human activity.

2.1.4 Washover Areas

The dunes normally run parallel with the Gulf shore, but there are contrasting areas where the terrain is nearly flat in these areas from Gulf shore to Bay shore. These broad areas may be relief zones for the flow of water into and out of the bays during storm events. These areas are defined as washover areas. Such low-lying areas are present along the barrier islands and are inundated by intense wave action associated with storm surges from the Gulf of Mexico. Some dunes and mounds may be present in washovers, but generally these areas are relatively flat. The largest washover areas extend into Laguna Madre (White, 1978). These areas are generally barren of vegetation, but the shallow water and ponded channels support a variety of fish, shrimp, and shorebirds. The dunes and dune systems generally contain almost pure sand, while the lower elevations contain varying mixtures of clay with sand. Coastal dunes are the product of wind-deposited sand anchored by sparse mats of vegetation. Sand dunes provide habitat for a variety of shorebirds, terrestrial mammals, and reptiles.

These low-lying areas are periodically inundated and subjected to intense wave and current energy during hurricanes. Washover areas on Mustang and Padre Islands range in width from less than 200 feet to more than 2,000 feet (White, 1978). Major washover areas on these islands are generally devoid of vegetation. Washover areas serve as energy-release areas for storm tides and surge and also create pathways for nutrients and sediments to be flushed to enhance biologic productivity in the bays, grassflats, and marshes on the Bay side of the islands.

2.2 Biological Resources

The biological resources associated with areas surrounding PAIS, Matagorda Island, and Mustang Island are typical of the Texas coastal environment. Natural resources in these areas include federal- and state-listed threatened and endangered species, migratory birds, shorebirds, colonial waterbirds, rearing areas for commercially important species of finfish and shellfish, marine benthic organisms, and a variety of dune and estuarine vegetation. Fisher (1996) describes several major aquatic habitat types that occur in the region: riverine, salt marsh, algal mat, seagrass beds, oyster reefs, beach, open bay bottom, and oceanic habitat. These habitats support nearly 3,200 species of plants and animals. Although each of these habitats is present in the area, the Skaubay/Berge Banker Oil Spill impacted only the beach and oceanic habitat.

2.2.1 Birds

The region is one of the premier bird-watching spots in the world, as the area attracts more than 400 species of birds. Common wading birds include the great blue heron (*Ardea herodias*), little blue heron (*Egretta caerulea*) roseate spoonbill (*Platalea ajaja*), laughing gull (*Larus atricilla*), and several species of sandpipers. Shorebirds that forage along Texas beaches include, for example, piping (*C. melodus*), snowy (*Charadrius alexandrinus*), and black-bellied plovers (*Pluvialis squatarola*) and caspian (*Sterna caspia*) and royal terns (*Sterna maxima*). The barrier islands affected by the spill serve as wintering areas for many species of birds, including the redhead (*Aythya americana*), whooping crane (*G. americana*), Canada goose (*Branta canadensis*), and peregrine falcon (*Falco peregrinus*). Approximately 125 species of neotropical birds migrate through Padre Island and the surrounding areas during the fall and spring migrations. White pelicans (*Pelecanus erythrorhynchos*), great egrets (*Ardea alba*), snowy egrets (*Egretta thula*), terns, herons, and egrets, killdeer (*Charadrius vociferus*), meadowlarks (*Sturnella magna*), and sandhill cranes (*Grus canadensis*) are also common.

The most common birds affected by the spill were pied-billed (*Podilymbus podiceps*) and eared grebes (*Podiceps nigricollis*), double-crested cormorants (*Phalacrocorax auritus*), northern gannets (*Morus bassanus*), laughing gulls (*L. atricilla*), great egrets (*A. alba*), little blue herons (*E. caerulea*), royal terns (*S. maxima*), sanderlings (*Calidris alba*), common loons (*Gavia immer*), and lesser scaups (*Aythya affinis*) (USFWS, 1995).

The affected area of the spill is habitat for several listed bird species. The peregrine falcon (*Falco peregrinus*), which is seen frequently during the spring and fall, and the Northern aplomado falcon (*Falco femoralis septentrionalis*), which is seen occasionally, are observed along south Texas coastal beaches and inland areas. Both sub-species of the peregrine falcon occur on PAIS, the Arctic peregrine falcon (*F.p. tundrius*) and the American peregrine falcon (*F.p. anatum*). Other birds listed as federal and/or state endangered species that frequent this region include brown pelicans (*P. occidentalis*), interior least tern (*Sterna antillarum athalassos*), and whooping crane (*G. americana*). Threatened species include the piping plover (*C. melodus*), redish egret (*Egretta rufescens*), sooty tern (*Sterna fuscata*), white-faced ibis (*Plegadis chihi*), white-tailed hawk (*Buteo albicandatus*), and wood stork (*Mycteria americana*). Section 2.3 discusses the threatened and endangered species found in the spill area in more detail.

2.2.2 Invertebrates

Hundreds of species of invertebrates occur in and along the Texas beaches from the high intertidal zone to the subtidal benthos. In sandy habitats above the tidal zone, a variety of crustaceans can be

found, including fiddler crabs (*Uca* spp.) and ghost crabs (*Ocypode* spp.). These organisms provide an important food source for shorebirds and migratory waterfowl. The tidal zone supports numerous smaller crustacean species of amphipods and copepods. The blue crab (*Callinectes sapidus*), which favors brackish bays and mud bottoms, is found along the Gulf coast. The blue crab (*C. sapidus*) is the most economically important crab in the state in terms of commercial and recreational harvests.

2.2.3 Fisheries

The Texas shrimp fishery comprises one of the largest seafood industries in the United States. There are six species of shrimp that are commercially caught in the Gulf of Mexico. The most common and economically important are the white shrimp (*Litopenaeus setiferus*), pink shrimp (*Farfantepenaeus duorarum*), and the brown shrimp (*Farfantepenaeus aztecus*). In terms of dollar value, Texas ranks in the "top ten" states for commercial fish and shellfish landings (Stedman and Hanson 1997). About one-third of the state's recreational fishing occurs along the coast.

Numerous resident fish species use the nearshore environment and open water as rearing, foraging, and spawning areas. Many species of fish come into the shallows seasonally as juveniles for refuge and return to the Gulf as adults. Recreationally important fish in the region, such as the red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), and southern flounder (*Paralichthys lethostigma*), are common in bays and estuaries. Ponded channels created by Gulf storms create habitat for spotted sea trout (*Cynoscion nebulosus*) and pinfish (*Lagodon rhomboides*). Common offshore fishes include the billfishes, sailfish (*Istiophorus* sp.) and marlins (*Makaira* sp., *Tetrapturus* sp.), mackerel (*Scomberomorus maculatus*), red snapper (*Lutjanus campechanus*), and whiting (*Menticirrhus* spp.). Most abundant in numbers are the schooling fishes, including the herrings or shads (Clupeidae), the commercial Gulf menhaden (*Brevoortia patronus*), and the anchovies (Engraulidae), of which the most common is the bay anchovy (*Anchoa mitchilli*) (Dickson and Moore 1977).

Texas lower coastal bays are important nursery areas for shrimp, oyster, blue crab (*C. sapidus*), and many species of sport fish, such as red drum (*S. ocellatus*), spotted sea trout (*C. nebulosus*), tarpon (*Megalops atlanticus*), shark, mackerel (*S. maculatus*), and southern flounder (*Paralichthys lethostigma*). An estimated 600 species of fish inhabit the waters along the Texas coast.

2.2.4 Mammals, Amphibians, and Reptiles

Barrier islands do not support large numbers of mammals; however, Padre Island and Mustang Island are home to several mammal species. Pocket gophers (*Geomys pinetis*), spotted ground squirrels (*Spermophilus spilosoma*), mice (*Peromyscus attwateri*), raccoons (*Procyon lotor*), black-tailed jackrabbits (*Lepus californicus*), and armadillos (*Dasypus novemcinctus*) dominate the animal community. A small population of coyotes (*Canis latrans*) is present as well.

There are many species of rodents that feed on the native grasses of Padre Island, and coyotes (*C. lantrans*), snakes, and many species of birds feed on the rodents. Deer are often seen. The island's largest native mammal is the coyote (*Canis latrans*). Other mammals include badger (*Taxidea taxus*), raccoon (*P. lotor*), opossum (*Didelphinae*), kangaroo rat (*Dipodomys compatus*), bats, and spotted ground squirrel (*S. spilosoma*). The island has three poisonous snakes: the Western diamondback (*Crotalus atrox*), the massasauga (*Sistrurus catenatus*), and the Texas coral snake (*Micrurus tener*). There are also many non-venomous snakes. A wide variety of amphibians are also found on Padre Island including the Rio Grande leopard frog (*Rana berlandieri*), green treefrog (*Hyla cinerea*), Hurter's Spadefoot

(*Scaphiopus hurterii*), spotted chorus frog (*Pseudacris clarkii*), Gulf coast toad (*Bufo valliceps*), and Texas toad (*Bufo speciosus*). Additionally, five species of threatened or endangered sea turtles have the potential to nest on Padre Island within PAIS (leatherback sea turtle [*Dermochelys coriacea*], green sea turtle [*Chelonia mydas*], Kemp's ridley sea turtle [*L. kempii*], hawksbill sea turtle [*Eretmochelys imbricata*], and loggerhead sea turtle [*Caretta caretta*]) (http://www.data2.itc.nps.gov/nature/animals.cfm?alphacode=pais&loc=1, 2003). Section 2.3 provides a further discussion of threatened and endangered species.

Matagorda Island is home to the horned lizard (*Phrynosoma cornutum*). Very few amphibians are found on Matagorda Island; however, the most common ones include the leopard frog (*Rana sphenocephala*), bullfrog (*Rana catesbeiana*), and Gulf coast toad (*Bufo valliceps*). More than 30 species of reptiles occur on the island, the largest of which is the American alligator (*Alligator mississippiensis*). Of the 19 species of snakes, the most frequently encountered include the Western diamondback rattlesnake (*Crotalus atrox*), speckled king snake (*Lampropeltis getula*), and Western coachwhip (*Masticophis flagellum testaceous* (http://www.bellnetweb.brc.tamus.edu/reptiles.htm, 2003).

2.2.5 Marine Mammals

Many marine mammals that live in the Gulf of Mexico can be sighted off the waters of the barrier islands in south Texas. In many cases, however, these animals are only observed associated with a stranding event where marine mammals beach themselves. With the exception of the West Indian manatee (*Trichechus manatus*), all marine mammals sighted along Texas beaches or offshore are cetaceans, marine mammals that include whales, dolphins, and porpoises. The West Indian manatee (*T. manatus*) is rare along the Texas coast. Sightings of manatees probably represent migrants from coastal Mexico. The most recent sighting occurred in December 2001 in Corpus Christi Bay.

The bottlenose dolphin (*Tursiops truncatus*) is the most common coastal marine mammal of the Gulf of Mexico and is routinely sighted in nearshore waters. This species occurs along the entire Texas coast and its associated embayments. The Atlantic spotted dolphin (*Stenella frontalis*) is also common, but it is usually found in deeper offshore waters. Other cetaceans that have been recorded off the Texas coast include the sperm whale (*Physeter macrocephalus*), killer whale (*Orcinus orca*), and rough-toothed dolphin (*Steno bredanensis*). A few of the large baleen whales are also present. Most of the marine mammal species inhabit the open ocean, but they may occasionally enter areas that were affected by the spill.

Marine mammals listed as federal and/or state endangered species that populate this region include the West Indian manatee (*T. manatus*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), right whale (*Eubalaena glacialis*), and sperm whale (*P. macrocephalus).*

Threatened whale species include the dwarf sperm whale (*Kogia simus*), false killer whale (*Pseudorca crassidens*), Gervais beaked whale (*Mesoplodon europaeus*), Goose-beaked whale (*Ziphius cavirostris*), killer whale, pygmy killer whale (*Feresa attenuata*), pygmy sperm whale (*Kogia breviceps*), and the short-finned pilot whale (*Globicephala macrorhynchus*). Other threatened marine mammals include the Atlantic spotted dolphin (*Stenella frontalis*), and the rough-toothed dolphin (*Steno bredanensis*). Section 2.3 provides a detailed discussion of threatened and endangered marine mammal species.

2.2.6 Vegetation

Dune vegetation is particularly important because of its sand stabilizing characteristics; its destruction can severely decrease the ability of the dunes to protect inland areas against storms. The plant species in the affected area of the spill would include those species that grow on the Gulf beaches and dunes. The vegetation holding the dunes in place is drought-resistant and salt-tolerant species such as sea oats (*Uniola paniculata*), sea-purslane (*Sesuvium* spp.), or morning glory (*Ipomoea* spp.) (White 1978). The plants provide habitat for birds and terrestrial mammals and stabilize blowing sands.

Vegetated fore-island dunes help protect other barrier island resources and the mainland against storms by serving as the major line of defense against storm surge and flooding. They dissipate wave and current energy released by storms and by providing the highest elevations on the islands (White 1978).

2.3 Endangered and Threatened Species

The federal Endangered Species Act (ESA) of 1973 and the state of Texas ESAs of 1973 (animals) and 1988 (plants) direct federal and state agencies to protect and conserve listed endangered and threatened animals and plants. The habitat of endangered and threatened species takes on special importance because of these laws and because conservation of the species requires careful management. The historical distribution of the species that appear on the threatened and endangered list was more widespread than is observed currently.

Several threatened and endangered species occur within the affected area of the spill. The listing status for each species within the state of Texas may differ from its federal status. There currently are no plant species listed as either threatened or endangered in the affected area of the spill. A state of Texas plant species of concern, roughseed sea-purslane (*Sesuvium trianthemoides*), occurs within PAIS.

The affected area of the spill is habitat for several listed bird species. The peregrine falcon (*F. peregrinus*) and the Northern aplomado falcon (*F. f. septentrionalis*) are occasionally observed along south Texas coastal beaches and inland areas. Both sub-species of the peregrine falcon occur on PAIS, the Arctic peregrine falcon (*F.p. tundrius*) and the American peregrine falcon (*F.p. anatum*). Although the interior population of the least tern (*S. antillarum*) is listed as endangered, nests of this species are observed along the Gulf of Mexico side of PAIS. ANWR is the wintering ground for the only naturally migrating and breeding population of the whooping crane (*G. americana*). The refuge is also federally designated as critical habitat for the whooping crane (*G. americana*).

The endangered brown pelican (*P. occidentalis*) is common on the Texas barrier islands and is found within the affected area of the spill. The piping plover (*C. melodus*) is listed as threatened under both the federal and state ESAs. The state of Texas provides further protection for several other shorebirds that are not listed under the federal ESA. The following shorebirds are listed as threatened by the state of Texas and known to occur in the affected area: reddish egret (*E. rufescens*), white-faced ibis (*P. chihi*), sooty tern (*S. fuscata*), and wood stork (*M. americana*). The white-tailed hawk (*B. albicaudatus*) is also listed as threatened by the state of Texas and occurs throughout PAIS, including the Gulf beaches (http://www.tpwd.state.tx.us/nature/endang/birds/). There are several species of marine mammals that are listed under both state and federal ESAs. The West Indian

manatee (*T. manatus*) is listed as endangered under both federal and state of Texas ESAs. The sperm whale (*P. macrocephalus*) and three baleen whales (blue whale [*B. musculus*], fin whale [*B. physalus*], and right whale [*E. glacialis*]) are also listed as endangered on both the federal and state ESAs. The state of Texas lists 10 additional cetaceans that live off the Texas coast as threatened. The federal Marine Mammal Protection Act provides additional protection for all marine mammal species.

Five species of endangered and threatened sea turtles inhabit the Gulf of Mexico. All five occur in central and south Texas coastal waters and have been observed along beach areas affected by the spill. The Kemp's ridley sea turtle (*L. kempii*), hawksbill (*E. imbricata*), and leatherback (*D. coriacea*) are listed as endangered; the loggerhead (*C. caretta*) and green sea turtle (*C. mydas*) are listed as threatened. All five species of sea turtles nest on Padre Island. A full list of endangered species potentially present in the spill area is presented in Table 2.

2.4 Protected Areas

There are numerous federal and state parks and refuges shorelines, beaches, and waterfronts in and around the Texas coast. Several of these protected areas were directly affected by the oil spill or lie within the affected area. These protected areas were established to protect and preserve unimpaired natural and cultural resources, scenery, threatened and endangered species, and environmentally sensitive habitats for future generations. Visitors to the areas contribute substantially to the local economy on a year-round basis. Common recreational activities at many of these areas include sunbathing and swimming, camping, hiking, picnicking, wildlife viewing, sport fishing, boating, surfing, wind surfing, and sightseeing.

This section identifies and provides both a brief description of the protected areas that occur within the area affected by the oil spill or where restoration projects are proposed to be implemented as well as the environmental values and recreational use activities of each area.

2.4.1 Federally Protected Areas

The federally owned lands that occur within the spill area, PAIS, Matagorda Island National Wildlife Refuge, and ANWR are managed by several different federal and state agencies, including NPS, USFWS, TPWD, and GLO. NPS manages PAIS; the Matagorda Island National Wildlife Refuge is cooperatively managed under a joint agreement between the TPWD, USFWS, and the GLO; and USFWS manages the ANWR.

NPS was established to promote and regulate the use of national parks. The mission of the NPS is to conserve the scenery, the natural and historic objects, and the wildlife therein as well as to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

USFWS, named in 1939, grew out of several older government bodies created to monitor and improve declining fish populations. The current stated mission is "to provide the best counsel, coordination, education, and liaison services to Fish and Wildlife Service program offices in the functional areas for which we are responsible to fulfill the Service's mission as efficiently and effectively as possible. We also serve as a strong, helpful coordinating point for internal and external customers, including the public and other governmental bodies requiring assistance."

Table 2. Federal and State Endangered Species Potentially Present in the Spill Area

	Common Name	Scientific Name	Federal Status	State Status
Animals				
Birds	Brown Pelican	*Pelecanus occidentalis*	E	E
	Interior Least Tern	*Sterna antillarum athalassos*	E	E
	Piping Plover	*Charadrius melodus*	T	T
	Reddish Egret	*Egretta rufescens*	SOC	T
	Sooty Tern	*Sterna fuscata*	T	T
	White-Faced Ibis	*Plegadis chihi*	SOC	T
	Whooping Crane	*Grus americana*	E	E
	Wood Stork	*Mycteria americana*		T
	White-Tailed Hawk	*Buteo albicandatus*		T
Fish	None			
Invertebrates	None			
Marine Mammals	West Indian Manatee	*Trichechus manatus*	E	E
	Atlantic Spotted Dolphin	*Stenella frontalis*		T
	Blue Whale	*Balaenoptera musculus*	E	E
	Dwarf Sperm Whale	*Kogia simus*		T
	False Killer Whale	*Pseudorca crassidens*		T
	Fin Whale	*Balaenoptera physalus*	E	E
	Gervais Beaked Whale	*Mesoplodon europaeus*		T
	Goose-Beaked Whale	*Ziphius cavirostris*		T
	Pygmy Killer Whale	*Feresa attenuata*		T
	Pygmy Sperm Whale	*Kogia breviceps*		T
	Right Whale	*Eubalaena glacialis*	E	E
	Rough-Toothed Dolphin	*Steno bredanensis*		T
	Short-Finned Pilot Whale	*Globicephala macrorhynchus*		T
	Sperm Whale	*Physeter macrocephalus*	E	E
	Killer Whale	*Orcinus orca*		T
Amphibians and Reptiles	Green Sea Turtle	*Chelonia mydas*	T	T
	Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	E
	Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E
	Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
	Loggerhead Sea Turtle	*Caretta caretta*	T	T
Plants	Sea-Purslane	*Sesuvium portulacastrum*		SOC

E Endangered
SOC Species of Concern
T Threatened

2.4.1.1 Padre Island National Seashore

PAIS was established on September 28, 1962, and is managed by the NPS. At 110 miles, Padre Island is the longest undeveloped barrier island in the world. PAIS is located on the longest undeveloped section of a barrier island having 70 miles of sand-and-shell beaches. Padre Island, like all barrier islands, is a dynamic place where the many environments—beach, dunes, grasslands, and tidal flats—are shaped and reshaped daily in response to natural sculptors that include tides, waves, and storms. Among the wildlife that flourishes on the island are many birds that live there year-round or visit seasonally. Padre Island is situated on the Central Flyway, a superhighway in the sky traveled by millions of migrating birds. Along the beach, the park provides habitat for laughing gulls

(L. atricilla), sandpipers, herons, and egrets. White pelicans (*P. erythrorhynchos*) are found in the shallows of Laguna Madre. Inland, on the dunes and grasslands, live killdeer (*C. vociferus*), meadowlarks (*S. magna*), and sandhill cranes (*G. canadensis*). Other animals also inhabit the island; among them are coyotes (*C. latrans*), blacktailed black-tailed jackrabbits (*L. californicus*), lizards (such as *Holbrookia propinqua*), Western diamondback rattlesnakes (*C. atrox*), and, in the intertidal zone along the beach, ghost crabs (*Ocypode* spp.) and ghost shrimp (*Natanta* spp.). The underwater life of the offshore waters of the Gulf of Mexico is just as abundant and includes red drum (*S. ocellatus*), spotted sea trout (*C. nebulosus*), black drum (*P. cromis*), and whiting (*Menticirrhus* spp.).

PAIS has numerous public recreation facilities including a visitor center, picnic areas, shower facilities, campground and primitive campsites, and nature trails. Activities at PAIS include sunbathing, swimming, camping, hiking, picnicking, wildlife viewing, sport fishing, boating, surfing, wind surfing, and sightseeing. Annual visitation averages more than 700,000 people.

2.4.1.2 Matagorda Island National Wildlife Refuge

Matagorda Island National Wildlife Refuge is located on the southern tip of Matagorda Island and occupies approximately 36,568 acres of the ANWR. The refuge was established in 1971 as a migratory bird preserve and to help conserve the endangered whooping crane (*G. americana*). In 1982, the TPWD assumed administration of public lands on the island. Matagorda Island State Park and Wildlife Management Area are still a unit of the National Wildlife Refuge System, but is cooperatively managed under a joint agreement by TPWD, USFWS and GLO. (http://www.tpwd.state.tx.us/conserve/txgems/matagrda/matagrda.htm, 2003)

2.4.1.3 Aransas National Wildlife Refuge

ANWR is located on both Blackjack Peninsula and the southern portion of Matagorda Island and occupies approximately 58,982 acres. It is a coastal waterfowl refuge and a wintering grounds for the only naturally migrating and breeding population of the whooping cranes (*G. americana*). It is located approximately 60 miles northeast of Corpus Christi, Texas. Approximately 80,000 people visit the refuge each year, most of whom want to view the abundant bird species for which the refuge is so well known.

2.4.2 State-Protected Areas

The state-owned lands that occur within the spill area, MISP and Matagorda Island State Park, are managed by several different federal and state agencies, including TPWD, USFWS, and GLO.

The mission of TPWD is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for present and future generations. The state Parks Division is responsible for protecting, interpreting, and managing cultural and natural resources of statewide significance and providing outdoor recreation opportunities and opportunities to learn about Texas history and natural science. Several of the areas impacted by the spill are under management of TPWD.

GLO's core mission is the management of 20.3 million acres of state lands and mineral-rights properties. Included in that portfolio are the beaches, bays, estuaries, and other "submerged" lands up to10.3 miles out in the Gulf of Mexico, institutional acreage, grazing lands in western Texas, and

timberlands in eastern Texas. The land office now leases drilling rights for oil and gas production on state lands. Several of the areas impacted by the spill are under management of GLO.

2.4.2.1 Mustang Island State Park

MISP opened to the public in 1979. It is 3,954 acres in size and has about 5 miles of beach. Mustang Island is a coastal barrier island with a unique and complicated ecosystem.

There are a number of facilities located at the park, including water, electricity, shade shelters, and a restroom/shower facility located near the park headquarters and portable toilets and rinsing showers at the north end of the developed area. Visitors to the park can enjoy camping, picnicking, fishing swimming, hiking and biking on the beach, sunbathing, surfing, and excellent birding, especially during spring and fall migrations. Large numbers of waterfowl and shorebirds are common, as are several species of hawks and a large variety of songbirds. Pocket gophers (*G. pinetis*), spotted ground squirrels (*S. spilosoma*), mice (*P. attwateri*), raccoons (*P. lotor*), black-tailed jackrabbits (*L. californicus*), and armadillos (*D. novemcinctus*) dominate the animal community. A small population of coyotes (*C. latrans*) is present as well. An estimated 600 species of saltwater fish inhabit the waters along the coast.

2.4.2.2 Matagorda Island State Park

Matagorda Island State Park occupies approximately 7,325 acres at the northern end of Matagorda Island. TPWD has managed Matagorda Island State Park since 1983. Activities at the park today include camping, hiking, bicycling, surfing, swimming, beachcombing, bird watching, nature studies, and fishing. A passenger ferry, on-island shuttle, and scheduled tours are available for use by recreationists.

Nineteen species listed by federal or state government as threatened or endangered are found at the park, including whooping crane (*G. americana*), peregrine falcon (*F. peregrinus*), brown pelican (*P. occidentalis*), Kemp's ridley sea turtle (*L. kempii*), and horned lizard (*Phrynosoma cornutum*). The island marshes are important nursery areas for shrimp, oyster, blue crab, and many species of sport fish, such as red drum (*S. ocellatus*), spotted sea trout (*C. nebulosus*), tarpon (*M. atlanticus*), shark (such as dusky shark *Carcharhinus obscurus*), mackerel (*S. maculatus*), and southern flounder (*P. lethostigma*). Very few amphibians are found on Matagorda Island; the most common ones include the leopard frog (*Rana sphenocephala*), bullfrog (*Rana catesbeiana*), and Gulf coast toad (*Bufo valliceps*). More than 30 species of reptiles occur on the island, the largest of which is the American alligator (*A. mississippiensis*). Of the 19 species of snakes, the most frequently encountered include Western diamondback rattlesnake (*Crotalus atrox*), speckled king snake (*L. getula*), and Western coachwhip (*M.f. testa ceous*). More than 300 species of birds use the island, many during spring and fall migrations. Barrier islands do not support large numbers of mammals; the most common are white-tailed deer (*Odocoileus virginianus*), coyote (*C. latrans*), raccoon (*P. Lotor*), badger (*T. taxus*), and black-tailed jackrabbit (*L. californicus*). The most common marine mammal is the bottle-nosed dolphin (*T. truncatus*).

2.5 Historic and Cultural Resources

The history of Padre Island and Mustang Island includes a variety of historic and cultural resources from three periods. Prior to the arrival of the Spanish about 1519, Native Americans used the

islands, at least on a seasonal basis, for some 4,500 years. Beginning about 1519, Spanish expeditions began to explore, map, and describe the Texas coast. In 1553, a fleet of 16–20 Spanish galleons was shipwrecked off the islands. The first recorded permanent habitation of Padre Island was in 1805, when a ranch was established at the southern end of the island. Numerous archeological sites representing all three periods (Native American, Spanish, and American) are located throughout Padre Island including the Novilla Line Camp, located on PAIS, which is listed on the National Register of Historic Places.

Matagorda Island has only been in existence for 5,000 years. The Karankawa Indians used it until European settlers drove them off the island. The island featured prominently in the growth of Texas in the 1800s until major storms in the late nineteenth and early twentieth centuries destroyed many towns in the area, slowing economic growth. Matagorda Island was the site of skirmishes in the War Between the States and contains a number of historically significant sites. Because the island conditions are so harsh and transient, the only visual remnant of the war are the antebellum lighthouse, the faint outline of overgrown hand-dug trenches, and a small nineteenth-century graveyard. One hundred fifty years ago, the town of Saluria, located on the northernmost tip of the island, was dominated by the busy seaport of Indianola. Additionally, the historic Fort Esperanza and Matagorda Island lighthouse are located on the island. There are many additional historic sites along Padre and Matagorda Islands, but they were not affected by the oil spill.

3. INJURED RESOURCES

Local bird populations and other biological resources were significantly affected by the spill, as were sand dunes and other geological resources. Recreational beach use was also interrupted or diminished by the oil spill and associated cleanup actions. Damages were awarded based on the magnitude and duration of impacts to natural resources and lost recreational use.

3.1 Physical Environment

3.1.1 Shorelines

The Skaubay/Berge Banker oil spill injured a large variety of habitat and marine life along the Texas coast. An estimated 186 miles of federal and state shoreline habitat—sandy beaches, fore dunes, and active dunes—were oiled. Shoreline oiling in most other areas was in the form of tar balls and tar mats.

The oil was removed from the shorelines using manual and mechanical methods. The mechanical method involved using a road grader to push the sand with tar balls into windrows above the high tide line in various portions of the spill area. The objective was to use the sand in a positive, constructive manner on south Padre Island rather than as a waste material. The sand gathered within PAIS and along several state beaches was removed and placed along the vegetation line on county beach property. These constructed dunes were left un-vegetated and have eroded as a result of tropical storm activity.

Sand was moved from four state-owned areas: (1) from PAIS to Bob Hall Pier, (2) Newport Pass on Mustang Island, (3) a 30-foot-wide area near mile marker 22 on Mustang Island, and (4) several small areas within MISP.

Geological resources, sediments, and soils were injured by both the deposition of oil by surface waters and the subsequent injury from response action. The existing road was widened to facilitate the mobilization of response equipment to portions of PAIS. This road widening as well as the response equipment impacted the foredune ridge and a line of coppice dunes. More than 38,000 cubic yards of oil-contaminated sand was removed from PAIS. Additionally, the parking lot at Malaquite Beach Visitor Center (MBVC) was damaged during the cleanup effort by heavy equipment.

3.2 Biological Resources

3.2.1 Birds

The number of oiled live or dead birds collected following an oil spill commonly represents only a portion of the number actually affected. Dead birds may be washed out to sea, scavenged, or not found during shoreline search-and-collection efforts. Live birds may also fly out of the spill area before they succumb to the effects of ingested oil or hypothermia brought on by the effects of oiling interfering with the natural insulating properties of feathers.

To determine the magnitude of injury to biological resources, including birds, several techniques are available to resource managers and oil spill responders to quantify injuries. There are two general

types of assessment procedures for determining injury and damages. "Type A" procedures are standardized procedures for simplified assessments requiring minimal field observation; they are available to determine damages for minor spills in certain environments. "Type B" procedures are more detailed procedures for assessments in other cases. Regulations provide criteria for when to use "Type A" procedures, "Type B" procedures, or both (http://www.doi.gov/oepc/wp_docs/exec_sum.html, 2003).

Currently, there are two "Type A" procedures that have been developed by the Department of the Interior (DOI) for modeling injuries: one for minor spills in coastal or marine areas that incorporates the Natural Resource Damages Assessment Model for Coastal and Marine Environments (NRDAM/CME), and another for minor spills in the Great Lakes environment. To run either model, the user supplies limited data, such as wind conditions and the amount and duration of the spill, and the model determines the physical fate of the spilled substance and estimates acute lethal effects. The model then estimates and sums the cost of restoring baseline conditions and the value of certain lost interim public uses, such as hunting, fishing, bird watching, and beach visitation. "Type A" procedures are intended for minor spills, so the regulations place a monetary cap on their use when trustees intend to obtain a rebuttable presumption. For larger spills, "Type B" procedures, which require more comprehensive planning and data gathering efforts, may be more appropriate (http://www.doi.gov/oepc/wp_docs/exec_sum.html, 2003). During the injury assessment phase for the Skaubay/Berge Banker oil spill response, the Trustees had a model simulation run with the NRDAM/CME to estimate bird injuries from this spill (Whittington, 2001).

Between February 16 and April 3, 1995, it was reported that a total of 105 oil-covered birds were recovered on Matagorda, Mustang, and Padre islands (USFWS 1995). Of the recovered birds, 95 were dead when collected and 10 were recovered live and rehabilitated (Table 3). In addition, hundreds of others were observed with oiled feathers. Based on the number of birds collected dead, those recovered and rehabilitated, and observations of live oiled birds, it was estimated that approximately 3,000 to 7,800 birds of various species were adversely impacted by the oil spill. In comparison, the Type A model that was run for wildlife losses during injury assessment predicted bird injuries that indicated 6,688 waterfowl, 1,844 seabirds, 15 wading birds and 1–2 shorebirds would be killed (Whittington, 2001).

Additionally, the habitats of many bird species that utilize the Texas coast for nesting, foraging, and resting were oiled. Important habitats include sandy shoreline, sand dunes, surface water, and intertidal areas, all of which were oiled by the spill.

3.2.2 Fish, Marine Mammals, and Marine Organisms

Larval, post-larval, juvenile, and adult finfish, shellfish, and mollusks were affected by the presence of oil- and water-soluble fractions in the water. These invertebrates and larval organisms ultimately provide a food source to the migratory birds, marine and terrestrial mammals, and reptiles.

3.3 Lost Recreational Use Services

The oil spill adversely affected several public facilities and areas, including portions of Matagorda Island National Wildlife Refuge, Matagorda Island State Park, MISP, and PAIS. The spill occurred just prior to the "spring break" of many local, regional, and state schools and universities, when use of the beach recreational facilities is traditionally very heavy. Managers at the parks that were

Table 3. M/V Berge Banker Oil Spill—Observed and Expected Oiled Bird Injury Estimates as of May 1995

Species	Collected		Oiled	
	Mortalities	Rehabilitated	Observed	Expected
Common Loon	4	1	<10	100–200
Eared Grebe	8	0	<10	50–100
Pied-billed Grebe	4	2	<10	50–100
Northern Gannet	9	2	10–50	100–200
Brown Pelican	—	0	<10	10–50
Double-crested Cormorant	8	0	<10	10–50
Great Blue Heron	1	0	—	<10
Tricolored Heron	1	0	—	<10
Little Blue Heron	3	0	—	10–50
Yellow-crowned Night Heron	2	0	—	10–50
Great Egret	1	0	—	<10
Heron sp.	1	—	—	—
White-faced Ibis	1	0	0	<10
Canada Goose	1	0	0	<10
Lesser Scaup	6	3	<10	100–200
Mallard	1	0	0	<10
Gadwall	1	0	0	<10
Ruddy Duck	1	0	0	<10
Blue-winged Teal	1	0	0	<10
Redhead Duck	1	0	0	<10
Northern Harrier	1	0	0	<10
Common Moorhen	2	0	0	10–50
Piping Plover	—	0	10–50	50–100
Snowy Plover	—	0	<10	10–50
Am. Oystercatcher	—	0	<10	<10
Sanderling	6	0	100–200	500–1,000
Willet	—	1	<10	50–100
Short-billed Dowitcher	1	0	—	<10
Herring Gull	2	0	10–50	100–200
Ring-billed Gull	—	0	1,000+	1,000–5,000
Laughing Gull	10	0	50–100	200–500
Bonaparte's Gull	—	0	10–50	100–200
Gull sp.	1	0	—	—
Forster's Tern	—	0	10–50	200–500
Royal Tern	14	1	10–50	200–500
Tern sp.	2	0	—	—
Unknown sp.	1	0	—	—
Total	**95**	**10**		

Source: USFWS, 1995.

affected had to make individual decisions whether to remain open or closed, and a decision to close facilities factored significantly in the estimation of lost recreational use.

PAIS beaches were closed from March 1 through March 20, 1995, to accommodate spill response actions. The Trustees estimated that this beach closure resulted in 7,036 lost or cancelled beach visits. Texas state beaches remained open during response actions, but it was estimated that visitation was reduced by 33,533 visits, and the quality of experience was diminished for an additional 33,845 visits from February 15, 1995, when oil first washed onshore, until February 28, 1995, when the cleanup was completed. Tables 4 and 5 show the areas within each park that were impacted and the duration of the impact. The impacts to the affected area were diminished use and closure. These locations can be seen on Figures 2 and 23. The total duration in days was used to calculate awarded damages.

Table 4. PAIS Diminished Use and Resource Closures

Time Period	Area Affected	Duration (days)
February 15 to 28 *Diminished Use*	Malaquite Beach	14
	South Beach	14
	Bird Island	14
	North Beach	14
	Total	**56**
March 1 to 20 *Closed*	Malaquite Beach	21
	South Beach	21
	Bird Island	21
	North Beach	21
	Total	**84**

Table 5. Lost and Diminished Use

Time Period	Beach	Duration (days)
February 15 to 28 *Diminished Use*	Mustang Island State Park	14
	Matagorda Island State Park	14
	Total	**28**

An estimate of the lost recreational use in dollars was determined by two methods, one for lost beach visits and one for diminished beach visits. The total was determined by combining the results of these two methods. Lost beach visits were estimated by comparing estimated actual visitation during the impact period to estimated baseline visitation for the same period. The estimated number of visits was based on counts made by park personnel. The baseline calculations assumed a linear trend between the estimated 1994 and 1997 actual visitation levels. These lost visits resulted in lost entrance fees at PAIS. A benefits-transfer method was used to value lost and diminished beach visits. This method combines value estimates from existing economic studies with site-specific injury information to estimate the value of lost use. The estimated total value of lost beach visits was calculated by multiplying the number of lost beach visits by the visitor-day value derived from the selected economic study. Based on the closures, along with the diminished quality of visitation, the Trustees estimated that the total damages were approximately $1.1 million.

4. RESTORATION PLANNING

4.1 Restoration Strategy

The goal of the OPA is to make the environment and public whole for injuries to natural resources and services resulting from an incident involving the discharge or substantial threat of a discharge of oil. The OPA recommends that this goal be achieved by returning injured natural resources to their baseline condition and by compensating for any interim losses of natural resources and services that occur during the period of recovery to baseline or pre-spill condition.

Restoration actions under OPA are either primary or compensatory. Primary restoration involves actions taken to return injured natural resources and services to baseline on an accelerated time frame. NEPA requires the Trustees to consider a "No Action" alternative, and the OPA regulations recommend that Trustees consider the equivalent, natural recovery, under primary restoration. Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate for lost services pending environmental recovery. The principal advantages of this approach are the ease of implementation and the absence of monetary costs. The Trustees may select natural recovery under three conditions: (1) if feasible, (2) if cost-effective primary restoration is not available, or (3) if injured resources would recover quickly to baseline without human intervention. Alternative primary restoration activities can range from natural recovery to actions that prevent interference with natural recovery to more intensive actions expected to return injured natural resources and services to baseline faster than natural recovery.

Compensatory restoration is action taken to compensate for the interim losses of natural resources or services pending recovery to baseline conditions. The type and scale of compensatory restoration may depend on the nature of the primary restoration and the level and rate of recovery of the injured natural resources or services given the primary restoration action. When identifying the compensatory restoration components of the restoration alternatives, the Trustees should first consider compensatory restoration actions that provide services of the same type and quality and of comparable value as those lost. If compensatory actions of the same type and quality and comparable value cannot provide a reasonable range of alternatives, Trustees then consider other compensatory restoration actions that will provide services of at least comparable type and quality as those lost. When services of the same type and quality and of comparable value can be provided, the OPA regulations prescribe the "service-to-service" scaling approach to determine the appropriate scale of compensatory restoration.

Although the Trustees have determined that natural recovery is appropriate as one means of primary restoration for injuries resulting from the Skaubay/Berge Banker oil spill, the No Action alternative is rejected for compensatory restoration. Losses were, and continue to be, suffered during the period of recovery from this spill, and technically feasible, cost-effective alternatives exist to compensate for these losses.

The Trustees for the Skaubay/Berge Banker oil spill determined that damages will be applied "toward the restoration, replacement, rehabilitation, or acquisition of the equivalent of the natural and National Park System resources or resource services which were injured, destroyed or lost as a result of that spill." For this spill, the Trustees considered the area affected by the oil, estimates of

initial lost ecological and recreational services, and recovery periods of each impacted habitat type to determine the magnitude of damage. In accordance with the scaling approach the Trustees relied on available data, applicable literature, experience, and best professional judgment. Precise scaling calculations are often not possible because knowledge of relevant physical and biological processes is not sufficient. Accordingly, some general assumptions were adopted by the Trustees to allow an estimation of the scale of restoration necessary to compensate for injuries resulting from this spill.

The Trustees developed criteria to evaluate alternative restoration projects identified during the scoping process as well as restoration alternatives, hereafter collectively referred to as "restoration alternatives" or "projects." The criteria include relevant federal and state statute provisions governing the use of recoveries for natural resource damages.

4.2 Evaluation Criteria

The OPA regulations (15 CFR 990.54) recommend that Trustees develop a reasonable range of primary and compensatory restoration alternatives and then identify the selected restoration alternative(s) based on specified selection criteria. The Trustees for the Skaubay/Berge Banker oil spill developed selection criteria separated into two categories, the first being described as "threshold" and the latter described as "additional" criteria. Restoration project alternatives must achieve a minimum level of acceptance on the threshold criteria to receive further consideration under the additional criteria. The Trustees used the evaluation criteria listed below to consider and prioritize all restoration project alternatives currently identified, including alternative projects that were proposed by the public. The criteria are not ranked in order of priority.

4.2.1 Threshold Criteria

Technical Feasibility

The project alternative must be technically sound. The Trustees consider the level of uncertainty or risk involved in implementing the project. A proven track record demonstrating success of projects utilizing a similar or identical restoration technique can be used to satisfy these evaluation criteria.

Consistency with the Trustees' Restoration Goals

The proposed alternative must meet the Trustees' intent to restore rehabilitate, replace, enhance, or acquire the equivalent of the injured natural resource or the services those resources provided.

Compliance with Laws

The proposed alternative must comply with all applicable federal or state laws and regulations.

Public Health and Safety

The proposed alternative will comply with public and agency health and safety requirements and guidelines so as to protect and maintain the health and safety of the public.

4.2.2 Additional Criteria

Relationship to Injured Resources and Services

Projects that restore, rehabilitate, replace, enhance, or acquire the equivalent of the resources and services injured by the spill are preferred to projects that benefit other comparable resources or services. The Trustees consider the types of resources or services injured by the spill, the location, and the connection or "nexus" of project benefits to those injured resources.

Avoidance of Further Injury

Proposed project alternatives should avoid or minimize adverse impacts to the environment and the associated natural resources. These adverse impacts could result from the approval of future projects when implementing the proposed project alternative. The Trustees will consider the avoidance of future short-term and long-term adverse impacts or injuries as well as mitigation of past injuries when evaluating proposed projects.

Likelihood of Success

The Trustees will consider the potential for success and the level of expected return of resources and resource services. The Trustees will also consider the ability to monitor and evaluate the success of the project, the ability to correct any problems that arise during the course of the proposed project alternative, and the capability of individuals or organizations expected to implement the alternative.

Multiple Resource Benefits

The Trustees will consider the extent to which the proposed project alternative benefits more than one natural resource or resource service, including both ecological and recreational-use services. These benefits are measured in terms of the quantity and associated quality of the improvements to natural resources or visitor services as a result of the project.

Time to Provide Benefits

The Trustees will consider the time it takes for benefits to be provided to the target ecosystem and/or public and fiscal efficiency and scheduling of the project.

Duration of Benefits

The Trustees will consider the expected longevity of benefits from the proposed project alternative. Projects that provide long-term benefits are most favorable.

Protection of Alternative

The Trustees will consider the opportunities to protect the implemented alternative and resulting benefits over time through conservation easements, land acquisition, maintenance activities, sustainability of design, or other types of resource dedication. Long-term protection and maintenance of the project and any improvements are favorable attributes.

Opportunities for Collaboration

The Trustees will consider the possibility of matching funds, in-kind services, volunteer assistance, and coordination with other ongoing or proposed projects. External funding and in-kind support and services that reduce costs or extend benefits are favorable.

Benefits Relative to Costs

The Trustees will qualitatively consider the relationship of expected resource and service benefits to the expected project costs from each alternative. Trustees seek projects with the most cost-efficient approach and greatest benefit-to-cost ratios to deliver an equivalent type and amount of benefits or services.

Total Cost and Accuracy of Estimate

The Trustees evaluate the estimated total cost of each project alternative and the feasibility of the estimate. The total cost estimate should include costs to design, implement, monitor, and maintain

the selected alternative. The feasibility of cost estimates are evaluated based on the completeness, accuracy, and reliability of methods used to estimate costs, as well as the credentials of the person or entity submitting the cost estimate to accurately estimate costs.

Comprehensive Range of Projects

The Trustees will evaluate the extent to which a project contributes to a more comprehensive restoration package that replaces or compensates for the loss in resource or recreational use services as a result of the spill.

4.3 Evaluation of Environmental Restoration Alternatives

To reduce transaction costs and avoid delays in restoration, the OPA regulations encourage Trustees to conduct the NEPA process concurrently with the development of a Restoration Plan. To comply with the requirements of NEPA, the Trustees analyzed the effects of each proposed restoration alternative on the quality of the recreational environment. NEPA's implementing regulations direct federal agencies to evaluate the potential significance of proposed actions by considering both the context and the intensity of the action. For most of the restoration actions considered, the appropriate context and area of potential significance of the action is regional, not national or worldwide. Several restoration alternatives described in this section are based on conceptual designs rather than detailed engineering design work or operational plans. Therefore, details of specific projects may require additional refinements or adjustments to reflect site conditions or other factors, and individual projects may require preparation of additional NEPA documents. The Trustees assume that implementation of the restoration projects would begin in 2003.

The Environmental Consequences, including the Direct, Indirect, and Cumulative Effects, of each project are evaluated and discussed within each project description. The Direct Effects are impacts that are caused by implementing the project at the same time and in the same place. Indirect Effects are impacts caused by implementing the project that occur later in time or farther in the distance than the project itself. Cumulative Effects are additive impacts to a particular environmental resource and take into account other past, present, and reasonably foreseeable future actions. The Cumulative Effects discussed within each project description examine the cumulative effects of those specific projects. The Cumulative Effects of implementing all of the selected projects together are discussed in Section 4.3.6, Environmentally Preferred/Selected Project Summary.

Following settlement for environmental damage claims for the Skaubay/Berge Banker oil spill, the Trustees signed an MOA to guide the restoration planning and implementation process. The MOA specifies that the settlement will be allocated to two ecological resource categories (bird enhancement and dune and vegetation restoration) and lost recreational use. As illustrated in Table 6, the cost of the proposed restoration projects exceeded the amount available for each resource category. Additional funds from interest earned on the restoration settlement, in excess of those allocated by the MOA, are available for implementing restoration projects. These additional funds will be allocated to support the selected restoration projects.

The restoration planning process resulted in the identification of 17 proposed restoration projects listed in Table 6. There are insufficient funds available to implement all of the projects. Figure 4 presents a site location map for the projects under consideration at the Texas State Beaches. Table 7 also includes the three projects (Projects 18–20) completed by the Responsible Parties and the

Table 6. Comparison of Available Funds to Proposed Restoration Projects

Potential Bird Enhancement Projects	**Estimated Cost (total funds available, $122,082)**
Coyote Island Acquisition/Preservation	$122,082
Mustang Island Acquisition/Preservation—Francine Cohn Nature Preserve	$122,082
Packery Channel Sanctuary Acquisition	$122,082
Potential Dune and Vegetation Restoration Projects	**Estimated Cost (total funds available, $115,000)**
Dune Restoration and Preservation—Gulf Side	$115,000
Dune Restoration and Preservation—Bay Side	$230,760
Dune Reconstruction—Gulf Side	$101,100
Mustang Island State Park	**Estimated Cost (total funds available, $890,893)**
Equipment Purchase	$206,000
New Restroom/Shower Facility	$250,000
Beach Pavilion at Fish Pass	$52,000
Interpretive Pavilion and Marsh Boardwalk	$132,200
Park Ranger III Position—Equipment Operator, 5 years	$139,160
Park Exhibit Technician II Position—Interpreter, 5 years	$156,365
Two Birding Pavilions Beside Park Office	$42,000
Shade Shelters and Picnic Tables	$120,000
Master Plan for Mustang Island Infrastructure	$40,000
Padre Island National Seashore	**Estimated Cost (total funds available, $205,766)**
Interpretive Education Alternative Opportunities	$201,000
Auditorium and First Aid Station Expansion	$200,400

Project selected as compensation for injured natural resources.

restoration planning projects (Project 21), which this document is a part of, to arrive at site total settlement dollars.

In accordance with the Consent Decree, MOA, and OPA, expenditures from the Skaubay/Berge Banker oil spill restoration fund are limited to restoring injured natural resources and lost or diminished services. To restore these injured resources and lost use that resulted from the Skaubay/Berge Banker oil spill, the Trustees ranked the restoration alternatives into three status categories—Highly Recommended, Moderately Recommended, and Non-Recommended—after completing the analysis of projects against the evaluation criteria. The analysis is shown in Table 8. The final ranking of restoration projects and the estimated funding allocation is provided in Table 7. Table 9 presents the restoration projects grouped by status category.

Section 4.3 describes the 6 restoration alternatives that were considered to compensate for injured natural resources and the 11 restoration alternatives considered to compensate for lost recreational use services.

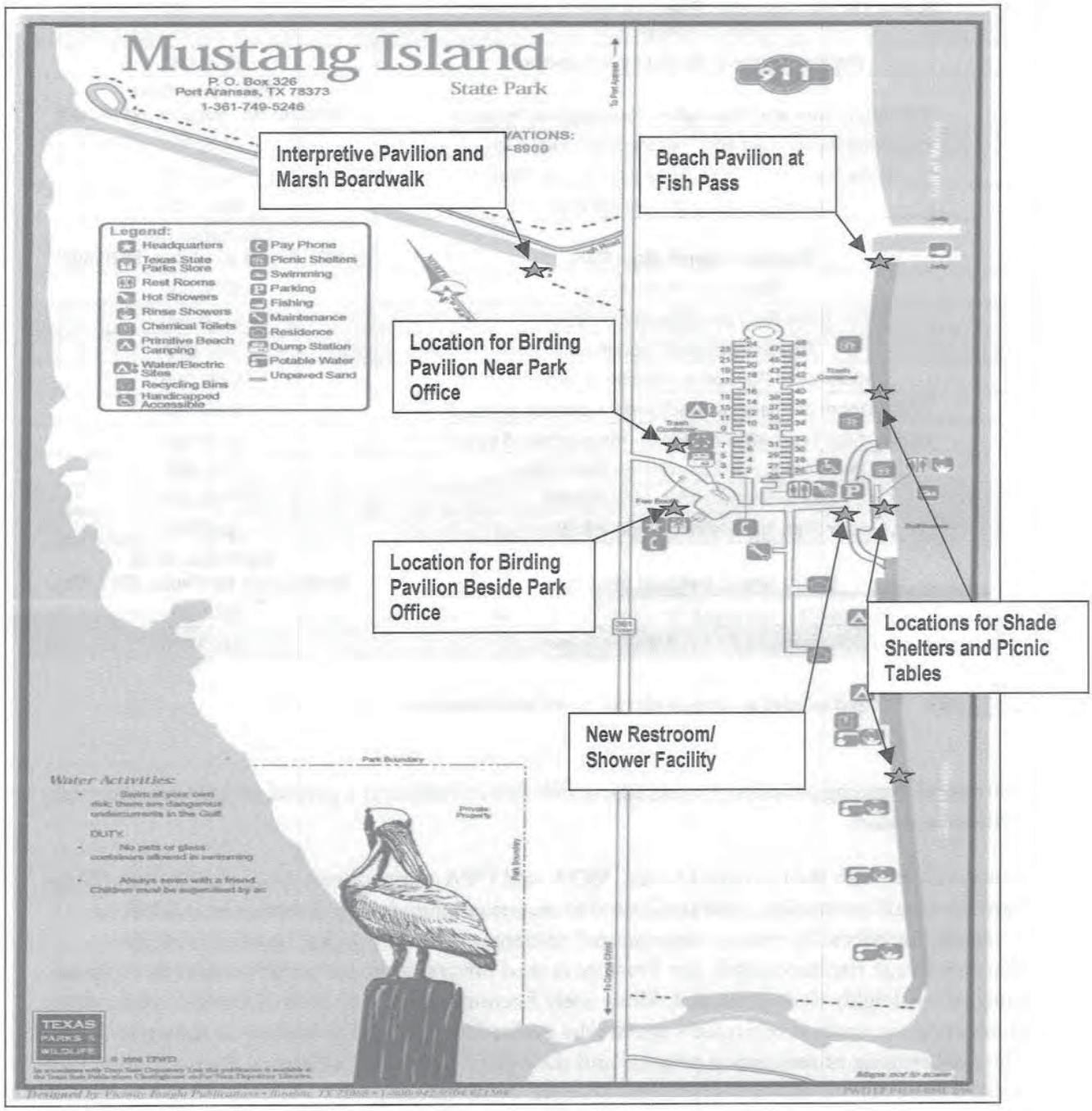


Figure 4. MISP with Proposed Lost Use Project Locations

Table 7. Summary of Potential Projects and Estimated Funding Allocations for the Skaubay/Berge Banker Oil Spill

Project No.	Resource Category and Project Name	Estimated Cost	CD Status[1]	Project Status[2]	Estimated Funding Allocation
	Bird Restoration				***$122,082***
1	Coyote Island Acquisition/Preservation	$122,082	N	H	$122,082
2	Mustang Island Acquisition/Preservation—Francine Cohn Nature Preserve	$122,082	N	H	$122,082
3	Packery Channel Sanctuary Acquisition	$122,082	N	N	$122,082
	Dune/Vegetation Injury				***$115,000***
4	Dune Restoration and Preservation—Gulf Side	$115,000[3]	N	H	$115,000
5	Dune Restoration and Preservation—Bay Side	$230,760	N	M	$115,000
6	Dune Reconstruction—Gulf Side	$101,100	N	M	$101,100
	Lost and Diminished Recreational Use Services (TX)				***$890,893***
7	Equipment Purchase	$206,000	N	N	$206,000
8	New Restroom/Shower Facility	$250,000	N	H	$250,000
9	Beach Pavilion at Fish Pass	$52,000	N	H	$52,000
10	Interpretive Pavilion and Marsh Boardwalk	$132,200	N	M	$132,200
11	Park Ranger III Position—Equipment Operator	$139,160	N	N	$139,160
12	Park Exhibit Technician II Position—Interpreter (Stand Alone)	$156,365	N	N	$156,365
12A	Park Exhibit Technician II Position—Interpreter (Combined with other Interpretive Projects)	$156,365	N	N	$156,365
13	Two Birding Pavilions Beside Park Office	$42,200	N	M	$42,000
14	Shade Shelters and Picnic Tables	$120,000	N	H	$120,000
15	Master Plan for Mustang Island Infrastructure	$40,000	N	H	$40,000
	Lost and Diminished Recreational Use Services (PAIS)				***$205,766***
16	Interpretive Education Opportunities	$201,000	N	H	$201,000
17	Auditorium and First Aid Station Expansion	$200,400	N	H	$200,400
	Completed Projects (PAIS)				***$234,336***
18	Parking Lot Repair	$25,000	Y	C	$25,000
19	Beach Ecological Services	$14,292	Y	C	$14,292
20	Dune/Vegetation Injury	$40,044	Y	C	$40,044
21	Environmental Planning	$155,000	Y	I	$155,000
	TOTAL				**$1,568,077**

Project selected as compensation for injured natural resources.

[1] A "Y" means the Trustees relied on the project to develop the damage claim and agreed in the Consent Decree (CD) to consider the project during development of the RP/EA if the project is feasible. An "N" means the Trustees did not rely on the project to develop the damage claim.

[2] H = Highly Recommended Project, M = Moderately Recommended Project, N = Non-Recommended Project, C = Completed, I = In progress.

[3] Only one site has been currently identified. Another location may be identified later.

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Table 8. Evaluation of Alternatives against Evaluation Criteria

CRITERIA	No Action	Mustang Island Acquisition/ Preservation	Coyote Island Acquisition/ Preservation	Packery Channel Acquisition	Dune Restoration/ Preservation (Gulf Side)	Dune Restoration/ Preservation (Bay Side)	Dune Reconstruction (Gulf Side)	New Restroom/ Shower Facility	Beach Pavilion at Fish Pass	Master Plan for Mustang Island	Shade Shelters & Picnic Tables	Interpretive Pavilion & Marsh Boardwalk	Two Birding Pavilions	Equipment Purchase	Park Ranger III Position (Equipment Operator)	Stand Alone Park Exhibit Technician II Position (Interpreter)	Combined Park Exhibit Technician II Position (Interpreter)	Expand Auditorium & First Aid Station	Padre Island Interpretive Educ. Alt. Opportunities
THRESHOLD CRITERIA																			
Technical Feasibility: The project alternative must be technically sound. The Trustees consider the level of uncertainty or risk involved in implementing the project. A proven track record demonstrating success of projects utilizing a similar or identical restoration technique can be used to satisfy these evaluation criteria.	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1
Consistency with the Trustees' Restoration Goals: The proposed alternative must meet the Trustees' intent to restore, rehabilitate, replace, enhance, or acquire the equivalent of the injured natural resource or the services those resources provided.	3	1	1	2	1	2	1	1	1	1	1	2	2	2	3	2	1	1	1
Compliance with Laws: The proposed alternative must comply with all applicable state or federal laws and regulations.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Public Health and Safety: The proposed alternative will comply with public and agency health and safety requirements and guidelines so as to protect and maintain the health and safety of the public.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ADDITIONAL CRITERIA																			
Relationship to Injured Resources and Services: Projects that restore, rehabilitate, replace, enhance, or acquire the equivalent of the resources and services injured by the spill are preferred to projects that benefit other comparable resources or services. The Trustees consider the types of resources or services injured by the spill, the location, and the connection or "nexus" of project benefits to those injured resources.	3	2	2	3	1	2	1	1	1	2	1	2	2	3	3	2	2	1	1
Avoidance of Further Injury: Proposed project alternatives should avoid or minimize adverse impacts to the environment and the associated natural resources. These adverse impacts could result from the approval of future projects when implementing the proposed project alternative. The Trustees will consider the avoidance of future short-term and long-term adverse impacts or injuries, as well as mitigating past injuries when evaluating proposed projects.	2	1	1	1	1	1	1	2	1	1	2	2	2	2	3	1	1	1	2
Likelihood of Success: The Trustees will consider the potential for success and the level of expected return or resources and resource services. The Trustees will also consider the ability to monitor and evaluate the success of the project, the ability to correct any problems that arise during the course of the proposed project alternative, and the capability of individuals or organizations expected to implement the alternative.	1	1	1	2	1	1	1	1	1	1	1	1	1	2	3	2	1	1	1
Multiple Resource Benefits: The Trustees will consider the extent to which the proposed project alternative benefits more than one natural resource or resource service including both ecological and recreational use services. These benefits are measured in terms of the quantity and associated quality of the improvements to natural resources or visitor services as a result of the project.	3	1	1	2	2	2	2	2	2	1	2	1	1	3	3	2	2	1	1
Time to Provide Benefits: The Trustees will consider the time it takes for benefits to be provided to the target ecosystem and/or public and fiscal efficiency and scheduling of the project.	3	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1

1 = Meet the criteria very well
2 = Adequately meets criteria
3 = Does not meet the criteria

Project selected as compensation for injured natural resources.

Table 8. Evaluation of Alternatives against Evaluation Criteria (Concluded)

CRITERIA	No Action	Mustang Island Acquisition/ Preservation	Coyote Island Acquisition/ Preservation	Packery Channel Acquisition	Dune Restoration/ Preservation (Gulf Side)	Dune Restoration/ Preservation (Bay Side)	Dune Reconstruction (Gulf Side)	New Restroom/ Shower Facility	Beach Pavilion at Fish Pass	Master Plan for Mustang Island	Shade Shelters & Picnic Tables	Interpretive Pavilion & Marsh Boardwalk	Two Birding Pavilions	Equipment Purchase	Park Ranger III Position (Equipment Operator)	Stand Alone Park Exhibit Technician II Position (Interpreter)	Combined Park Exhibit Technician II Position (Interpreter)	Expand Auditorium & First Aid Station	Padre Island Interpretive Educ. Alt. Opportunities
Duration of Benefits: The Trustees will consider the expected longevity of benefits from the proposed project alternative. Projects that provide long-term benefits are most favorable.	3	1	1	1	2	2	2	2	2	1	2	2	2	3	3	3	3	1	1
Protection of Alternative: The Trustees will consider the opportunities to protect the implemented alternative and resulting benefits over time through conservation easements, land acquisition, maintenance activities, sustainability of design, or other types of resource dedication. Long-term protection and maintenance of the project and any improvements are favorable attributes.	3	1	1	1	2	2	2	1	1	1	1	1	1	2	2	2	2	1	1
Opportunities for Collaboration: The Trustees will consider the possibility of matching funds, in-kind services, volunteer assistance, and coordination with other ongoing or proposed projects. External funding and in-kind support and services that reduce costs or extend benefits are favorable.	3	1	1	1	2	2	2	1	2	2	2	2	2	2	3	3	3	2	1
Benefits Relative to Costs: The Trustees will qualitatively consider the relationship of expected resource and service benefits to the expected project costs from each alternative. Trustees seek projects with the most cost-efficient approach and greatest benefit to cost ratios, to deliver an equivalent type and amount of benefits or services.	3	1	1	3	1	1	1	1	1	1	1	2	2	3	3	2	2	1	1
Total Cost and Accuracy of Estimate: The Trustees evaluate the estimated total cost of each project alternative and the feasibility of the estimate. The total cost estimate should include costs to design, implement, monitor, and maintain the selected alternative. The feasibility of cost estimates are evaluated based on the completeness, accuracy, and reliability of methods used to estimate costs, as well as the credentials of the person or entity submitting the cost estimate to accurately estimate costs.	1	2	2	2	2	2	2	1	2	1	1	2	2	1	1	1	1	2	2
Comprehensive Range of Projects: Trustees will evaluate the extent to which a project contributes to a more comprehensive restoration package that replaces or compensates for the loss in resource or recreational use services as a result of the spill.	3	1	2	2	1	1	1	2	1	1	1	1	1	2	3	2	2	1	1
Score	34	17	18	24	20	22	21	19	19	18	19	22	22	30	35	27	25	17	17
Summary	N	H	H	N	H	M	M	H	H	H	H	M	M	N	N	N	N	H	H

1 = Meet the criteria very well
2 = Adequately meets criteria
3 = Does not meet the criteria

16-20: H = Highly Recommended Project
21-23: M = Moderately Recommended Project
> 23: N = Non Recommended Project

Project selected as compensation for injured natural resources.

Table 9. Project Status Summary

Resource Category and Project Name	Estimated Funding Allocation
Selected Projects	
Mustang Island Acquisition/Preservation—Francine Cohn Nature Preserve	$122,082
Dune Restoration and Preservation—Gulf Side	$115,000
New Restroom/Shower Facility	$250,000
Beach Pavilion at Fish Pass	$52,000
Shade Shelters and Picnic Tables	$120,000
Master Plan for Mustang Island Infrastructure	$40,000
Auditorium and First Aid Station Expansion	$200,400
Highly Recommended Projects	
Coyote Island Acquisition/Preservation	$122,082
Interpretive Education Opportunities	$201,000
Moderately Recommended Projects	
Dune Restoration and Preservation—Bay Side	$115,000
Dune Reconstruction—Gulf Side	$101,100
Interpretive Pavilion and Marsh Boardwalk	$132,200
Two Birding Pavilions Beside Park Office	$42,200
Non-Recommended Projects	
No Action	$0
Packery Channel Sanctuary Acquisition	$122,082
Equipment Purchase	$206,000
Park Ranger III Position—Equipment Operator	$139,160
Park Exhibit Technician II Position—Interpreter (Stand Alone)	$156,365
Park Exhibit Technician II Position—Interpreter (Combined with other Interpretive Projects)	$156,365

In the event the Trustees determine that a selected project described in this section is not feasible, the Trustees may redirect the funds allocated to the infeasible project to another highly recommended project or projects. A project may be determined to be infeasible if, upon further investigation, the Trustees find that a project no longer satisfies the evaluation criteria used to determine the selected projects. For example, no matching funds may be identified, the allocated funds may be insufficient to carry out a selected project, or Trustees may be unable to ensure the long-term protection of a selected project through conservation easements, land acquisition, or other types of resource dedication.

4.3.1 No Action Alternative

Project Description and Background

As required by NEPA, the Trustees considered a No Action alternative. Under a No Action alternative, compensatory projects would not be implemented. Natural recovery would be allowed to take place, but none of the compensatory projects listed in Section 4.3 would be implemented.

Restoration Objectives

The restoration objectives under this alternative would be natural recovery of the damaged resources.

Scaling Approach

Numerous oiled birds were observed and collected after the spill, and their habitat and food sources were impacted from the spill. Additionally, the beachfront and foredunes were damaged both by the oil that was deposited by surface waters and from the heavy equipment used in the response action, and recreational use of the national and state parks was interrupted by the oil spill and associated cleanup actions. The No Action alternative would not provide compensation for the injuries caused to the natural resources from the oil spill or be consistent with the Trustees' restoration goals of restoring, rehabilitating, replacing, enhancing, or acquiring the equivalent of the injured resource or the services those resources provided.

Probability of Success

The probability of successful implementation of this alternative is high, because only natural recovery would take place and no restoration activities would be implemented.

Success Criteria and Monitoring

Because no restoration activities would be performed, success would be determined by the natural recovery of the injured resource, including sand dunes and bird habitats. The Trustees will continue to monitor the injured resources as well as the deterioration of public use facilities.

Project Cost and Schedule

There would be no cost or scheduled activities associated with the No Action alternative.

Permitting Requirements

There would be no permit requirements associated with this the No Action alternative.

Environmental Consequences

Under the No Action alternative, no stabilization or repair of the injured dunes would occur, nor would the protection or enhancement of birds or their habitat.

Direct Effects

Shoreline

The injury caused by the spill and the subsequent response action has created disturbed areas that are not stable and are eroding. The direct effects of the No Action alternative are the continued erosion and degradation of those disturbed areas and not protecting sensitive areas from further injury.

Birds

The No Action alternative would have no direct effect on the birds.

Fish, Mammals, Amphibians, Reptiles and Other Animals

The No Action alternative would have no direct effect on fish, mammals, amphibians, reptiles, or other animals.

Recreation Use

Under the No Action alternative, the existing facilities would continue to deteriorate.

Indirect Effects

Shoreline

The No Action alternative would have no indirect effect on the shorelines.

Birds

The indirect effects of the No Action alternative are that there would be no additional protected, disturbance-free lands for waterfowl, wading birds, and shorebirds to use for foraging, nesting, and roosting.

Fish, Mammals, Amphibians, Reptiles and Other Animals

The indirect effects of the No Action alternative would be no additional protected, disturbance-free habitat or shoreline that would benefit fish, marine mammals, and marine organisms.

Recreation Use

The continued deterioration of existing facilities would result in diminished quality of the visitor experience and could result in reduced recreational use by the public.

Cumulative Effects

The cumulative effects from the No Action alternative would include the potential loss of habitat for waterfowl, wading birds, and shorebirds. The beachfront areas where these habitats occur have high economic value. If these areas are not protected, the possibility that they will be developed is present.

Evaluation

During the damage assessment phase, it was determined by the Trustees and concurred by legal decision that natural recovery was not the appropriate course of action. Natural recovery could be facilitated in conjunction with other proposed actions and it was determined that a No Action alternative would not be feasible and does not meet the needs of mitigating the injured resources.

A No Action alternative would violate the terms of the Consent Decree and was therefore eliminated from detailed study. If environmental damage were expected from project implementation, then a No Action alternative could be determined not to violate the Consent Decree and other use for compensatory damages would be made. It was determined, however, that compensatory projects could be implemented without causing significant environmental damage and therefore the No Action alternative is not the Trustees selected alternative.

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4.3.2 Bird Restoration and Enhancement Projects

Based on the investigation that followed the spill, it was determined that the oil on the shorelines and in the water affected an estimated 3,000 to 7,800 birds of various species and several types of habitats, including beaches, dunes, and washovers. Because the spill occurred in February, many of the waterfowl and shorebirds normally wintering in the area were affected the most. These birds included the pied-billed (*P. podiceps*) and eared grebes (*P. nigricollis*), double-crested cormorants (*P. auritus*), northern gannets (*M. bassanus*), laughing gulls (*L. atricilla*), great egrets (*A. alba*), little blue herons (*E. caerulea*), royal terns (*S. maxima*), sanderlings (*C. alba*), common loons (*G. immer*), and lesser scaup (*A. affinis*). The spill also affected the birds' food sources, marine benthic invertebrates, including beach-dwelling organisms as well as larval, post-larval, juvenile, and adult finfish, shellfish, and mollusks.

Although the spill directly impacted the Gulf side of Mustang and Padres islands, many of the bird species impacted use both the Gulf side and the Bay side of the islands for foraging. Opportunities for bird restoration projects on the Gulf side are minimal since the impacted lands are already owned by the federal or state park systems. Therefore, the bird restoration projects presented are located on the Bay side of the impacted area as shown in Figure 5.

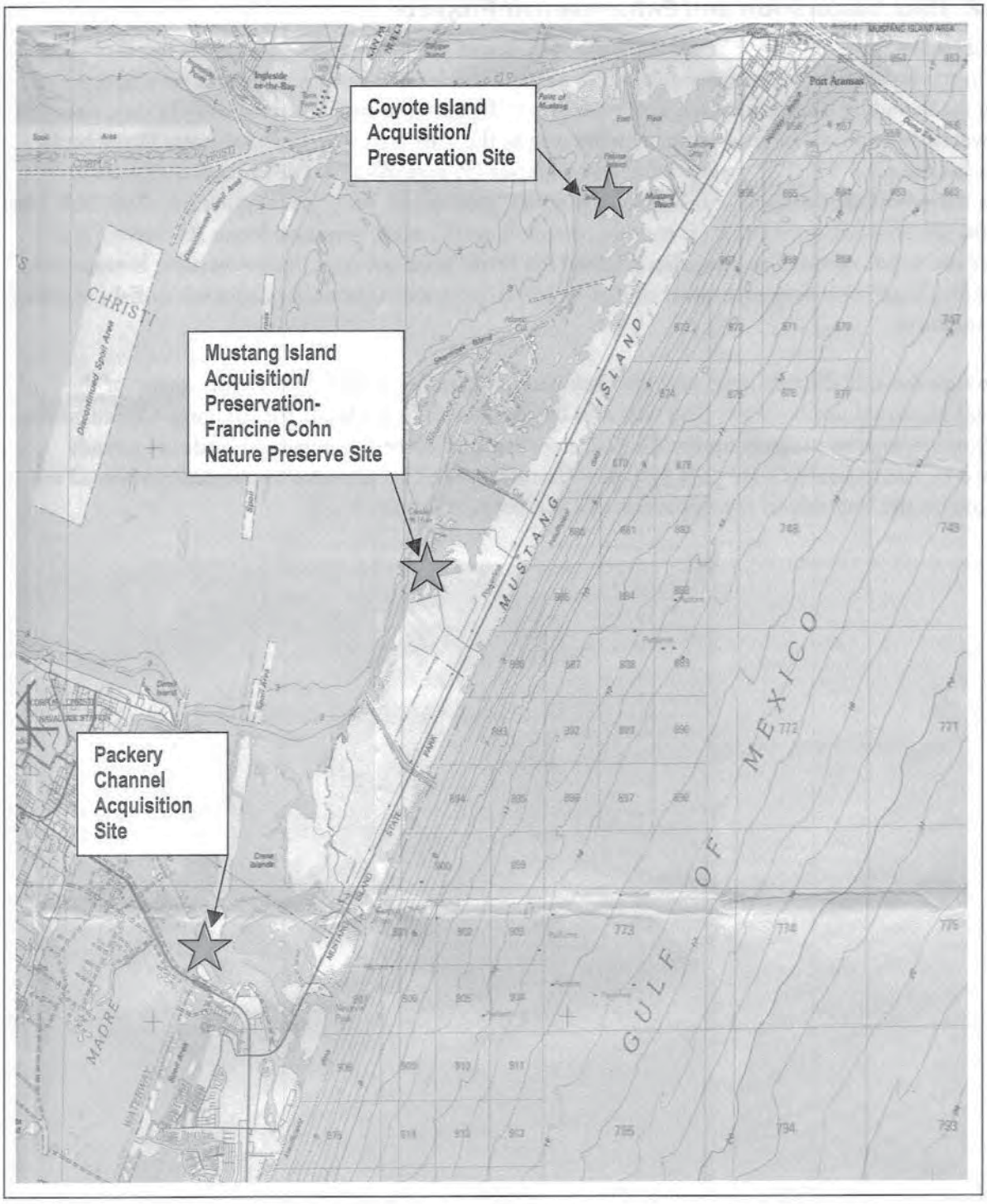


Figure 5—MISP Vicinity Map with Three Bird Restoration Project Locations

4.3.2.1 Mustang Island Acquisition/Preservation—Francine Cohn Nature Preserve (Selected)

Project Description and Background

The Mustang Island Acquisition/Preservation—Francine Cohn Nature Preserve project involves fee simple acquisition or the purchase of a conservation easement of a portion of the acquisition areas identified on Mustang Island (Figure 6). The easement would be incorporated into the existing Francine Cohn Nature Preserve (Cohn Preserve). TNC owns and manages the current 300-acre Cohn Preserve, and it would coordinate the management of the newly purchased land or easement with the rest of the Cohn Preserve. The Trustees would obtain Third Party Rights of Enforcement of Conservation Easement terms protecting the ecological services provided by the acquisition/preservation property.



Figure 6. Locations of Existing Preserve and Potential Acquisition Sites

The Cohn Preserve provides educational field trips to a variety of community groups. The areas available for acquisition are adjacent to the preserve and are located on the west side of Mustang Island, approximately 1 mile south of the nationally recognized rookery on Shamrock Island, which is owned and managed by TNC, and north of MISP. A map showing the location of the preserve and the proposed acquisition areas is presented in Figure 6.



Figure 7. Mustang Island Site

Mustang Island includes large areas of freshwater and saltwater wetlands, barrier island dunes and prairies, sea grass beds, and rookery islands (Figure 7). These areas are critically important ecological communities and offer regionally rare habitat for waterfowl, wading birds, shorebirds, and other wetland fauna. Many of these same ecological communities were injured by the spill, impacting a variety of, migratory waterfowl, and shorebirds, as well as other species. Many of these impacted species typically nest on nearby Shamrock Island annually. The implementation of this project would ensure the preservation of this nearby critical habitat and would help ensure that adequate food resources are available to support the nesting activity. This project would also provide new opportunities for wildlife viewing by maintaining the bird habitat and use of the expanded preserve for educational field trips by various groups.

Restoration Objectives

The project objective is to provide protected, disturbance-free areas for waterfowl, wading birds, and shorebirds to use for foraging, nesting, and roosting. By implementing this project, property on Mustang Island would be acquired that includes ecological communities similar to those injured, including beaches, dunes, and open water, as well as other community types such as grasslands and intertidal flats that are currently used by the affected bird species. The spill not only directly impacted the shorebirds in the affected area by impacting the birds themselves, but also their food sources. This project would also compensate for loss of forging, nesting, and roosting resources for the species impacted by the spill. Additionally, this project would address the lost ecological services by affording long-term protection of important habitat and by increasing the natural resources available to those species and populations injured by the spill. By implementing this project, additional lands and opportunities will be available to the public for educational field trips to the expanded Cohn Preserve.

Scaling Approach

Numerous oiled birds were observed and collected during the spill. Their habitat and food sources were also impacted from the spill. Mustang Island provides important habitat for nesting, resting, and foraging for many of the species of birds impacted by the spill.

There are numerous site-specific environmental and human-related factors that influence waterfowl, wading bird, and shorebird survival and reproductive success. These include factors such as human disturbance, predation, invasive non-native vegetation, weather, natural events, oil spills, and other contaminants. The Trustees have not quantified the extent of potential benefits that would result from this habitat protection; however, Mustang Island has critical ecological communities that provide habitat and food sources for waterfowl, wading birds, and shorebirds. By implementing this project, human disturbance would be minimized, increasing the nesting, resting, and foraging opportunities afforded to the waterfowl, wading birds, and shorebirds. Additionally, the land acquisition would be incorporated into an existing preserve providing a large contiguous tract of land that would be properly managed for waterfowl, wading birds, shorebirds, and other wildlife use.

Although it is proven that public outreach programs are an effective means of protecting natural resources, it is very difficult to quantify the benefits. Based on the results of similar projects and best professional judgment of the Trustees, this scale of habitat protection, increased nesting and foraging opportunities, along with public outreach undertaken to protect and enhance these habitats is expected to compensate for injuries to waterfowl, wading birds, and shorebirds.

Probability of Success

The probability of success for this habitat project is very high and the level of risk is low. TNC, which would manage this acquisition property, has an established track record of land stewardship and community involvement. The areas identified for acquisition have been identified in TNC's Gulf Coast Prairies and Marshes Ecoregional Plan as one of the highest priority conservation sites on the Texas coast. As such, TNC has committed significant resources to help protect the island's unique ecological resources. It also manages similar properties for habitat protection and enhancement in the area and has had successful results for increasing waterfowl, wading bird, and shorebird protection and enhancing the public's understanding of the environment. Given TNC's

commitment to this area, the Trustees expect that similar ecological and community benefits will be accomplished through this project.

Success Criteria and Monitoring

The success criterion will be the reduction in incidence of disturbance to waterfowl, wading birds and shorebirds and increased foraging opportunities for birds. As part of this project, the Trustees will continue to monitor disturbance to waterfowl, wading birds, and shorebirds on the acquired lands.

Project Cost and Schedule

The project would include the fee for simple acquisition or purchase of a conservation easement of as much land as possible of the acquisition areas identified on Mustang Island given that $122,082 is designated for this resource category—an estimated $2,500 per acre. Any additional land acquisition would be performed with additional external funds and are not part of this project. It is estimated that the acquisition would take 12 months from the date of project approval.

Environmental Consequences

This project would result in environmental benefits by reducing the level of human-related disturbance to the waterfowl, wading birds, and shorebirds that currently use this portion of Mustang Island and would, therefore, most likely attract additional numbers. This project would also create a larger contiguous tract of land that is preserved, ensuring a continued foraging habitat for the nationally important rookery located on nearby Shamrock Island. Because this project provides for acquisition of the property and management by TNC, the project is not expected to result in any significant environmental impacts and is expected to ensure protection of unique ecological resources.

Direct Effects

Shoreline

Acquiring and managing this parcel on Mustang Island as a preserve would protect the parcel shoreline habitat from degradation by human overuse and development. This shoreline connects parcels to the north and south that provide habitat for shorebirds.

Birds

This project would reduce the level of human-related disturbance to the waterfowl, wading birds, and shorebirds that currently use this portion of Mustang Island. This project would also connect to other parcels and would create a larger contiguous tract of land that is preserved, ensuring a continued foraging habitat for the nationally important rookery located on nearby Shamrock Island.

Fish, Mammals, and Other Organisms

As a part of the Francine Cohn Preserve, the land acquired through this project would be a part of the key TNC marine conservation area. This project would provide additional essential fish habitat for numerous commercially and recreationally important species.

Recreation Use
This area was not previously used for public recreation uses. Preservation of the acquired area would prohibit recreation activities outside activities accepted by TNC as a part of their management plan. The Francine Cohn Preserve emphasizes educational field trips to the preserve, so as an extension of the preserve, this project would provide additional lands and opportunities for educational outreach.

Indirect Effects

Shoreline
This project would have no indirect effect on the shorelines.

Birds
A reduction in human disturbance would most likely attract additional waterfowl, wading birds, and shorebirds to this area on Mustang Island.

Fish, Mammals, and Other Organisms
Indirect effects on fish, mammals, and other organisms would be through the stewardship program of TNC. Specific management actions for this resource have not been defined.

Recreation Use
This project would have no indirect effect on recreation use.

Cumulative Effects

The cumulative effects of this project include the proposed land acquisition, other land acquisitions in the area, and the other past, present, and reasonably foreseeable future actions.

The proposed project would complement the past and ongoing land acquisitions in the area to protect Texas's barrier island systems from threats like coastal development and habitat destruction and fragmentation. The proposed project would create land use continuity between the existing Francis Cohn Preserve, adjacent to the north, and Mustang Island State Park, adjacent to the south. Other past or ongoing acquisitions in the Padre Island area include TNC's South Padre Island Preserve (24,532 acres) and Shamrock Island (110 acres) and wetlands or undeveloped shoreline on Mustang Island along Corpus Christi Bay in Nueces County, under the Coastal Bend Bays and Estuaries Program and TNC partnership. Because this project is a land acquisition for preservation and conservation, it would not cumulatively contribute to past, present, or future land development or resource disturbing activities in the area.

Evaluation

Mustang Island has unique ecological resources that offer nesting, resting, and foraging opportunities to birds. Waterfowl, wading bird, and shorebird feeding patterns and habitats were adversely impacted by the spill. The habitat protection afforded by this project, along with the public outreach program that TNC would implement, would be a practical and effective method to improve conditions for waterfowl, wading bird, and shorebird resting and foraging and has been successfully implemented at other sites in Texas. Additionally, this project would create a larger contiguous tract of land that is preserved, ensuring continued foraging habitat for the nationally important rookery located on nearby Shamrock Island. The larger the contiguous habitat to support

these rookery activities, the greater the foraging opportunities will be. The long-term goal of TNC is to obtain all the acquisition areas shown, which would increase the benefits of this project. Although accurate quantification of the success and benefits of this project is difficult, this project is expected to be successful in reducing human disturbance to birds in this area of Mustang Island as well as providing increased long-term foraging opportunity for birds.

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and determined that this project is consistent with these selection factors. The Trustees determined that this type and scale of restoration would effectively provide appropriate compensation for injuries to waterfowl, wading birds, and shorebirds that occurred as a result of the oil spill as well as protect unique ecological resources that benefit a wide variety of flora and fauna. Because this project adds to an already protected portion of Mustang Island and therefore creates a larger contiguous tract of protected land, it was placed in the highly recommended category. Although both the Coyote Island Land Acquisition project and this project were both ranked as highly recommended, the Trustee Representatives selected this project for compensation since this project not only benefits the bird species that were impacted, but also benefits a wide variety of unique flora and fauna indigenous to the area.

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4.3.2.2 Coyote Island Acquisition/Preservation

Project Description and Background

The Coyote Island Acquisition/Preservation project involves the fee title acquisition or purchase of a conservation easement on a portion of the approximate 300-acre parcel. This project would allow permanent protection of a portion of the island, located in the East Flats area on the Bay side of Mustang Island (Figure 8), that provides nesting and foraging habitat for shorebirds. The Nature Conservancy (TNC) would manage the acquisition property. The Trustees would obtain Third Party Rights of Enforcement of Conservation Easement terms protecting the ecological services provided by the acquisition/preservation property.



Figure 8. Coyote Island Location

As an integral part of its stewardship of this land, TNC would enhance the habitat for nesting birds. Any enhancements would be pursued with the engagement of local partners. The local community would be engaged in a conservation project through a public outreach program that TNC has expressed interest in leading. Upon acquisition of the property, TNC would incorporate the conservation project into its Coastal Conservation Education Program for use as a "living laboratory" for area school children.

Restoration Objectives

This project objective is to compensate for loss of avian species foraging and roosting resources impacted by the spill by permanently protecting nesting, resting, and foraging habitat for waterfowl, wading birds, and shorebirds. This project would address the lost ecological services by affording long-term protection of important habitat and by improving the natural resources available to those species and populations injured by the spill.

Currently, several factors threaten Coyote Island's productivity as a nesting island. Predator access and human disturbance negatively affect the island's ability to offer nesting, resting, and foraging opportunities to birds.

Scaling Approach

Numerous oiled birds were observed and collected during the spill. Their habitat and food sources were also impacted by the spill. Coyote Island provides important habitat for nesting, resting, and foraging for many of the species of birds impacted by the spill.

There are numerous site-specific environmental and human-related factors that influence waterfowl, wading bird, and shorebird survival and reproductive success, such as human disturbance, predation,

invasive non-native vegetation, weather, natural events, oil spills, and other contaminants. The Trustees have not quantified the extent of potential benefits that would result from this habitat protection. However, the island has approximately 9,000 feet of shoreline that provides habitat for shorebirds. By implementing this project, human disturbance would be minimized and proper management of the lands would occur, increasing the nesting, resting, and foraging opportunities afforded to the waterfowl, wading birds, and shorebirds. However, predation does occur on the island from the presence of coyotes (*C. latrans*), and this predator access would not change by implementing this project.

Although it is proven that public outreach programs are an effective means of protecting natural resources, it is very difficult to quantify the benefits. Based on the results of similar projects and best professional judgment of the Trustees, this scale of habitat protection, with increased nesting, roosting, and foraging opportunities along with the public outreach undertaken to protect and enhance these habitats, is expected to compensate for injuries to waterfowl, wading birds, and shorebirds.

Probability of Success

The probability of success for this habitat project is high. TNC, which would manage this acquisition property, has an established track record of land stewardship and community involvement. It also manages similar properties for habitat protection and enhancement in the area with successful results for increasing shorebird protection and enhancing the public's understanding of the environment. The Trustees expect that similar benefits will be accomplished through this project.

Success Criteria and Monitoring

The success criterion will be the reduction in incidence of disturbance to waterfowl, wading birds, and shorebirds and increased public outreach by engaging the local community in a conservation project. As part of this project, the Trustees will continue to monitor disturbance to waterfowl, wading birds, and shorebirds at Coyote Island.

Project Cost and Schedule

The project includes the fee title acquisition or purchase of a conservation easement on as much land as the $122,082 designated fund will allow. TNC estimates that the land could be purchased for approximately $2,000 per acre. Therefore, the $122,082 would be used to purchase as much land as possible. Acquisition of the balance of the parcel (over the $122,082) would be performed with additional external funds and are not considered under this project.

It is estimated that the acquisition would take 12 months from the date of project approval.

Environmental Consequences

This project would result in environmental benefits by reducing the level of human-related disturbance to the waterfowl, wading birds, and shorebirds that currently use Coyote Island and would, therefore, most likely attract additional numbers of these birds to Coyote Island. Because this project provides for acquisition of the property and management by TNC, the project is not expected to result in any significant environmental impacts. However, this decrease in human-related

disturbance may also contribute to increased coyote (*C. latrans*) populations and, therefore, increased predation.

Direct Effects

Shoreline

Acquiring and managing a part of the 300-acre parcel on Coyote Island as a preserve would protect the Coyote Island shoreline habitat from degradation by human overuse and development. Shoreline in this area provides habitat for shorebirds.

Birds

TNC would manage the acquired part of the 300-acre parcel on Coyote Island as a preserve and education outreach area. Management activities would include enhancing and restoring habitat for nesting birds. This acquisition and management would also reduce the level of human-related disturbance to the waterfowl, wading birds, and shorebirds that use Coyote Island.

Fish, Mammals, and Other Organisms

This project would have no direct effect on fish, mammals, or other organisms.

Recreation Use

This area was not previously used for public recreation uses. Preservation of the acquired area would prohibit recreation activities outside activities accepted by TNC as a part of their management plan.

Indirect Effects

Shoreline

This project would have no indirect effect on the shorelines.

Birds

A reduction in human disturbance would most likely attract additional waterfowl, wading birds, and shorebirds to Coyote Island. Coyote (*C. latrans*) populations may increase because of the reduced level of human disturbance. The coyote population increase may result in additional predation on the avian population on Coyote Island.

Fish, Mammals, and Other Organisms

Indirect effects on fish, mammals and other organisms would be through the stewardship program of TNC. Specific management actions for this resource have not been defined.

Recreation Use

This project would have no indirect effect on recreation use.

Cumulative Effects

The cumulative effects of this project include the proposed land acquisition, other land acquisitions in the area, and the other past, present and reasonably foreseeable future actions.

The proposed project would complement the past and ongoing land acquisitions in the area to protect Texas's barrier island systems from threats like coastal development and habitat destruction and fragmentation. Past or ongoing acquisitions in the Padre Island area include TNC's Francis

Cohn Preserve (300 acres), South Padre Island Preserve (24,532 acres) and Shamrock Island (110 acres) and wetlands or undeveloped shoreline on Mustang Island along Corpus Christi Bay in Nueces County, under the Coastal Bend Bays and Estuaries Program and TNC partnership. Because this project is a land acquisition for preservation and conservation, it would not cumulatively contribute to past, present or future land development or resource disturbing activities in the area.

Evaluation

Coyote Island offers nesting, resting, and foraging opportunities to birds. Waterfowl, wading birds, and shorebird feeding patterns and habitats were adversely impacted by the spill. The habitat protection afforded by this project, along with the public outreach program that TNC would implement, would be a practical and effective method to improve conditions for shorebirds resting and foraging and has been successfully implemented at other sites in Texas. Although accurate quantification of the success and benefits of this project is difficult, this project is expected to be successful in reducing human disturbance to shorebirds on Coyote Island, although it may increase coyote (*C. latrans*) predation.

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and determined that this project is consistent with these selection factors. The Trustees determined that this type and scale of restoration would effectively provide appropriate compensation for injuries to shorebirds that occurred as a result of the oil spill. Even though there are financial constraints of needing still-unidentified matching funds to acquire the island in its entirety, this project was placed in the highly recommended category.

4.3.2.3 Packery Channel Sanctuary Acquisition

Project Description and Background

The Packery Channel Sanctuary Acquisition project involves acquiring as many lots as possible in the residential area of North Padre Island known as Packery Channel. The Audubon Outdoor Club of Corpus Christi suggests the acquisition of as many lots as possible to cement long-term habitat and resource protection. This project area is located on North Padre Island, within the Corpus Christi city limits, adjacent to the Packery Channel waterway on the east and Nueces County Park and maintenance facilities to the north. The area can be accessed from Corpus Christi over the J.F. Kennedy Causeway and via South Padre Island Drive, which serve as the south and west boundaries, respectively, of the area. This area is listed on the "Texas Coastal Birding Trail," Central Coast, as Site #64.



Figure 9. Important Habitat and Resources for Birds at the Proposed Packery Channel Acquisition

This area consists of several undeveloped residential lots that contain important habitat, including small sand dunes covered with thick growth of coastal oak (*Quercus germinata*), bay laurel (*Umbellularia californica*), wax-leaf myrtle (*Myrica californica*), coral bean (*Eucalyptus forrestiana*), lantana (*Lantana sp.*), honeysuckle (*Lonicera sp.*), coastal grasses, vines, and wildflowers (Figure 9).

Packery channel is a winter home to many migratory waterfowl and shorebirds and also provides critical habitat and food to birds passing through the area. In particular, the densely shrubbed lots provide critically needed food and rest for the migratory nearctic-neotropical warblers, including the cerulean (*Dendroica cerulea*), golden-winged (*Vermivora chrysoptera*), blue-winged (*Vermivora pinus*),worm-eating (*Helmitheros vermivorus*), and Swainson's warblers (*Limnothlypis swainsonii*). Rare birds, such as the sulfur-bellied flycatcher (*Myiodynastes luteiventris*), gray kingbird (*Tyrannus dominicensis*), and black-whiskered vireo (*Vireo altiloquus*) have been sighted, as have more than 200 other species that migrate, nest, and roost at this site.

The Audubon Outdoor Club of Corpus Christi has established a sanctuary of 17 interior lots, which they own, and hopes to acquire adjacent lots, thus connecting the entire set of interior lots bordered by the existing residential lots. Three of the Audubon-owned lots consist of a low 'marsh-like' area that provides water to the birds. Upon purchase, the Audubon Outdoor Club, with assistance from Texas A&M University at Corpus Christi, would determine the feasibility of providing a source of water to that part of the sanctuary designated as marsh. When this area has a constant source of water, a boardwalk would be constructed that enters from Playa Del Ray onto the undeveloped street Villa Fransisca, to an elevated area above the marsh. USFWS has expressed an interest in assisting with the construction of the boardwalk. The city of Corpus Christi has been contacted to confirm that the streets of Villa Fransisca and Villa Santiago would remain undeveloped.

Development and clearing of the remaining residential lots at the site is in progress. If the proposed dredging of Packery Channel Waterway were approved, continued development of the area would accelerate and cause rapid destruction of the vital habitat. Sixty-six acres of the natural vegetation has been zoned as business by the city of Corpus Christi.

Restoration Objectives

This project objective is to compensate in part for foraging resources for migratory bird species impacted by the spill and help preserve unique habitat types. The impact of the spill not only directly affected the habitat itself, but also the food sources available to migratory and local bird populations. Migratory birds have returned to the area to find reduced available food sources. Additionally, the project compensates for losses of recreational opportunities for viewing natural areas and wildlife observations caused by the spill. This project affords long-term protection of important habitat by improving the natural resources available to bird and other wildlife species. In doing so, the public would have lands committed to natural area educational and recreational opportunities.

Scaling Approach

Numerous oiled birds were observed and collected during the spill. Their habitat and food sources were also impacted by the spill. Packery Channel provides important habitat for nesting, resting, and foraging for many species of migratory birds; however, many of the migratory bird species that utilize Packery Channel were not directly impacted from the spill.

The Trustees have not quantified the extent of potential benefits that would results from this habitat protection. However, Packery Channel has unique ecological communities that provide habitat, resting, and food sources for migratory birds and shorebirds. By implementing this project, this unique ecological community would be preserved, increasing the nesting, resting, and foraging opportunities afforded to the migratory and local bird populations. Additionally, this project would provide increased wildlife viewing opportunities to the public.

It is the best professional judgment of the Trustees that while this project would protect a unique ecological community, this scale of habitat protection for this habitat would not compensate for injuries to waterfowl, wading birds, and shorebirds, as only minimal habitat for these species is located in Packery Channel.

Probability of Success

The probability of success for this project is high. The Audubon Outdoor Club of Corpus Christ is currently preserving and successfully managing several parcel of land in the Packery Channel area. An increased amount of area would increase the use of the lands by migratory and local bird populations.

Success Criteria and Monitoring

The success criterion will be the reduction in incidence of disturbance to migratory birds and increased foraging opportunities for birds. As part of this project, the Trustees will continue to monitor disturbance to birds on the acquired lands.

Project Cost and Schedule

Lot costs vary and have increased approximately 15 percent to 20 percent per lot since the project was proposed. The project would include the acquisition of as many lots as possible given that $122,082 is designated for this resource category. Any additional enhancements would be performed with additional external funds and are not part of this project. It is estimated that the acquisition would take 12 months from the date of project approval.

Environmental Consequences

The long-term goal of the Audubon Outdoor Club of constructing a boardwalk for public viewing opportunities in the marsh area would have environmental impacts; however, the boardwalk is not part of this project.

Direct Effects

Shoreline
This project would have no direct effect on the shorelines, because the land proposed for acquisition would not be adjacent to a water body or river.

Birds
This tract of land provides critical resting and foraging opportunities for many migratory birds. This project would provide additional habitat on the Packery Channel waterway connecting existing tracts preserved by the Audubon Outdoor Club.

Fish, Mammals, and Other Organisms
This project would have no direct effect on fish, mammals, or other organisms.

Recreation Use
This area was not previously used for public recreation uses. The zoned land use for the property is residential. The land acquisition would have no effect on recreation use because the proposed project does not include immediate action for recreation improvements on the property.

Indirect Effects

Shoreline
This project would have no indirect effect on the shorelines.

Birds
Preventing residential construction on the parcel would reduce the breadth of human impact to the habitat, although recreation use would be in the long-range plans for the site. This limitation of human disturbance would most likely attract additional many migratory birds to the Packery Channel.

Fish, Mammals, and Other Organisms
This project would have no indirect effect on fish, mammals, or other organisms.

Recreation Use
Indirect recreation effects on recreation use depend on the Audubon Outdoor Club, Texas A& M University at Corpus Christi, USFWS, and the city of Corpus Christi following through tentative

plans to research and construct a water source to the parcel and to construct a boardwalk for bird viewing.

Cumulative Effects

The cumulative effects of this project include the proposed land acquisition, other land acquisitions in the area, and the other past, present and reasonably foreseeable future actions.

The proposed project would complement the past and ongoing land acquisitions in the area by the Audubon Outdoor Club to protect the Packery Channel waterway from habitat destruction and fragmentation for migratory birds. Foreseeable actions in this area include residential construction in parcels adjacent to and in the area of the proposed project that have not been purchased for habitat conservation. Construction for residential development may include site grading, road grading and paving, removal of shrubs, grasses and/or trees, and the underground installation of electrical, water, and wastewater services. The proposed project would not contribute to these future actions.

Evaluation

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and determined that this project is not consistent with these selection factors. Although the implementation of this project would result in positive benefits by preserving a unique ecological community, it is not an ecological community that was directly impacted by the spill. The Packery Channel area does have some habitat type—shoreline—that was directly impacted by spill; however, this is not the area that is available for acquisition. The Trustees determined that this type and scale of restoration would not effectively provide appropriate compensation for injuries to waterfowl, wading birds, and shorebirds that occurred as a result of the oil spill. This project was placed in the non-recommended category.

4.3.3 Dune and Vegetation Restoration Projects

Geological resources, sediments, and soils were damaged both by the oil that was deposited by surface waters and from the heavy equipment used in the response action. Oil was removed from the shoreline using manual and mechanical methods. To remove the tar balls and patties mechanically, a road grader was used to push the affected sand into windrows located in various portions of the spill area and above the high tide line. The objectives were to use the sand in a positive, constructive manner rather than as a waste material, to prevent access to blowouts and unauthorized roads, and slow natural succession or erosion of dunes. The Trustees, with the exception of PAIS, and Responsible Parties mutually agreed that the sand should be used for emergency dune-restoration purposes. The removal of sand containing oil and tar balls was performed using a variety of earth moving equipment, including road graders for removal of sand from the beachfront, front end loaders for movement of the sand to the nearby foredune areas, and dump trucks for movement of the sand to other foredune areas along the MISP. A total of 38,950 cubic yards of sand was removed from PAIS, with 20,247 cubic yards sold as road base material and 18,704 cubic yards trucked to MISP. A total of 23,968 cubic yards was removed from four state-owned areas: (1) from PAIS to Bob Hall Pier, (2) Newport Pass on Mustang Island, (3) a 30-foot-wide area near mile marker 22 on Mustang Island, and (4) several small areas within MISP. This material was used in conjunction with the 18,704 cubic yards from PAIS and placed along the vegetation line in the upper beach to construct 344 sand dunes along Nueces and Kleberg counties and in MISP. These constructed dunes were not revegetated in anticipation that the site would revegetate naturally; the dunes have since eroded as a result of tropical storm activity.

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4.3.3.1 Dune Restoration and Preservation—Gulf Side (Selected)

Project Description and Background

The Dune Restoration/Preservation—Gulf Side project includes performing restoration and/or preservation to Gulf-side dune areas of Texas state beaches. The restoration work would involve installing sand fences, placing sand from off-site locations, revegetating the area, and installing bollards—wooden posts linked with cables, for example—to prohibit unauthorized vehicular traffic. The sand fencing would encourage sand deposition and dune growth. If a location on PAIS were selected for this type of project, the sand used would come from an approved sand source, with the same grain size, shape, and mineral content and be free of contamination and exotic vegetation. The areas identified for this type of restoration are shown in Figure 10. Currently, one specific area injured by unauthorized vehicular traffic has been identified for restoration (Figure 11). If this project is selected for implementation, additional locations will be identified for restoration and another environmental assessment will be performed.

For the one identified location, approximately 1,000 feet of bollards along the seaward side of Highway 361 would be installed in the one area identified for restoration. The bollards would be installed along the seaward side of Highway 361 (500 feet) and the Gulf side (500 feet) of a washover area in MISP. Additionally, approximately 600 feet of temporary sand fencing would be installed along the Gulf side of the washover to promote dune growth (Figure 12).

It is not clear why motorists use the identified area, rather than a maintained beach access road 500 feet to the south, but the result has adversely impacted dunes and dune vegetation. Restricting vehicular access would help this area restore naturally. The vegetation in the washover would likely recover once vehicular traffic is blocked. In addition, the installation of temporary sand fencing along the Gulf side of the washover would facilitate dune growth.

Restoration Objectives

The restoration objectives for this project are the restoration and preservation of sand dune areas along the Gulf side of Mustang Island. The injury caused by the spill and the subsequent response action has created disturbed areas that are not stable and are eroding. This project would compensate the public for the damage by improving the condition of the beach and dunes in and around the affected areas. By implementing this project, a variety of benefits could be realized. These benefits include restoring and/or preserving impacted dunes and protecting such sensitive areas from further injury, while allowing natural recovery to occur and encouraging natural growth of the dune system.

Scaling Approach

The beachfront and foredunes were damaged both by the oil that was deposited by surface waters and from the heavy equipment used in the response action. After analysis, the Trustees concluded that the restoration/preservation of injured sand dunes, along with the emergency restoration activities performed by the Responsible Parties as part of the response action, would provide appropriate compensation for the injury caused to the beachfront and sand dunes by the spill.

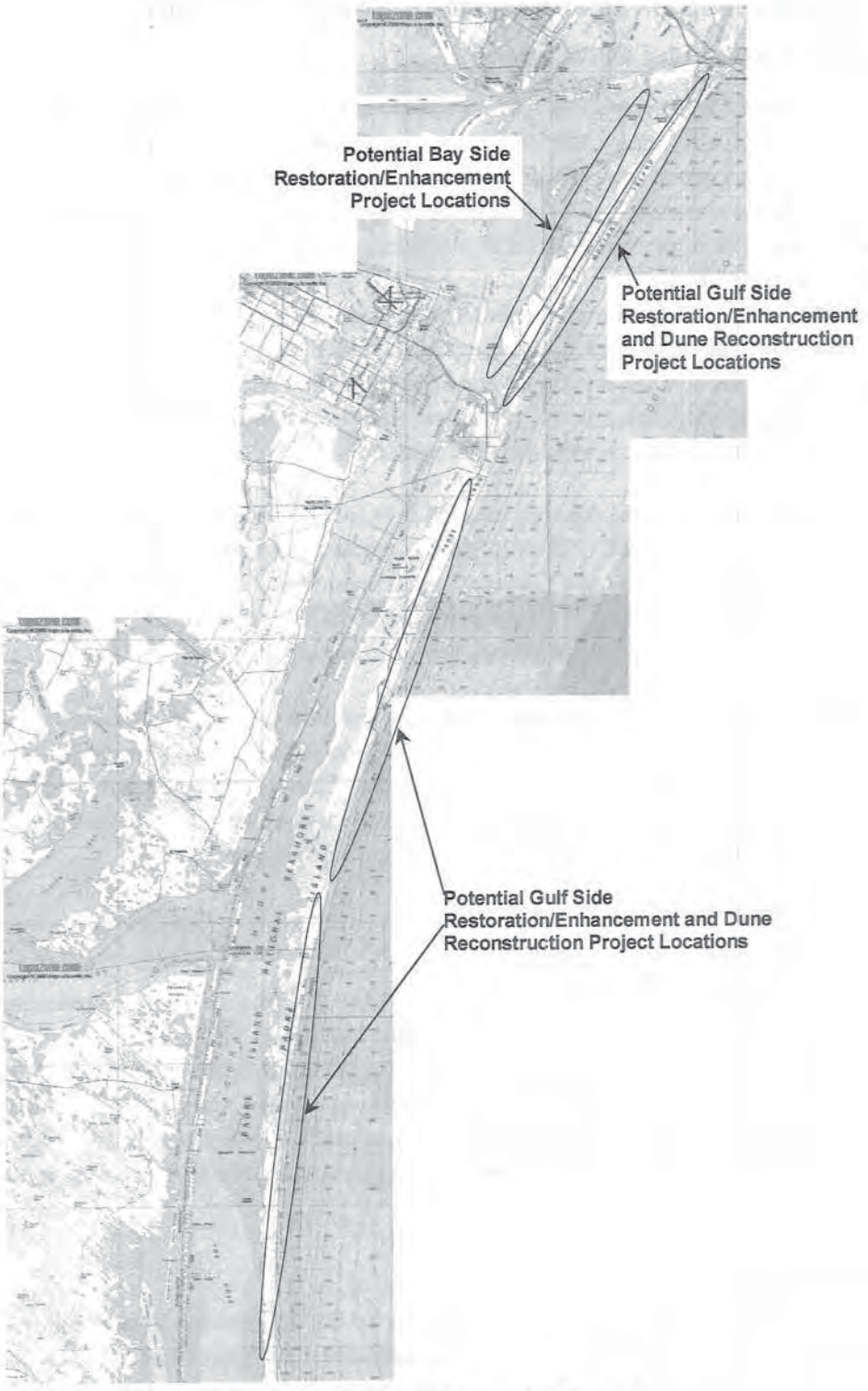


Figure 10. Potential Locations for Dune Restoration/Preservation/Reconstruction Projects

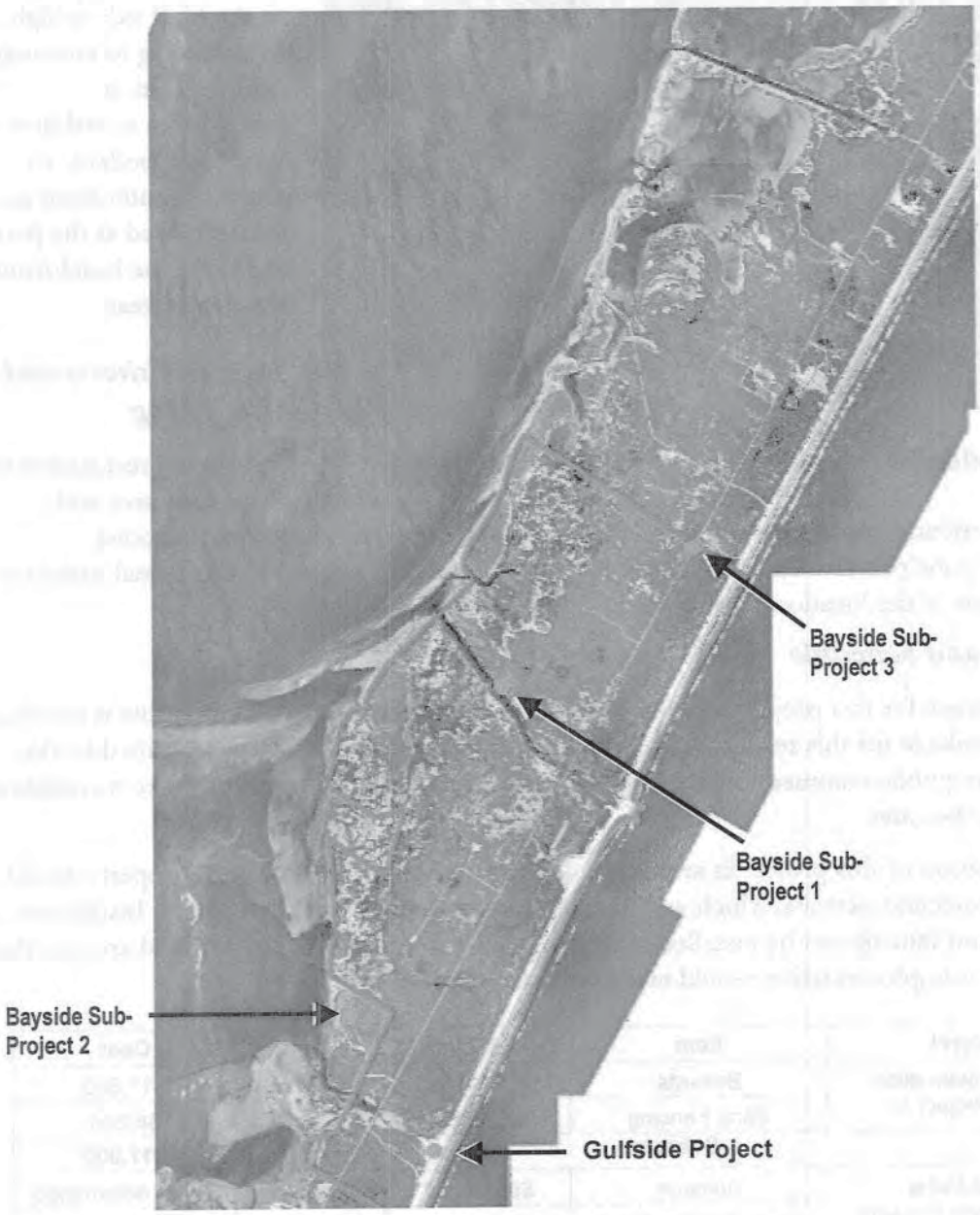


Figure 11. Identified Potential Dune Restoration/Preservation/Reconstruction Locations



Figure 12. Identified Potential Restoration/Preservation/Reconstruction Locations

Probability of Success

The probability of success of these types of projects on the Gulf side is high. Sand fencing to encourage sand deposition, revegetation to stabilize the dunes, and bollards to control unauthorized access has been used at the parks and along the beachfront in numerous areas.

Success Criteria and Monitoring

Performing restoration of the injured area and successfully restricting unauthorized vehicular access will be the determination of success. Monitoring for dune preservation and unauthorized vehicular access would be informal based on visual assessment of the location by park staff.

Project Cost and Schedule

The estimated costs for this project below. Although the total cost of the identified site is less than the $115,000 available for this resource category, additional similar sites will be identified by the Trustees or from public comment. The site identified for restoration is based on current conditions along the public beaches.

The implementation of this project in areas outside the federal park or state park property would require dune protection permits, which would take approximately 8 weeks to obtain. Installation of bollards, and sand fencing can be installed in approximately 2 weeks for the identified area, so the total duration for implementation would take approximately 4 months.

Project	Item	Unit Cost	Quantity	Cost
Dune Preservation (Sub-Project 1)	Bollards	$58.00 ea*	200 ea	$11,600
	Sand Fencing	$10.50/linear ft	600 ft	$6,300
Subtotal				**$17,900**
Other Dune Preservation Projects	Bollards	$58.00 ea*	As needed	To be determined
	Furnish/Place Sand	$12.50/cy	As needed	To be determined
	Sand Fencing	$10.50/linear ft	As needed	To be determined
	Dune Plant Material	$2.00 ea	As needed	To be determined
			Subtotal	**$97,100**
			Total Cost	**$115,000**

* Price quotes for bollard installation performed previously have varied from $25.00 to $92.00 each. For estimating purposes, a mean price of $58.00 was used. Once the specific locations of bollard installation have been determined, the Trustees will obtain price quotes and spend the allotted monies on dune restoration/preservation while obtaining economy of scale as possible from implementation of projects.

The total duration for implementation of this type of project will be variable based on the work performed. For example, at any other identified locations, installation of bollards can be done in at a rate of approximately 50 bollards per day. Installation of sand fencing only takes a matter of days. Sand placement can be performed at a rate of approximately 120 cubic yards per day. If a site is to be vegetated, a period of approximately 1 week will be required to allow the dunes to settle. Installation of vegetation should not take more than 1–2 weeks. This type of project should not be implemented during hurricane season. Revegetation should take place in the fall or spring.

Permitting Requirements

Were this type of project to be implemented outside a state and/or National Park area, it would require compliance with Beach Management Plans and a consistency review by GLO. This compliance may include the following requirements:

- "Dune building structures shall not be erected in washover areas except adjacent to the toe of existing dunes" (Section IV, C, 3a).
- "The dune building structures should be placed parallel to existing dunes bordering the washover area instead of parallel to the gulf shoreline" (Section IV, C, 3b).
- The Beach Management Plans also have some specific requirements for repairing blowout areas.

A Section 7 consultation with USFWS may be required because the habitat for the piping plover (*C. melodus*), sea turtles, and brown pelican (*P. occidentalis*) may be disturbed during site work. A review of potential archaeological impacts would also be conducted internally within TPWD through the terms of an interagency Memorandum of Understanding with the Texas Historical Commission that allows qualified agency staff to undertake the review of departmental projects.

Environmental Consequences

One site has been currently selected for restoration/preservation activities, so the evaluation of the environmental aspects of any additional locations cannot be performed. When this RP/EA is final, therefore, this project will not be included in the FONSI. The environmental consequences will be examined as additional locations for this project are identified.

Direct Effects

Shoreline

This project would provide positive environmental benefits by facilitating dune growth and natural restoration of the dune vegetation, a vital part of the shoreline/beach habitat. To blend in with the natural environment, the sand placed at the site would need to be similar in grain size, shape, color, and mineral content to the native sand at the site and be free of contamination and exotic plants.

Measures would need to be taken during implementation of the restoration at the identified project location to ensure that additional injury did not occur to the surrounding dune area. Minor temporary direct effects to dunes would be anticipated from construction of sand fencing, re-vegetation, and bollard and cable installation. Temporary construction traffic on and around dunes would take place to complete the dune restoration. During the construction activities, sand

placement could cover existing vegetation or wildlife habitat. Mitigation measures might be necessary if the areas slated for sand placement were determined to be valuable habitat.

Birds
The habitat for the protected piping plover (*C. melodus*) is located along a section of the Gulf side of Mustang and Padre islands. Most of the plover foraging activity, approximately 80 percent, occurs along the Bay flats area and large washover areas (Corpus Christi Pass, Newport Pass) not the beach surf zone.

Adverse effects to the bird population, such as temporary dislocation, could be minimized or avoided during the construction phase.

Fish, Mammals, and Other Organisms
Sea turtles nest along the Gulf side of PAIS. Adverse effects to the sea turtles could be minimized or avoided by scheduling the construction phase so that it avoided the nesting season. The Trustees support this mitigation technique.

Recreation Use
The only direct effects this project may have on recreation use would be if the associated construction activities interfered with pedestrian paths or recreation use areas. Construction may prohibit recreation use in the area. This effect would be limited and temporary.

Indirect Effects

Shoreline
This project would have no indirect effect on the shorelines.

Birds
Facilitation of dune growth and natural restoration of the dune vegetation could create positive indirect effects on birds, by creating more habitats for shorebirds and migratory birds. This action could attract more birds to the restored area.

Fish, Mammals, and Other Organisms
This project would have no indirect effect on fish, mammals, and other organisms.

Recreation Use
Indirect effects to recreation use may include an increase in visitors in the vicinity of the dune restoration for bird watching if the project attracts additional birds to the enhanced habitat.

Cumulative Effects

The cumulative effects of this project include the proposed restoration project and other past, present and reasonably foreseeable future actions. Cumulative effects to wildlife habitat and to visitor use of facilities could result from simultaneous construction projects on federal and state lands. Cumulative effects would be identified once the Trustees and the public have determined the location of this project and other projects that will be implemented. The construction of this project may be phased to minimize cumulative effects.

Evaluation

This project would restore dune habitat along the Gulf side in the area of the injury from the spill. An evaluation to determine which of the four components of this project is applicable for a specific location selected for restoration will be necessary if additional sites are selected for restoration. The installation of sand fencing, placement of sand, revegetation, and use of bollards to restrict unauthorized vehicular access is a feasible and practical method of dune restoration/preservation. These methods have been successfully used all along the Texas coastline on federal and state lands.

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and concluded that this project is consistent with these selection factors. The Trustees determined that this type and scale of restoration would effectively provide appropriate compensation for injuries to sand dune areas that occurred as a result of the oil spill and subsequent response action. This project was placed in the highly recommended category.

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4.3.3.2 Dune Restoration and Preservation—Bay Side

Project Description and Background

The Dune Restoration/Preservation—Bay Side project includes performing restoration and/or preservation to Bay side dune areas of Texas state beaches. The restoration work would involve installing sand fences, placing sand from off-site locations, revegetating the area, and installing bollards, consisting of wooden posts linked with cables, to prohibit unauthorized vehicular traffic. The sand fencing would encourage sand deposition and dune growth. Examples of dune injuries that would be restored or enhanced are shown in Figures 13 and 14. Three specific areas have been identified for this type of restoration activities as shown in Figure 11. If additional projects are selected for implementation in the future, an environmental assessment will be performed before they are initiated. Figure 10 shows the potential project implementation locations.



Figure 13. Example of Dune Injury for Restoration and Preservation



Figure 14. Example of Dune Injury for Restoration and Preservation

Sub-Project 1 consists of restoring two damaged dunes along Fish Pass Road and installing approximately 200 feet of bollards to restrict unauthorized vehicular traffic from sensitive areas. The first dune site would not require additional sand, but it would require installing sand fencing and revegetating an area of approximately 1,200 square feet. The second dune site would require approximately 200 cubic yards of sand and 1,600 square feet of sand fencing and vegetation.

Sub-Project 2 consists of a single dune area that has been damaged by off-road vehicles. The area damaged would require approximately 300 cubic yards of sand, sand fencing, and vegetation in an area of approximately 1,000 square feet. Limiting vehicular access to this area of the park would require approximately 2 miles of bollards. It might also be necessary to install bollards along Highway 361 as well.

Sub-Project 3 is the installation of 1.5 miles of bollards along Highway 361. Drivers of off-road vehicles have used old oil field roads to access the Bay side of the island, an activity that has resulted

in damage to sensitive habitats. Bollards are currently placed in the middle of the access roads, but they have not prevented drivers from driving around them. To adequately limit this access, additional bollards would need to be installed from the edge of the park to Fish Pass.

These project areas are different than the Gulf-facing sites in terms of vegetation, habitat, and impacts. The primary issue at these sites is drivers of off-road vehicles who exit the unimproved roadways and drive over dunes and other sensitive areas, damaging them. Bollards can assist in restricting access to help prevent this kind of damage, but proper spacing is needed to prevent people from circumventing them. Typically, the line of bollards needs to extend from and to a permanent structure or impediment, such as a bridge or permanent body of water, to be effective.

Restoration Objectives

The restoration objectives for this project are the restoration and preservation of sand dune areas along the Bay side of Mustang Island. The injury caused by the spill and the subsequent response action created disturbed areas that were not stabilized and are eroding. This project would compensate the public for the damage by improving the condition of the beach and dunes in and around the affected areas. By implementing this project, a variety of benefits could be realized. These benefits include restoring and/or preserving impacted dunes and protecting such sensitive areas from further injury, while allowing natural recovery to occur and encouraging natural growth of the dune system.

Scaling Approach

The beaches and foredunes were damaged both by the oil that was deposited by surface waters and by the heavy equipment used in the response action. After analysis, the Trustees concluded that although this project is located along the Bay side of the islands, the restoration/preservation of injured sand dunes, along with the emergency restoration activities performed by the Responsible Parties as part of the response action, would provide appropriate compensation for the injury caused to the injured geologic resources by the spill.

Probability of Success

The probability of success of these types of projects on the Bay side is moderate. Placement of sand fencing to encourage sand deposition and dune growth along the Bay is questionable because of the prevailing winds from the southeast. Revegetation to stabilize the dunes and bollards to control unauthorized access are techniques that have been used at the parks and along the beachfront in numerous areas.

Success Criteria and Monitoring

Performing restoration of the injured area and successfully restricting unauthorized vehicular access will be the determination of success. Monitoring for dune preservation and unauthorized vehicular access would be informal based on visual assessment of the location by park staff.

Project Cost and Schedule

The following costs have been identified for this project. Although the total cost of the identified site is higher than the $115,000 available for this resource category, specific sites for

restoration/preservation will be determined by the Trustees or from public comment. The sites identified for restoration were selected based on current conditions along the Bay side of Mustang Island.

Project	Item	Unit Cost	Quantity	Cost
Dune Protection and Preservation (Sub-Project 1)	Bollards	$58.00 ea*	40 ea	$2,320
	Furnish/Place Sand	$12.50/cy	200 cy	$2,500
	Sand Fencing	$10.50/linear ft	350 ft	$3,675
	Dune Plant Material	$2.00 ea	928 ea	$1,856
			Subtotal	**$10,351**
Dune Preservation (Sub-Project 2)	Bollards	$58.00 ea*	2,112 ea	$122,496
	Furnish/Place Sand	$12.50/cy	300 cy	$3,750
	Sand Fencing	$10.50/linear ft	150 ft	$1,575
	Dune Plant Material	$2.00 ea	358 ea	$716
			Subtotal	**$128,537**
Sensitive Area Preservation (Sub-Project 3)	Bollards	$58.00 ea*	1,584 ea	$91,872
			Subtotal	**$91,872**
			Total Cost	**$230,760**

* Price quotes for bollard installation performed previously have varied from $25.00 to $92.00 each. For estimating purposes, a mean price of $58.00 was used. Once the specific locations of bollard installation have been determined, the Trustees will obtain price quotes and spend the allotted monies on dune restoration/preservation while obtaining economy of scale as possible from implementation of projects.

The implementation of this project in areas outside the National Park or state park property would require dune protection permits, which would take approximately 8 weeks to obtain.

The total duration for implementation of this type of project will be variable based on the work performed. For example, at any other identified locations, installation of bollards can be performed at a rate of approximately 50 bollards per day and sand fencing can be installed in a matter of days. Sand placement can be performed at a rate of approximately 120 cubic yards per day. If a site is already vegetated, a period of approximately 1 week will be required to allow the dunes to settle. Installation of vegetation should not take more than 1–2 weeks. This type of project should not be implemented during hurricane season. Revegetation should take place in the fall or spring.

Permitting Requirements

Were this type of project implemented outside a state and/or National Park area, it would require dune protection permits and compliance with Beach Management Plans and a consistency review by GLO. This compliance may include the following requirements:

- "Dune building structures shall not be erected in washover areas except adjacent to the toe of existing dunes" (Section IV, C, 3a).
- "The dune building structures should be placed parallel to existing dunes bordering the washover area instead of parallel to the gulf shoreline" (Section IV, C, 3b).
- The Beach Management Plans also have some specific requirements for repairing blow-out areas.

A Section 7 consultation with USFWS may be required because the habitat for the piping plover (*C. melodus)* and brown pelican (*P. occidentalis*) may be disturbed during site work. A review of potential archaeological impacts would also be conducted internally within TPWD through the terms of an interagency Memorandum of Understanding with the Texas Historical Commission that allows qualified agency staff to undertake the review of departmental projects.

Environmental Consequences

One site has been currently selected for restoration/preservation activities, so the evaluation of the environmental aspects of any additional locations cannot be performed. When this RP/EA is final, therefore, this project will not be included in the FONSI. The environmental consequences will be examined as additional locations for this project are identified.

Direct Effects

Shoreline

This project would provide direct positive environmental effects by facilitating dune growth and natural restoration of the dune vegetation, a vital part of the shoreline/beach habitat. To blend in with the natural environment, the sand placed at the site would need to be similar in grain size, shape, color, and mineral content to the native sand at the site and free of contamination and exotic plants. The sand-fencing component of this project would be studied in more detail when specific locations have been identified for restoration implementation. The prevailing winds on the Bay side are from the southeast, so the ability of the fences to trap the sand is suspect.

Measures would need to be taken during implementation of the restoration at the identified project location to ensure that additional injury did not occur to the surrounding dune area. Minor temporary direct effects to dunes would be anticipated from construction of sand fencing, re-vegetation, and bollard and cable installation. Temporary construction traffic on and around dunes would take place to complete the dune restoration. During the construction activities, sand placement could cover existing vegetation or wildlife habitat. Mitigation measures might be necessary if the areas slated for sand placement were determined to be valuable habitat.

Birds

The habitat for the protected piping plover (*C. melodus*) is located along a section of the Gulf side of Mustang and Padre islands. Most of the plover foraging activity, approximately 80 percent, occurs along the Bay flats area and large washover areas (Corpus Christi Pass, Newport Pass).

Adverse direct effects to the bird population, such as temporary dislocation, could be minimized or avoided during the construction phase.

Fish, Mammals, and Other Organisms

This project would have no indirect effect on fish, mammals, and other organisms.

Recreation Use

Project construction may prohibit recreation use in the area. This direct effect would be limited and temporary. Also, the unauthorized off road vehicle use in the restoration areas would cease as a result of bollards, if the bollards are designed to prohibit all vehicle access to the area.

Indirect Effects

Shoreline

This project would have no indirect effect on the shorelines.

Birds

Facilitation of dune growth and natural restoration of the dune vegetation could create positive indirect effects on birds, by creating more habitats for shorebirds and migratory birds. This action could attract more birds to the restored area.

Fish, Mammals, and Other Organisms

This project would have no indirect effect on fish, mammals, and other organisms.

Recreation Use

Indirect effects to recreation use may include an increase in visitors in the vicinity of the dune restoration for bird watching if the project attracts additional birds to the enhanced habitat.

Cumulative Effects

The cumulative effects of this project include the proposed restoration project and other past, present and reasonably foreseeable future actions. Cumulative effects to wildlife habitat and to visitor use of facilities could result from simultaneous construction projects on federal and state lands. Once the Trustees and the public have determined the location of this project and which projects will be implemented, the construction may be phased to minimize cumulative effects.

Evaluation

This project would restore dune habitat along the Bay side near the area of the injury from the spill. An evaluation to determine which of the four components of this project is applicable for a specific location selected for restoration will be necessary if additional sites are selected for restoration as a result of this Restoration Plan. The installation of sand fencing, placement of sand, revegetation, and use of bollards to restrict unauthorized vehicular access is a feasible and practical method of dune restoration/preservation and will restore dune habitat along the Bay side in the area of the injury from the spill. These methods have been successfully used all along the Texas coastline on federal and state lands.

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and concluded that this project is consistent with these selection factors. The Trustees determined that this type and scale of restoration would effectively provide appropriate compensation for injuries resulting from the oil spill and subsequent response action. However, since this project is located on the Bay side of the islands, it was placed in the moderately recommended category.

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4.3.3.3 Dune Reconstruction—Gulf Side

Project Description and Background

As a whole, the Gulf side of Mustang and Padre islands is accreting and stable. There are areas, however, where a dune reconstruction project would be feasible and beneficial. This project consists of the reconstruction of a dune ridge adjacent to the beach on the Gulf side of Mustang or Padre Island to create a buffer against storm surges (Figure 10). The dune ridge would be approximately 900 feet long, 30 feet wide, and 6 feet tall and stabilized with vegetation. The project site has not specifically been determined. If this project is selected for implementation, a specific location will be identified and an additional environmental assessment will be performed.

Although the foredune ridge along the Gulf side of Mustang and Padre Islands is in excellent condition, the ridge is likely to receive tidal or storm damage from washover effects and is also extremely susceptible to storm surges. The reconstruction of a dune ridge adjacent to the beach would create a buffer against storm surges. The reconstructed ridge would provide a measure of protection for the area from washover effects and could provide an excellent opportunity to educate visitors about coastal processes.

Restoration Objectives

The objective of this project is to compensate for the damage done to the dunes and vegetation from the spill by creating a dune in the affected area. By implementing this project, a variety of benefits could be realized. These benefits include protecting a sensitive area from erosion and damage from storm surge, encouraging natural growth of the dune system, and providing an opportunity to educate visitors about coastal processes.

Scaling Approach

As a result of the spill and from the subsequent response action, geological resources, sediments, and soils were injured. The area impacted included the beachfront and dune areas not only from oil washing up on the beaches and foredunes but also from the mechanical equipment used for oil removal. After analysis, the Trustees concluded that the reconstruction of a sand dune along the Gulf side of the islands, combined with the emergency restoration activities performed by the Responsible Parties as part of the response action, would provide appropriate compensation for the injury caused to the beachfront and sand dunes by the oil spill.

Probability of Success

The probability of success of this project could be high, depending on the location selected. Reconstruction of a sand dune along the beach would be successful in protecting an area from erosion and damage from storm surge and would encourage natural growth of the dune system. Beachfront and dunes change on a daily basis because the tide ebbs and flows. Construction of sand dunes is a practical means of protecting some areas from further erosion and damage as the constructed dunes serve as a sacrificial erosion source and accretion barrier.

Success Criteria and Monitoring

The success of this project would be measured by how well the reconstructed ridge protected the area behind the ridge and surrounding natural ridge. Monitoring for this protection would be

informal based on visual assessment of the location by park staff. It is understood that the proposed dune ridge would require maintenance to ensure integrity. For this reason, maintenance considerations would be included in the MISP Master Plan, which should contain a sand management component.

Project Cost and Schedule

The estimated costs for this project are illustrated below.

Project	Item	Unit Cost	Quantity	Cost
Beach Dune Ridge Construction	Furnish/Place Sand	$12.50/cy	3000 cy	$37,500
	Sand Fencing	$10.50/linear ft	900 ft	$9,500
	Dune Plant Material	$2.00 ea	10,250 ea	$20,500
	Walkovers	$42/sq ft	800 sq ft	$33,600
			Total Cost	**$101,100**

The implementation of this project in areas outside the federal park or state park property would require dune protection permits, which would take approximately 8 weeks to obtain. Sand placement can be performed at a rate of approximately 120 cubic yards per day. The placed sand should be allowed to settle for approximately 1 week prior to revegetation. Planting would take approximately 2–3 weeks. Sand fencing installation would only take a matter of days to install. The total duration for implementation, therefore would take approximately 4 months. This type of project should not be implemented during hurricane season.

Permitting Requirements

Were this type of project to be implemented outside a state and/or National Park area, it would require dune protection permits and compliance with Beach Management Plans and a consistency review by GLO. This compliance may include the following requirements:

- "Dune building structures shall not be erected in washover areas except adjacent to the toe of existing dunes" (Section IV, C, 3a).
- "The dune building structures should be placed parallel to existing dunes bordering the washover area instead of parallel to the gulf shoreline" (Section IV, C, 3b).

A Section 7 consultation with USFWS may be required because the habitat for the piping plover (*C. melodus*) and brown pelican (*P. occidentalis*) may be disturbed during site work, and a review of potential archaeological impacts would be conducted internally within TPWD through the terms of an interagency Memorandum of Understanding with the Texas Historical Commission that allows qualified agency staff to undertake the review of departmental projects.

Environmental Consequences

A specific site has not been selected for reconstruction activities; therefore, the environmental aspects of the location could not be performed. When this RP/EA is final, therefore, this project will not be included in the FONSI. The environmental consequences would be examined when the project location is identified.

Direct Effects

Shoreline

This project would provide positive environmental effects by protecting a sensitive area and/or facilitating dune growth, depending on the selected location. If the location selected is a washover or washout area that extends all the way across the barrier island, construction of a dune that seals the natural washover could create significant environmental impact. These natural washover areas provide an avenue for the release of excess storm water from the Bay, and they channel storm surge from the Gulf that might otherwise destroy dunes. Additional study on the impact to the shoreline will be needed once a location is selected for project implementation.

Measures would need to be taken during implementation of the restoration at the identified project location to ensure that additional injury did not occur to the surrounding dune area. To blend in with the natural environment, the sand placed at the site will need to be similar in grain size, shape, color, and mineral content to the native sand at the site and be free of contamination and exotic plants. Minor temporary direct effects to dunes would be anticipated from construction of sand fencing, re-vegetation, and bollard and cable installation. Temporary construction traffic on and around dunes would take place to complete the dune restoration. During the construction activities, sand placement could cover existing vegetation or wildlife habitat. Mitigation measures might be necessary if the areas slated for sand placement were determined to be valuable habitat.

Birds

The habitat for the protected piping plover (*C. melodus*) is located along a section of the Gulf side of Mustang and Padre islands. Most of the plover foraging activity, approximately 80 percent, occurs along the Bay flats area and large washover areas, such as Corpus Christi Pass and Newport Pass, not the beach surf zone.

Adverse effects to the bird population, such as temporary dislocation, could be minimized or avoided during the construction phase.

Fish, Mammals, and Other Organisms

Sea turtles nest along the Gulf side of PAIS. Direct adverse effects to the sea turtles could be minimized or avoided by scheduling the construction phase so that it avoided the nesting season. The Trustees support this mitigation technique.

If the location selected is a washover or washout area that extends all the way across the barrier island, construction of a dune that seals the natural washover could create significant environmental impact on fish, marine mammals, and marine organisms. Some washover or washout areas serve as a migration route for finfish and shellfish during storms, and they allow for the transportation of organic matter, an important component of the food chain, to the Gulf during high tides and storms. Additional study on the effects to fish, mammals, and other organisms is needed once a location is selected for project implementation.

Recreation Use

Project construction may prohibit recreation use in the area. This effect would be limited and temporary.

Indirect Effects

Shoreline

This project would have no indirect effect on the shorelines.

Birds

Reconstruction of a new dune and natural restoration of the dune vegetation could create positive indirect effects on birds, by creating more habitats for shorebirds and migratory birds. This action could attract more birds to the restored area.

Fish, Mammals, and Other Organisms

This project would have no indirect effect on fish, mammals, and other organisms.

Recreation Use

Indirect effects to recreation use may include an increase in visitors in the vicinity of the dune restoration for bird watching if the project attracts additional birds to the enhanced habitat.

Cumulative Effects

The cumulative effects of this project include the proposed restoration project and other past, present and reasonably foreseeable future actions. Cumulative effects to wildlife habitat and to visitor use of facilities could result from simultaneous construction projects on federal and state lands. Once the Trustees and the public have determined the location of this project and which projects will be implemented, the construction may be phased to minimize cumulative effects.

Evaluation

This project would restore and protect a sensitive area along the Gulf side in or near the area of the injury from the spill. Depending on the location selected, the installation of a sand dune ridge is a feasible and practical method of protection of sensitive areas along the beachfront. These methods have been successfully used all along the Texas coastline on federal and state lands. The sand placed at the site will need to be similar in grain size, shape, color, and mineral content to the native sand at the site and be free of contamination and exotic plants.

The Trustees evaluated this project against all threshold and additional screening criteria developed to select recommended restoration projects and concluded that this project is consistent with these selection factors. The Trustees determined that this type and scale of restoration would effectively provide appropriate compensation for injuries to sand dune areas that occurred as a result of the oil spill and subsequent response action. Because the location is unknown at this time, a factor that would help determine the ability for successful implementation, this project was placed in the moderately recommended category.