TEXAS COASTAL RESILIENCY MASTER PLAN

TECHNICAL REPORT - MAY 2019

George P. Bush, Commissioner, Texas General Land Office

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Abbreviations & Acronyms

ADCIRC	Advanced Circulation Model
ADVSD	Abandoned or Derelict Vessels, Structures and Debris
ADLH	Altered, Degraded or Lost Habitat
AWS	Amazon Web Services
BEG	Bureau of Economic Geology
BSE	Bay Shoreline Erosion
BUDM	Beneficial Use of Dredge Material
C-CAP	Coastal Change Analysis Program
CEPRA	Coastal Erosion Planning and Response Act
CFD	Coastal Flood Damage
CGAP	Coastal Grants and Projects
CIAP	Coastal Impact Assistance Program
CMP	Coastal Management Program
CORS	Continuously Operating Reference Station
Crouch	Crouch Environmental Services, Inc.
CSRM	Coastal Storm Risk Management
CSTORM-MS	Coastal Storm Modeling System
Database	Project Geospatial Database
E&D	Engineering and Design
EFCSSD	Existing and Future Coastal Storm Surge Damage
EF JRB	Ellington Field Joint Reserve Base
ENOW	Economics: National Ocean Watch
EPA	Environmental Protection Agency
ESI	Environmental Sensitivity Index
DEM	Digital Elevation Model
FEMA	Federal Emergency Management Agency
FORE-SCE	Forecasting Scenarios of Land-Use Change
GBEDD	Gulf Beach Erosion and Dune Degradation
GBS	General Building Stock
GCCPRD	Gulf Coast Community Protection and Recovery District
GCN	Gulf Coast Network
GDP	Gross Domestic Product
GIS	Geographic Information System
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
GMSLR	Global mean sea level rise
GPS	Global Positioning System
GRP	Gross Regional Product
GT	Great diurnal tide range
Hazus	Hazards U.S.
HGSD	Harris-Galveston Subsidence District
HRI	Harte Research Institute for Gulf of Mexico Studies
HTU	Half-tide unit
HUC	Hydrologic Unit Code
ICR	Impact on Coastal Resources
IDW	Inverse distance weighting
IMPLAN	Impact Analysis for Planning Model
IOC	Issue of Concern
IPCC	Intergovernmental Panel on Climate Change
IWQQ	Impact on Water Quality and Quantity
LiDAR	Light Detection and Ranging
LMSL	Local Mean Sea Level
LULC	Land use/land cover
MAXELE	Maximum water surface elevation

MEOW	Maximum envelope of water
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MSA	Metropolitan Statistical Area
MTL	Mean Tide Level
MTS	Maritime Transportation System
NAICS	North American Industry Classification System
NAS	Naval Air Station
NAVD88	North American Vertical Datum of 1988
NGVD 1929	National Geodetic Vertical Datum of 1929
NGS	National Geodetic Survey
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
NOEP	National Ocean Economics Program
NPS	National Park Service
NWI	National Wetland Inventory
O&M	Operation and Maintenance
PAM	Port-A-Measure
RECONS	Regional Economic System Software
Report	Technical Report to the Texas Coastal Resiliency Master Plan
Resiliency Plan	Texas Coastal Resiliency Master Plan
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
RESTORE Council	Gulf Coast Ecosystem Restoration Council
RSLR	Relative sea level rise
RMSE	Root-mean-square error
RMW	Radius of Maximum Winds
SLAMM	Sea Level Affecting Marshes Model
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
SRTM	Shuttle Radar Topography Mission
SSPEED	Severe Storm Prediction, Education, and Evaluation from Disasters
STWAVE	Steady-State Spectral Wave
SWAMP	System-Wide Assessment and Monitoring Program
SWAN	Simulating Waves Nearshore Model
TAC	Technical Advisory Committee
TSS	Topography of sea surface
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
USD	U.S. dollars
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VDATUM	Vertical Datum Transformation
VLM	Vertical land movement
VMs	Virtual Machines
WBCSD	World Business Council for Sustainable Development
WSE	Water Surface Elevation

SECTION 1. Introduction

A. Report Purpose & Relationship to the Texas Coastal Resiliency Master Plan

The Texas General Land Office (GLO) has prepared an update to the 2017 Texas Coastal Resiliency Master Plan (Resiliency Plan) to guide the restoration, enhancement and protection of the state's natural resources. The updated 2019 Resiliency Plan provides a framework to protect communities, infrastructure and ecological assets from coastal hazards that include short-term, direct impacts (e.g. flooding, storm surge) and long-term, gradual impacts (e.g. erosion, habitat loss).

The Resiliency Plan is a tool for selecting and implementing projects that produce measurable economic and ecological benefits to advance coastal resiliency, provide for meaningful stakeholder engagement and work toward an adaptable planning process that accommodates changing coastal conditions as well as the evolving needs and preferences of the citizens of Texas.

The goal of this Technical Report (Report) is to support the content of the Resiliency Plan by demonstrating the application of sound and objective science and engineering drawn from current data and information. This Technical Report presents the methodology employed in Resiliency Plan development, the outcome of coastal analysis tasks (e.g. project identification, project screening, Technical Advisory Committee analysis, technical assessments) and the rationale for Resiliency Plan outcomes and proposed Actions.

B. Planning and Technical Approach Overview

Resiliency Plan development took place from March 2017 through March 2019, consistent with the planning process outlined in the Resiliency Plan. Resiliency Plan development tasks included more detailed analysis and screening of potential projects via desktop (planning-level) engineering and Technical Advisory Committee (TAC) reviews, environmental, physical, and economic characterizations of the coast and further development of Resiliency Strategies and proposed Actions. The planning process also entailed continued development of the project geospatial database (Database) comprised of projects and supplementary data (e.g. terrain, habitats, critical facilities) proposed by various coastal technical experts, agencies, stakeholders and organizations.

The Resiliency Plan is a continuation of the GLO's 2017 Texas Coastal Resiliency Master Plan and builds on technical and planning elements developed at that time.

C. Report Content & Structure

This Report is organized into eight sections. SECTION 1 provides an overview of Report purpose and goals, its relationship to the Resiliency Plan and its technical approach. SECTION 2 introduces the various partners involved in the collaborative Resiliency Plan development effort. SECTION 3 provides an overview of Texas coastal environments, drawn from the 2017 Resiliency Plan. SECTION 4 presents the methodology and planning principles used to guide the technical assessment. SECTION 5 identifies the steps taken to collect, organize, and analyze relevant coastal data and information. SECTION 6 describes various modeling efforts used to inform and develop the Resiliency Plan. SECTION 7 describes the steps taken to screen identified projects to ensure their relevance and contributions to coastal resiliency goals. SECTION 8 discusses the Technical Advisory Committee's role in the analysis of the proposed projects. SECTION 9 introduces the technical assessment methodology used to prioritize coastal projects for potential inclusion in the Resiliency Plan. SECTION 10 describes the final project and implementation recommendations and outlines adaptive management and future coastal management.

SECTION 2. TEXAS COASTAL RESILIENCY MASTER PLAN PARTNERS

Development of all aspects of the Resiliency Plan, including the planning framework and the technical work, was a collaborative effort among multiple partners that collectively represented a diverse array of disciplines (Figure 2-1). Presented below is an introduction to the various partners and their respective roles and responsibilities.

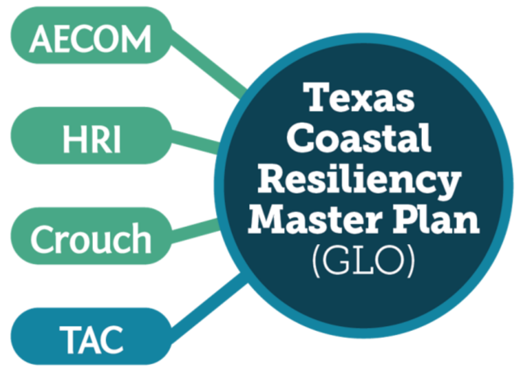

Figure 2-1: The GLO's Planning Team

A. TEXAS GENERAL LAND OFFICE

The Texas General Land Office is authorized under state legislation to restore, enhance and protect the state's coastal natural resources. To that end, the GLO led preparation of the Texas Coastal Resiliency Master Plan and, in so doing, provided a framework for projects that protect communities, infrastructure and ecological assets from coastal Issues of Concern (IOCs), such as coastal flooding, storm surge, erosion and habitat loss. The GLO managed a GLO Planning Team, listed and described alphabetically below, that was responsible for overseeing the direction and approach of Resiliency Plan development activities, as well as those associated with this Technical Report.

B. AECOM

AECOM was selected to provide planning and engineering support for technical elements of the Resiliency Plan development process. AECOM's responsibilities included participating in planning activities, liaising with the GLO and other partners (e.g., Technical Advisory Committee) and leading various technical tasks. The latter included literature review of existing models and data, project identification and review, planning-level engineering, analysis of benefits and socio-economic impacts, project technical assessments, analysis of Resiliency Strategies, coastal modeling, database development, report production and Resiliency Plan preparation assistance.

AECOM's team included several Texas-based firms with the following roles and capabilities:

- Crouch Environmental Services, Inc. - Public outreach and environmental planning
- DHI Water and Environment, Inc. - Coastal modeling and physical and risk assessments
- J. Simmons Group - Coastal construction and feasibility

C. CROUCH ENVIRONMENTAL SERVICES, INC.

Crouch Environmental Services, Inc. (Crouch) led outreach efforts that entailed coordinating with the TAC, local officials and government entities. Crouch also developed informational materials for the various end users of the Resiliency Plan and produced the Resiliency Plan and other materials for the Texas State Legislature, the TAC and public consumption.

D. HARTE RESEARCH INSTITUTE

Harte Research Institute (HRI) provided technical expertise on the physical and ecological systems along the Texas coast. This entailed acquiring or developing datasets and reference materials to contribute to technical analyses and support Resiliency Plan development. In addition, HRI performed a high-level vulnerability assessment for coastal changes due to land loss and storm surge impacts. HRI also performed landcover change and storm scenario modeling for each of the planning regions.

E. Technical Advisory Committee

The planning process involved engagement with a Technical Advisory Committee, composed of four regional committees (corresponding to the four regions identified in the Resiliency Plan) and one core committee (composed of GLO-identified statewide and regional decision makers, technical experts and coastal residents/users with insights into coastwide vulnerabilities, opportunities and unmet needs). The TAC included: researchers in many fields of coastal science; local, state and federal natural resource agency personnel; members of public, private and non-governmental organizations; and engineering and planning experts. The TAC provided input and feedback to the GLO and its partners on matters such as coastal Issues of Concern prioritization, identification and evaluation of candidate programs and projects and review of draft Resiliency Plan outcomes.

SECTION 3. Texas Coastal Environments

This overview is drawn from the 2017 Resiliency Plan, and describes features of the coastal landscape, highlighting the dynamic interactions that take place between the Gulf of Mexico and Texas' bays and barrier islands. These features form the foundation for coastal ecosystems that provide a range of protective measures and supply various economic benefits to coastal communities, the state and the nation. All of this underscores the importance of safeguarding what we value.

A. Features of the Coastal Landscape

I. Bays and Estuaries

Texas' coastal region is characterized by eight major bay systems: Sabine Lake, Galveston Bay, Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, Upper Laguna Madre and Lower Laguna Madre (Figure 3-1). The bay systems are bodies of water that are partially enclosed by land and are separated from the Gulf of Mexico by barrier islands and peninsulas, except for openings (passes and inlets) that allow for water to flow from the Gulf of Mexico into bays.

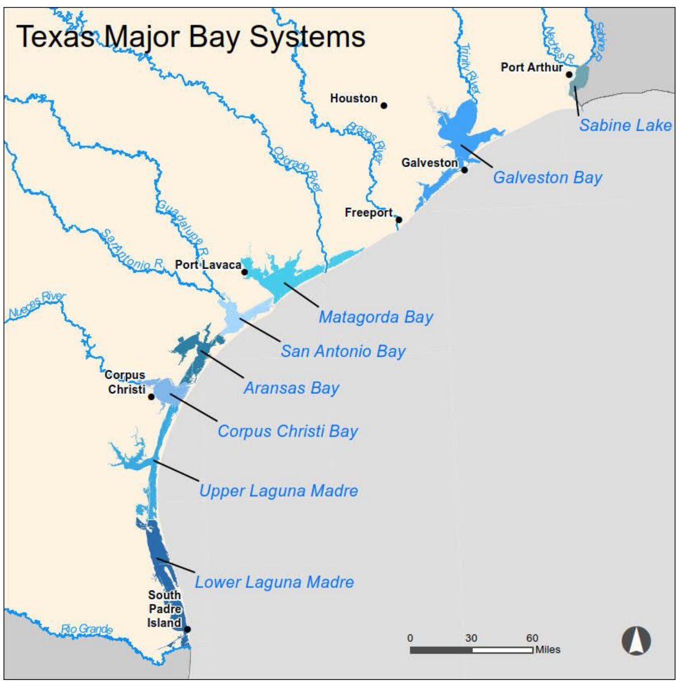

Figure 3-1: Texas Major Bay Systems

In Texas, many bays are also estuaries, or bodies of water where freshwater from rivers and streams empties and mixes with saltwater from the Gulf of Mexico. The major estuaries in Texas are named for the primary rivers emptying into them. The Trinity-San Jacinto Estuary (Galveston Bay) is the largest estuary in Texas. Estuaries form a transition zone between river environments and marine environments, and this mixture of freshwater and saltwater is known as brackish water. In estuaries, freshwater does not flow directly into the open Gulf, but is blocked by bordering mainland, peninsulas, barrier islands or fringing wetlands. Estuaries are affected by both marine (tides, waves and saltwater) and riverine (inflows of freshwater and sediments) influences. These fresh and saltwater influxes provide high levels of nutrients in the water column and sediments, which supports diverse wetland habitats for fish and wildlife that have adapted to brackish water.

The land area where sediment is deposited at the mouth of a river when it empties into a bay, or the Gulf of Mexico, is called a delta. A delta grows as sediment from the river accumulates, causing the river to break off into smaller channels, creating wetland habitat. Upstream disruptions to the river can impact delta formation.

These bay systems and the environments they support are influenced by regional weather patterns. About twice as much rain falls in the Sabine Lake region than along the Texas-Mexico border. Texas bays and estuaries follow a similar gradient in terms of salinity, which affects the types of coastal environments along the coast. In the Upper Coast, estuaries have lower salinity levels from increased precipitation that allow smooth cordgrass, known as *Spartina alterniflora,* to thrive in the wetlands. Towards the south, wetlands transition from more freshwater to higher salinity environments and become sparser due to the arid climate. In the southernmost part of the Texas coast, in the high salinity environment of the Laguna Madre, sparsely vegetated tidal flats are more common.

II. Barrier Islands and Peninsulas

Along most of the Texas coast, there is a near-continuous chain of peninsulas and barrier islands that divides the bays and estuaries from the Gulf of Mexico. Barrier islands are long, relatively narrow offshore deposits of sand and sediment that run parallel to the mainland along the coast, whereas peninsulas also run parallel to the mainland, but are still connected to the mainland. Shallow bays or lagoons divide barrier islands and peninsulas from the mainland. Barrier islands and peninsulas are predominately characterized by a Gulf-facing beach and dune system that gradually slopes down to the interior bayside shoreline, supporting various habitats such as wetlands and tidal flats. The Texas Gulf shoreline has two peninsulas and six barrier islands (Figure 3-2), including Padre Island, the longest undeveloped barrier island in the world.

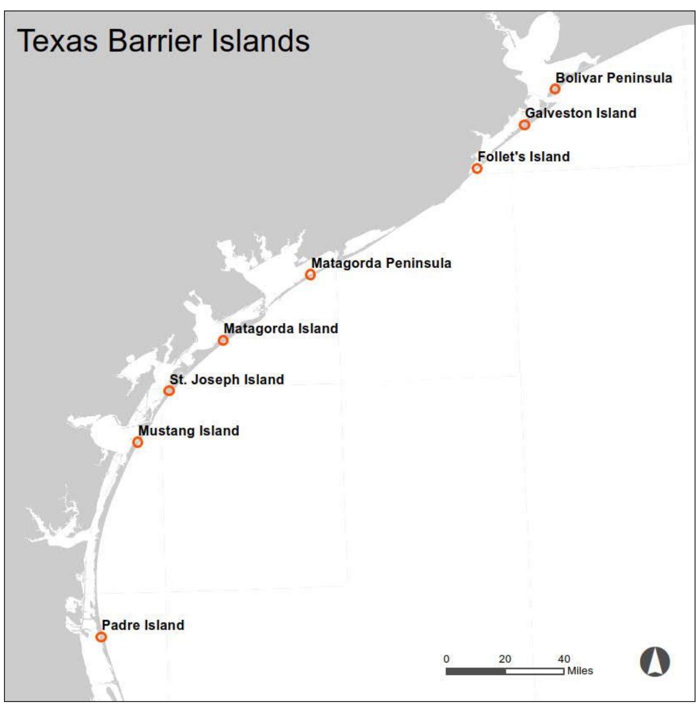

Figure 3-2: Barrier Islands and Peninsulas

By nature, barrier islands are not static landforms; they are dynamic systems, constantly shifting and migrating as sand is moved by waves, tides, currents and changing sea levels. The barrier islands and peninsulas are segmented by numerous natural and man-made passes, or inlets, that allow vessel access between the bays and Gulf, and water circulation of sediment and nutrients vital for bay ecosystem health. Tides and currents carry sediment from the bays – delivered by rivers and streams – into the Gulf where they can be deposited onto Gulf-facing beaches, and from the Gulf to bayside beaches. This provides natural beach nourishment and shoreline protection from erosive wave action. Water movement through an inlet can also deposit sand at both ends of the inlet's mouth, forming tidal deltas. Storm surge enters bays through these inlets and washes over barrier islands, and at weak points, causes breaching and forms new channels from erosion. As storm surge washes over the island, it carries sand from the beach and dunes, depositing it into the bay. This process, called "rolling over," is the method by which a barrier island migrates landward. After a storm, built up water in the bay causes shoreline flooding as it slowly funnels back into the Gulf through inlets.

B. Coastal Environments and the Ecosystem Services they Provide

The coastal landscape provides the foundation for a range of coastal environments, including beaches and dunes, wetlands, coastal uplands, oyster reefs and rookery islands. The primary natural coastal environments found along the Texas Gulf coast are shown in Figure 3-3. The economic benefits offered by the natural environments along the coast are diverse and include both traditional and non-traditional factors. Traditional economic factors include the dollars generated for the state through profitable activities such as fishing, ecotourism and recreation. Non-traditional economic factors, known as ecosystem services, are the benefits provided by the environment that support, sustain and enrich human life. For example, some ecosystem services provided by a wetland include habitat, water purification, erosion control and flood and storm protection. The Multihazard Mitigation Council estimates that every dollar spent on natural hazard mitigation saves an average of $4 in future benefits.

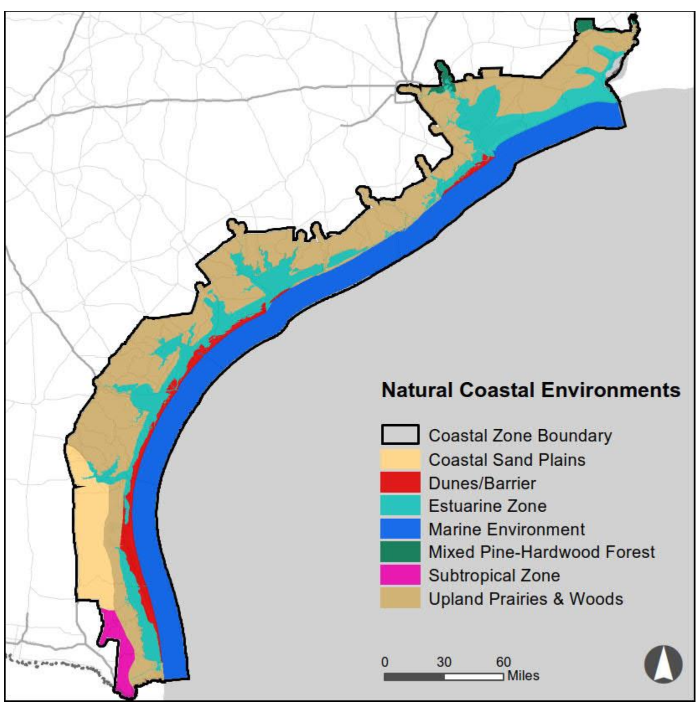

Figure 3-3: Natural Environments Along the Texas Coast

Texas' estuaries may vary in size, ecological characteristics and the amount of precipitation and freshwater inflows received, yet cumulatively they support unique and productive habitat for numerous fish and wildlife species due the high levels of nutrients provided by the brackish waters. The abundant fish and wildlife populations supported by the sheltered waters of estuaries are important to the coastal ecosystem and state economy. Approximately 95 percent of the Gulf's recreationally and commercially important fish (e.g., red drum and spotted seatrout), shellfish (e.g., crab and shrimp) and other marine species rely on estuaries during some part of their life cycle. Juvenile fish, crab and shrimp depend upon estuaries that have adequate freshwater inflows to balance salinity. This critical nursery habitat for the majority the majority of Gulf commercial and recreational finfish and shellfish species provides food and shelter as the species mature, before migrating out into the open waters of the Gulf. Oysters, found only in estuaries, comprise the basis for a thriving commercial harvesting industry and are dependent upon the estuary's brackish waters. Estuaries provide habitat for birds, fish, amphibians, insects and other wildlife to live, forage, nest and reproduce. Because they are so biologically productive, resident and migratory birds, by the tens of thousands, rest and feed in estuarine marshes.

Estuaries provide many ecosystem services, such as water filtration and nutrient regulation and cycling, and contribute to storm surge protection and shoreline stabilization by trapping sediments and rebuilding fringing wetlands. Rivers carry nutrients from upland watershed areas into estuaries, contributing to their high productivity, in addition to sediment and pollutants, which can decrease their productivity. Habitats associated with estuaries, such as freshwater and saltwater wetlands, mud and sand flats, oyster reefs, river deltas and seagrass beds act like enormous filters, helping to remove sediments and pollutants to improve water quality. Improved estuarine water quality also contributes to healthy ocean waters and marine life as the water exchanges from the bay to Gulf. Estuaries and their surrounding wetlands stabilize bay shorelines against erosion and act as natural buffers to protect coastal areas, inland habitats, and communities and infrastructure from flooding and storm surge.

Coastal communities and economies are built around estuaries because they provide commercial and recreational opportunities and support natural resource-based jobs and businesses. Estuaries provide recreational areas to boat, swim, fish, and bird and wildlife watching. The protected waters of estuaries are also important areas for ports and harbors and benefit waterborne transportation and commerce. The economic prosperity of many coastal communities is linked to the health of their respective estuary and the many services and resources provided.

I. Beaches and Dunes

The Gulf-facing beaches and dunes along Texas barrier islands are highly dynamic systems that provide a first line of defense against the destructive impacts of hurricanes and tropical storms on inland development and sensitive coastal environments. Texas beaches and dunes also provide valuable tourism and recreation opportunities to Texas residents and visitors and are a strong driver of economic activity throughout the coastal zone. Beaches and dunes provide many economic and social benefits, including flood protection, erosion control, water catchment and purification, habitat and foraging for wildlife, tourism and recreation, and aesthetic views.

Gulf beaches and their dune systems provide natural protection for upland areas and landward structures during storms. Beaches also supply foraging and nesting habitat for wildlife, including threatened and endangered species, such as piping plovers and sea turtles. In addition, migratory birds use sand dunes and barrier islands as landing or resting areas after flying thousands of miles over the Gulf of Mexico.

Along the barrier island Gulf shoreline, the interface of sand and sea produces sloping sand dunes and beaches of varying widths. The beach and dune system is integral to the dynamic beach environment and is constantly in flux due to sand exchange from wind, tides, currents, erosion and storm impacts. Longshore currents in the Gulf of Mexico play an important role in the configuration of Texas' Gulf-facing beaches and dunes. Along the Upper Coast a longshore current runs from north to south, while another longshore current runs from south to north, carrying sediment with them. These two currents meet at a convergence zone along the central Texas coast on Padre Island, near the Upper Laguna Madre. At this convergence zone, the beach is wide, and the dune ridge is high and continuous, whereas the beaches in the northern and southern portions of the state are narrower, with less continuous dune ridges. Sand is continually moved along the beach shoreline by longshore currents, and from the beach into the dunes by the wind (see Figure 3-4). During typical wave conditions, sand is transported by waves to and from offshore sand bars and the surf zone to the beach, contributing to the formation of the beaches.

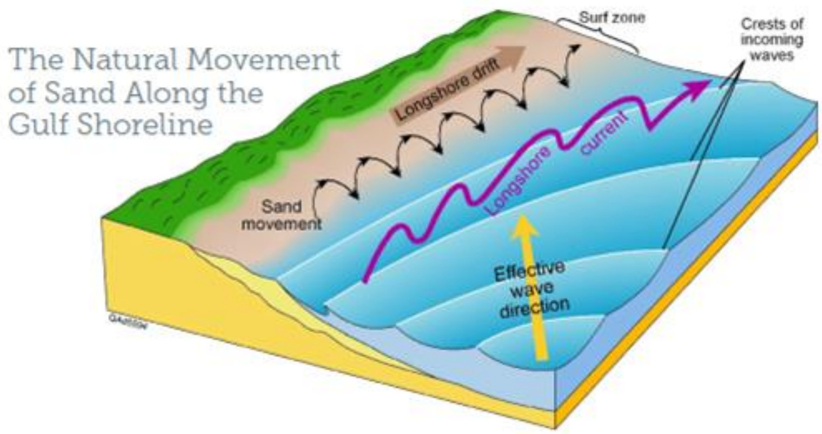

Figure 3-4: The Natural Movement of Sand Along the Gulf Shoreline

Dunes develop when wind blows sand inland where it is trapped by dune vegetation, thereby gradually building up the size of the dune. Wind and rain from seasonal storms can remove sand from the dunes and deposit it back onto the beach. During more severe storms, large amounts of beach and dune sand can be moved out into nearshore water. Storm surges and wind associated with tropical storms and hurricanes, however, can completely washover barrier islands or completely breach the dune, known as a blowout, flattening dunes and depositing the sand behind the dunes and in the bays. In these cases, depending on sediment supply and other factors, recovery can take years to decades, leaving inland infrastructure and habitats more vulnerable to subsequent storms.

Sand dunes provide a resilient natural barrier to the destructive forces of wind and waves and are therefore the least costly defense against storm-surge flooding and beach erosion. Sand dunes help prevent loss of life and property by absorbing the impact of storm surge and high waves and by stopping or delaying intrusion of water inland. Dune areas are essential to the protection of infrastructure and roads from nuisance flooding, erosion, storm surge, and high wind and waves.

Vegetated dunes are more effective at trapping wind-blown sand to replenish eroded beaches after storms. The health of dune grasses, shrubs and other stabilizing plant life is critical to the balance of this system. Loss of dune vegetation makes the dunes and inland areas more susceptible to wind and water erosion, especially during storms, decreasing the ability of sand dunes to properly protect habitats and ecosystems behind the volatile beach environment. In many areas, beaches have greatly decreased in width over the past several decades, resulting in extremely narrow, and in some cases, a complete loss of the beach and dune system.

II. Wetlands

Wetlands are naturally occurring or restored lands, including marsh and tidal flats, that are transitional between terrestrial and aquatic systems and, therefore, are periodically saturated or flooded with shallow water. Wetlands are characterized by herbaceous (non-woody) plants that can withstand temporary inundation and are adapted to wet soil conditions.

In the Resiliency Plan, coastal wetlands are classified as either estuarine wetlands or freshwater wetlands:

Estuarine Wetlands

Estuarine wetlands are found along the bay shorelines within an estuary and directly inland of beaches, dunes and barrier islands. These estuarine ecosystems support unique plant and animal communities that have adapted to brackish water, requiring tidal and freshwater exchange. Salt marshes are the most prevalent types of estuarine wetlands and are characterized by salt-tolerant plants such as smooth cordgrass, glasswort and saltgrass. Of wetland ecosystems, salt marsh has one of the highest rates of primary productivity due to the influx of nutrients from surface and tidal waters.

Estuarine wetlands provide spawning grounds, nurseries, shelter and food for finfish, shellfish, birds and other wildlife. The abundance and health of adult stocks of commercially harvested shrimp, blue crabs, oysters and other species are directly related to the quality and quantity of estuarine wetlands. This is especially true in the Gulf, where 97 percent (by weight) of the fish and shellfish caught by fishermen are dependent on wetlands at some point in their life cycle. Migratory birds use estuarine wetlands as foraging and hunting areas. A frequent Pressure to this ecosystem is reduced freshwater inflows, which can result in an increase in salinity, sometimes beyond what estuarine species can tolerate.

Freshwater Wetlands

Freshwater wetlands are areas that receive periodic or permanent influxes of freshwater to support plant life, and often are inundated or completely covered with freshwater. These wetlands derive most of their water from surface waters, including floodwater and runoff, but also receive some groundwater. In the coastal zone, freshwater wetlands typically exist where rivers and streams merge with other bodies of water, including the initial outflows of rivers to estuaries and lagoons. They can also be found in the coastal upland areas along stream banks, lakeside meadows or low-lying areas that receive adequate overland flow of rainwater or stream overflow. These freshwater wetlands support many species that depend upon consistent access to water that is neither too deep nor too brackish. This ecosystem provides a variety of habitat for birds, reptiles, amphibians, mammals and insects.

Coastal estuarine and freshwater wetlands are among the most biologically productive ecosystems and therefore, provide an important suite of ecosystem services and economic and social benefits. Coastal wetlands provide habitat for plants, fish and wildlife, clean water, convey and store floodwaters, trap sediment, reduce water pollution, help nutrient cycling and soil retention, and can protect shorelines from storms by diffusing wave energy. Many bird species, including rare and endangered species, depend on coastal wetlands for foraging, roosting and nesting areas that are also critical to both migratory and wintering waterfowl.

III. Coastal Uplands

Coastal uplands are areas adjacent to coastal wetlands and can encompass various ecosystems, including swamps, bottomland hardwood forests, coastal prairies, live oak woodlands and thorny brush. Coastal uplands can be used for agriculture and grazing and provide a dry land base for developing communities and cities. Coastal uplands are also important because they provide a buffer for wetland migration as sea levels rise. Common coastal uplands in Texas include coastal prairies and bottomland hardwood forests:

Coastal Prairies

Coastal prairies are large, open expanses of coastal uplands with continuous grassy vegetation that are located immediately inland of coastal marshes extending along the Gulf of Mexico shoreline. The dominance of grasses in these uplands can be attributed to the heavy clay soil that makes it difficult for woody plant species to establish. Specific areas with coastal prairies include a number of barrier islands, and the resacas, or disconnected channels, of the Laguna Madre. The natural history of Texas indicates that most of the land surrounding the bays and estuaries of the Texas coast were once a coastal prairie ecosystem and consisted of relatively flat ground with a very subtle, gradual rise in elevation. Once covering over 6.5 million acres of Texas land, coastal prairies now only occupy 65,000 acres, or less than 1 percent of the original acreage.

Coastal prairie vegetation consists mostly of grasses overlain by a diverse variety of wildflowers and other plants. Areas nearer to the coast typically have shorter grasses and plant life that are accustomed to occasional coastal breezes and storms, whereas areas farther from the coast and slightly higher in elevation have taller grasses and shrubs. The unique flat grasslands and thorny scrublands of the coastal prairie and adjacent marsh areas provide habitat for waterfowl and other wildlife, including endangered species such as the ocelot, the Attwater's Prairie Chicken and the Jaguarundi. Grasslands used for grazing, with some oak savannah and mesquite vegetation, provide ample habitat for the various species that utilize this ecosystem. Ecosystem services associated with coastal prairies along the Texas Gulf Coast include enhancing water quality and providing bird habitat.

Bottomland Hardwood Forests

In East Texas and near Galveston Bay, there are large forested areas adjacent to streambanks and floodplains called bottomland hardwood forests. The primary source of water for these hardwood forests is from riverbank flooding, however, their soil is not as wet as swamps. Common tree species found in these forested areas include bald cypress, water tupelo, oaks, hickory, elm, green ash, red maple and black willow. These forested areas are home to endangered mammals and birds, as well as rare plants and other species. Ecosystem services associated with bottomland hardwood forests include the harvest of timber, flood control, groundwater supply, habitat, hurricane protection, enhanced water quality and recreational opportunities.

IV. Oyster Reefs

Oyster reefs are submerged colonies of oysters found in nearshore rocky areas, bays and estuaries, especially near river mouths where waters are brackish and shallow. Oyster reefs in Texas are built primarily by the eastern oyster, *Crassostrea virginica*, through reproduction and settlement of oyster larvae onto existing reef structures, creating large mounds of oysters and oyster shells. Oysters settle on hard substrates, like concrete barriers and rocks, but prefer to colonize on other oyster shells, as they cannot thrive on sandy or soft muddy bay bottoms. As successive generations of oysters settle and grow, large reef structures can amass, comprised of many individual oysters. It is estimated that oyster reefs have 50 times the surface area of an equally sized flat bottom.

Oyster reefs increase biodiversity and provide valuable habitat for more than 300 marine aquatic species to forage and spawn, creating ideal locations for commercial and recreational fishing. Additional ecosystem services provided by oyster reefs include sediment stabilization, shoreline protection, erosion control, and water filtration and circulation within estuaries.

Oysters have the ability to filter water by removing pollutants and sediment, providing a vital service to some of the most impaired coastal waters. A single adult oyster can filter roughly two gallons of water every hour. The multitude of ecosystem services provided by oyster reefs are integral to the health and vitality of estuaries.

V. Rookery Islands

Rookery islands are typically quite small – only a few acres or less in size – and while some naturally exist, most were formed from the placement of dredged material during the creation or maintenance of nearby navigation channels, such as the Gulf Intracoastal Waterway, or smaller channels and basins supporting ports and marinas. These islands that dot the back side of the barrier islands and the adjacent bays protect bay shorelines and navigation channels from erosion.

Rookery islands are isolated from the mainland and are too small to sustain predator populations, thereby providing optimal foraging, roosting, breeding, nesting and rearing habitats for migratory birds and a wide variety of colonial waterbirds and coastal shorebirds, including herons, terns, pelicans, egrets and cormorants. Colonial waterbirds rely on open water, mud flats, estuarine wetlands and seagrass for foraging. Rookery islands provide areas for birdwatching, ecotourism and recreational fishing. Nesting pairs on rookery islands can range from a few pairs to thousands depending on island size.

Preservation of rookery islands becomes increasingly important as changes in the bays, such as relative sea level rise and sediment management practices, are resulting in the loss and degradation of islands. Several studies conducted in the Galveston Bay estuary found a link between declining waterbird populations and decline in wetland area, including wetlands found on rookery islands – underscoring the need for island preservation.

SECTION 4. TECHNICAL ASSESSMENT METHODOLOGY

A. TECHNICAL PROCESS OVERVIEW

The technical process is structured around the planning process presented in Figure 4-1. The technical process was composed of four elements (i.e., analyzing existing data and information, project screening, TAC analysis, additional technical analysis by project team), followed by the refinement of previously developed Resiliency Strategies. These four technical elements are described in detail in SECTION 5 through SECTION 9 and the refinement of the Tier 1 Projects is detailed in SECTION 10.

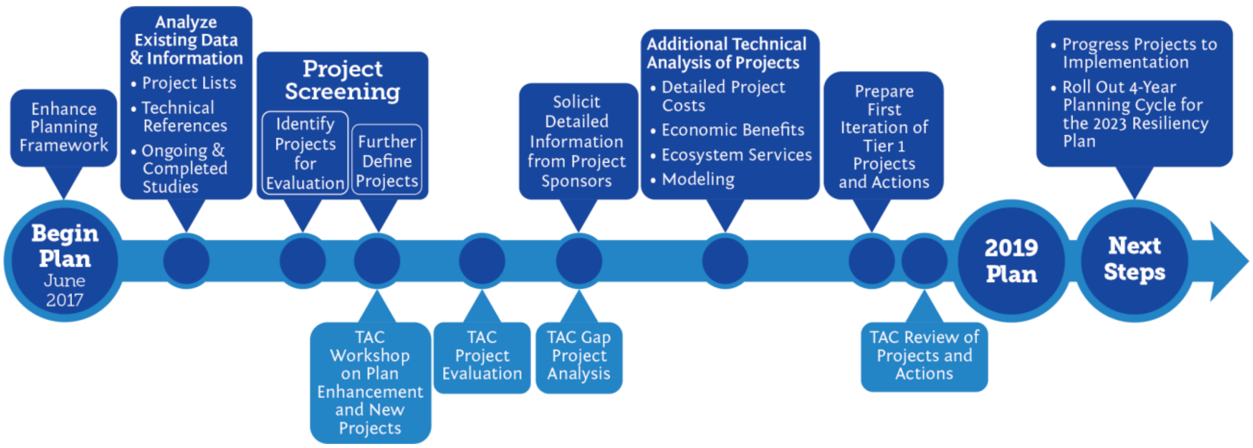

Figure 4-1: The Planning Process

Beginning with the projects prioritized in the 2017 Resiliency Plan and adding a comprehensive list of coastal resiliency projects proposed since 2017, the GLO Planning Team conducted multiple screenings to identify projects that aligned with Resiliency Plan goals. The screening process is described in detail in SECTION 7. Projects aligned with Resiliency Plan goals were subsequently analyzed through parallel technical analyses conducted by the TAC and the GLO Planning Team. The TAC determined the relevance of individual projects to specific regional coastal resiliency needs, while the GLO Planning Team focused on a range of factors, including:

- Modeling for Future Conditions;
- Infrastructure and Critical Facility Impacts;
- Detailed Costs;
- Economic and Benefits;
- Ecosystem Services;
- Sediment Management;
- Hurricane Harvey Impacts; and
- Coastal Management:
  - Long-Term Environmental Management; and
  - Incentivizing Ecological Enhancements.

At the completion of the prior steps, the TAC and local stakeholders were engaged through a series of regional meetings in Fall 2018 to present the draft findings of the Resiliency Plan and allow for feedback prior to finalizing the Resiliency Plan. For the purpose of project, physical and environmental assessments, the Texas coast was subdivided into four regions. These four regions also correspond to the regional TAC meetings that took place along the coast.

B. Four Coastal Region Analysis Approach

The Texas coast was divided into four regions to facilitate presentation of Issues of Concern and potential solutions. The four regions are generally based on major bay systems and habitats as described in Table 4-1 (USACE, 2015). These regions also align with other previous and ongoing coastal planning studies conducted by the GLO and the U.S. Army Corps of Engineers (USACE).

Table 4-1: The Four Coastal Regions

Region No.	Region Name	Description	Counties
1*	Sabine Pass to Galveston Bay	Mouth of Sabine River at the Texas-Louisiana border to the mouth of the Brazos River near Cedar Lakes	Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange
2	Matagorda Bay	Entire Matagorda Bay system from the Brazoria-Matagorda County line to eastern edge of San Antonio Bay	Calhoun, Jackson, Matagorda, and Victoria
3	Corpus Christi Bay	San Antonio Bay to Baffin Bay	Aransas, Kleberg, Nueces, Refugio, and San Patricio
4	Padre Island	Sothern edge of Baffin Bay to the Texas-Mexico border	Cameron, Kenedy, and Willacy

* Due to high population density, Region 1 was subdivided into Regions 1A (from the Sabine River to the west side of Galveston Bay) and 1B (from the west side of Galveston Bay to the Brazos River) for TAC and public meetings.

I. Subregions

The subregion boundaries developed for the 2017 Resiliency Plan and carried forward into the 2019 Resiliency Plan were delineated by considering several different datasets, including:

- Texas Commission on Environmental Quality service regions;
- Texas Water Development Board Groundwater Management Areas and Regional Water Planning Areas;
- Texas Parks and Wildlife Department Gould Ecoregions and Natural Subregions;
- U.S. Environmental Protection Agency Omernik Level IV Ecoregions; and
- U.S. Geological Survey (USGS) National Hydrography datasets and several different levels (e.g., 10-digit) of Hydrologic Unit Codes (HUCs).

The subregions were ultimately delineated according to USGS HUC-10 watersheds, bounded landward by the GLO Coastal Zone Boundary. These subregions:

- Highlight similarities in coastal attributes;
- Coincide neatly with the bay systems;
- Provide for local-level analysis and combine to make larger units for landscape-level analysis; and
- Allow for contiguous coverage across the Texas coast.

Figure 4-2 shows the 2017 subregions, which were not changed for the 2019 Resiliency Plan. For Gulf-facing beaches and dunes, a line was drawn 1,000 feet landward and parallel to the shoreline to encompass the foredune complex and the entire Gulf-facing beach within each region. Gulf-facing subregions extended to the Gulfward boundary of the state, three leagues (10.35 miles) out into the Gulf of Mexico.

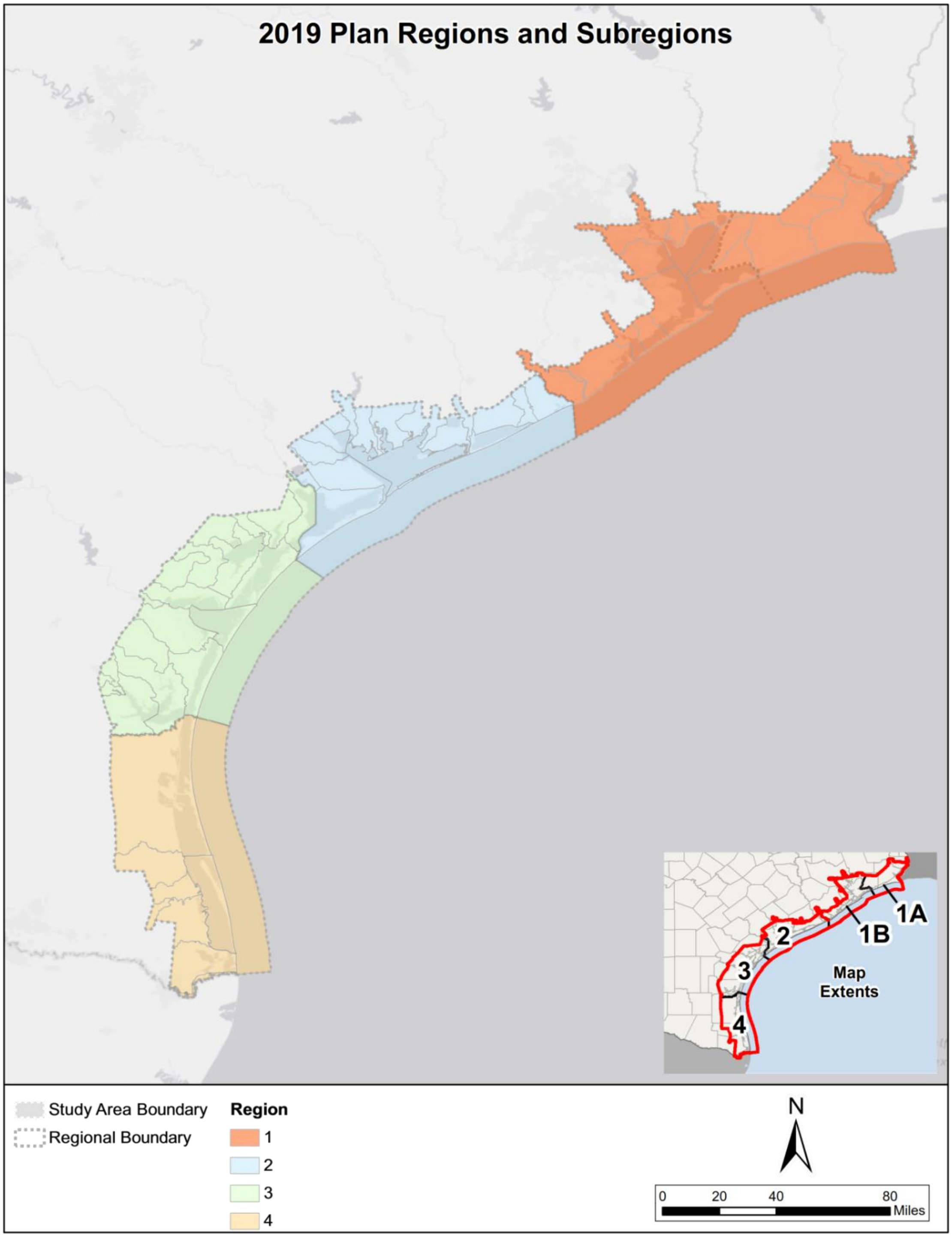

Figure 4-2: Texas Coastal Subregions (2017)

The list of subregions is given in Table 4-2. Maps showing the location of each subregion are provided in Figure 4-3 through Figure 4-6.

Table 4-2: Planning Subregions

Region	Subregion ID	Subregion Name
0	0.00	Coastwide
1	1.01	Region 1 Gulf facing beaches
	1.02	Old River Bayou
	1.03	Adams Bayou-Sabine River
	1.04	Cow Bayou
	1.05	Tenmile Creek-Neches River
	1.06	Salt Bayou
	1.07	Hillebrandt Bayou
	1.08	Lower Neches Valley Authority Canal-Taylor Bayou
	1.09	Spindletop Ditch
	1.10	East Fork Double Bayou
	1.11	Cane Bayou
	1.12	Old River-Trinity River
	1.13	Adlong Ditch-Cedar Bayou
	1.14	Buffalo Bayou-San Jacinto River
	1.15	Clear Creek-Frontal Galveston Bay
	1.16	Cedar Bayou-Frontal Galveston Bay
	1.17	Dickinson Bayou
	1.18	Halls Bayou
	1.19	Mustang Bayou
	1.20	Lower Oyster Creek
	1.21	Dry Bayou-Brazos River
	1.22	Lower San Bernard River
2	2.01	Region 2 Gulf facing beaches
	2.02	East Matagorda Bay
	2.03	Water Hole Creek-Caney Creek
	2.04	Peyton Creek-Live Oak Bayou
	2.05	Jones Creek-Colorado River
	2.06	East Branch Mad Island Slough-Matagorda Bay
	2.07	Matagorda Bay
	2.08	Tres Palacios River
	2.09	East Carancahua Creek
	2.10	Cox Creek
	2.11	Keller Branch-Lavaca River
	2.12	Arenosa Creek
	2.13	Placedo Creek
	2.14	Chocolate Bayou

Region	Subregion ID	Name
	2.15	Black Bayou-Green Lake
	2.16	Powderhorn Lake-Matagorda Bay
	2.17	San Antonio Bay-Espiritu Santo Bay
3	3.01	Region 3 Gulf facing beaches
	3.02	Hynes Bay-San Antonio Bay
	3.03	Saint Charles Bay
	3.04	Copano Creek
	3.05	Aransas Bay
	3.06	Mission River
	3.07	Copano Bay
	3.08	Lower Aransas River
	3.09	Chiltipin Creek
	3.10	Nueces Bay-Corpus Christi Bay
	3.11	Frontal Corpus Christi Bay
	3.12	Bayou Creek-Nueces River
	3.13	Oso Creek
	3.14	Upper Laguna Madre
	3.15	Petronila Creek
	3.16	Alazan Bay-Baffin Bay
	3.17	Chiltipin Creek-San Fernando Creek
	3.18	Lower Santa Gertrudis Creek
	3.19	Jaboncillos Creek
	3.20	Cayo del Grullo
4	4.01	Region 4 Gulf facing beaches
	4.02	Middle Laguna Madre
	4.03	East Main Drain-Laguna Madre
	4.04	Lower Laguna Madre
	4.05	Upper Pilot Channel-Laguna Madre
	4.06	Lower Arroyo Colorado
	4.07	Laguna Atascosa
	4.08	Brownsville Ship Channel
	4.09	Outlet Rio Grande

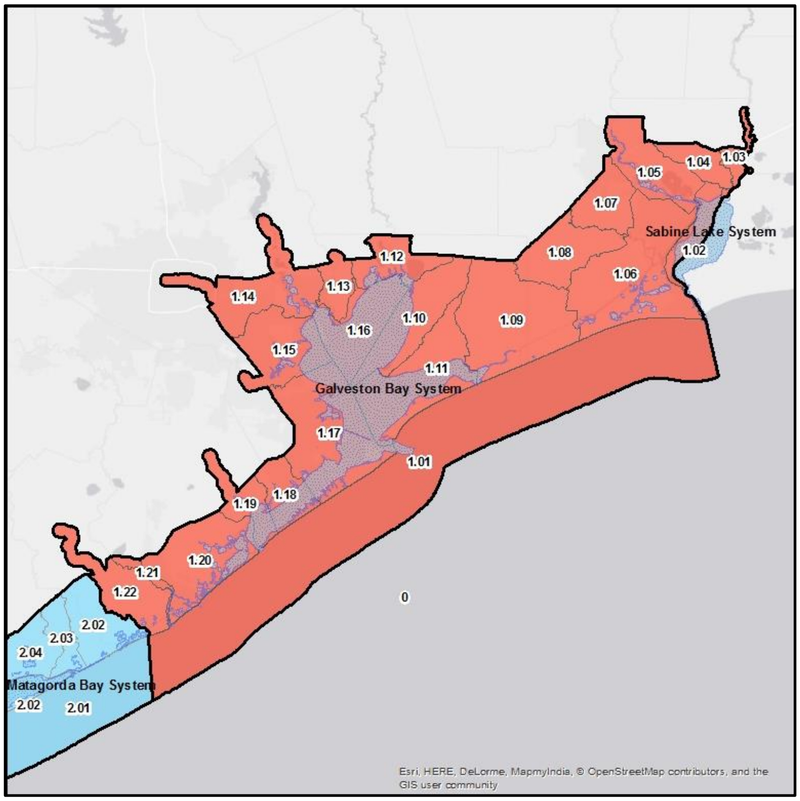

Figure 4-3: Region 1 Subregions

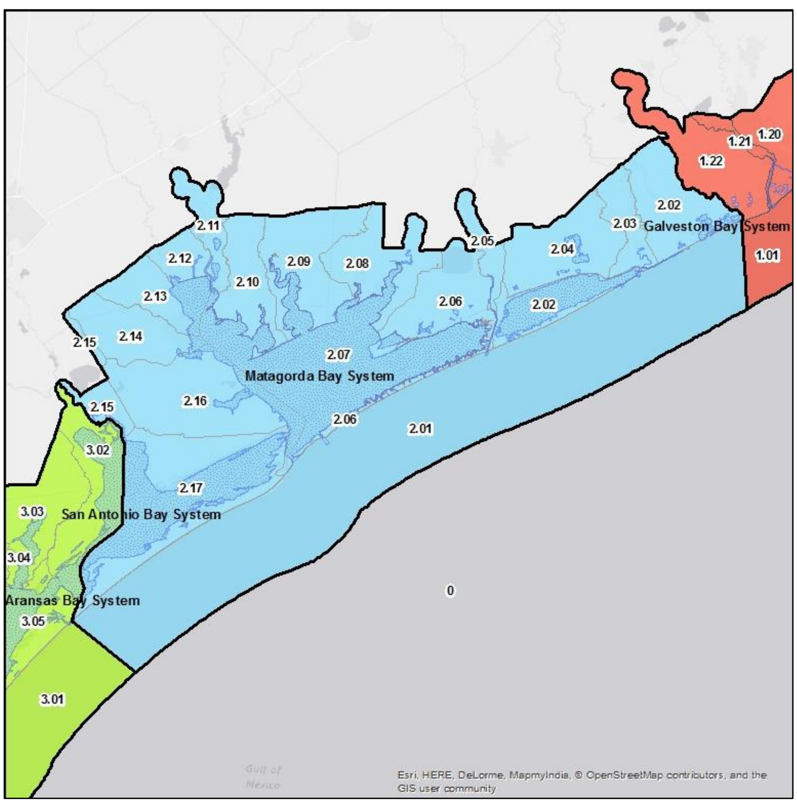

Figure 4-4: Region 2 Subregions

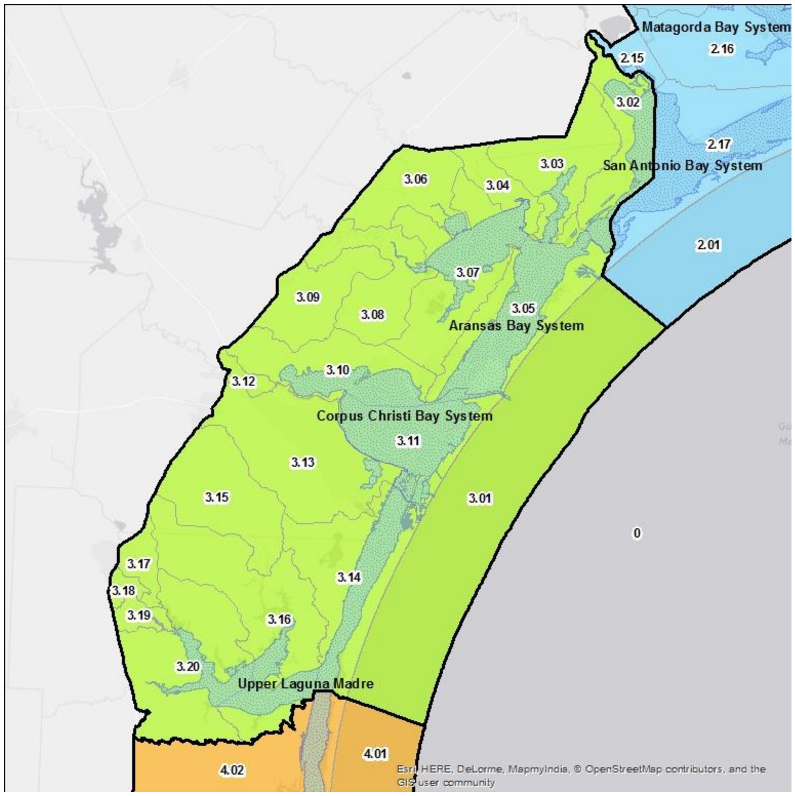

Figure 4-5: Region 3 Subregions

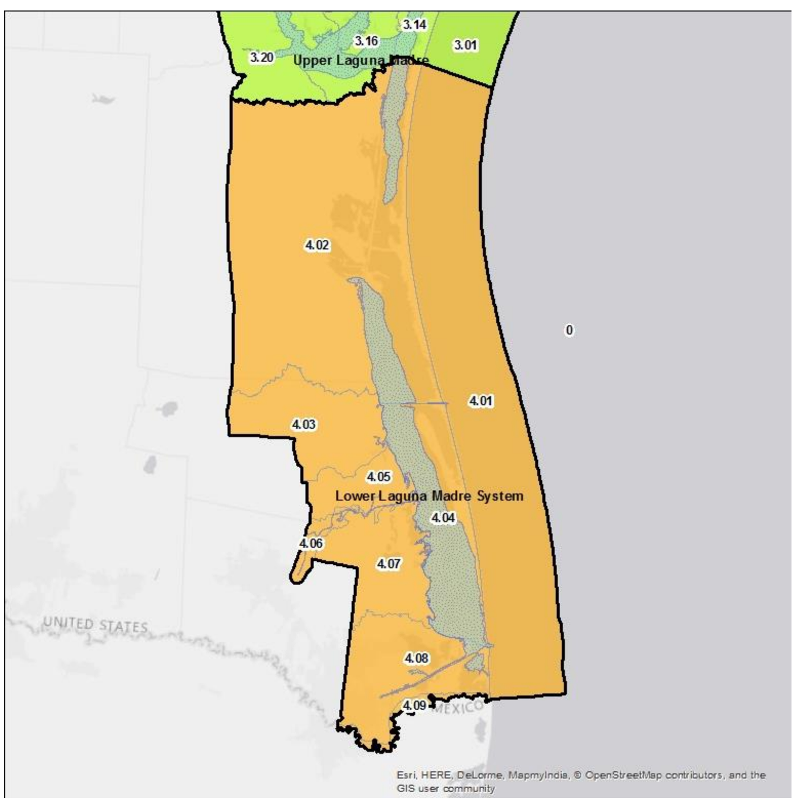

Figure 4-6: Region 4 Subregions

C. Coastal Resiliency Framework

The Coastal Resiliency Framework was used to guide the coastal planning efforts. The framework attempts to relay the development of vulnerability along the coast, how vulnerability is assessed, and the steps taken to improve the coast by reducing areas of risk or vulnerability. The various elements of the framework are shown in Figure 4-7 and described in detail below.

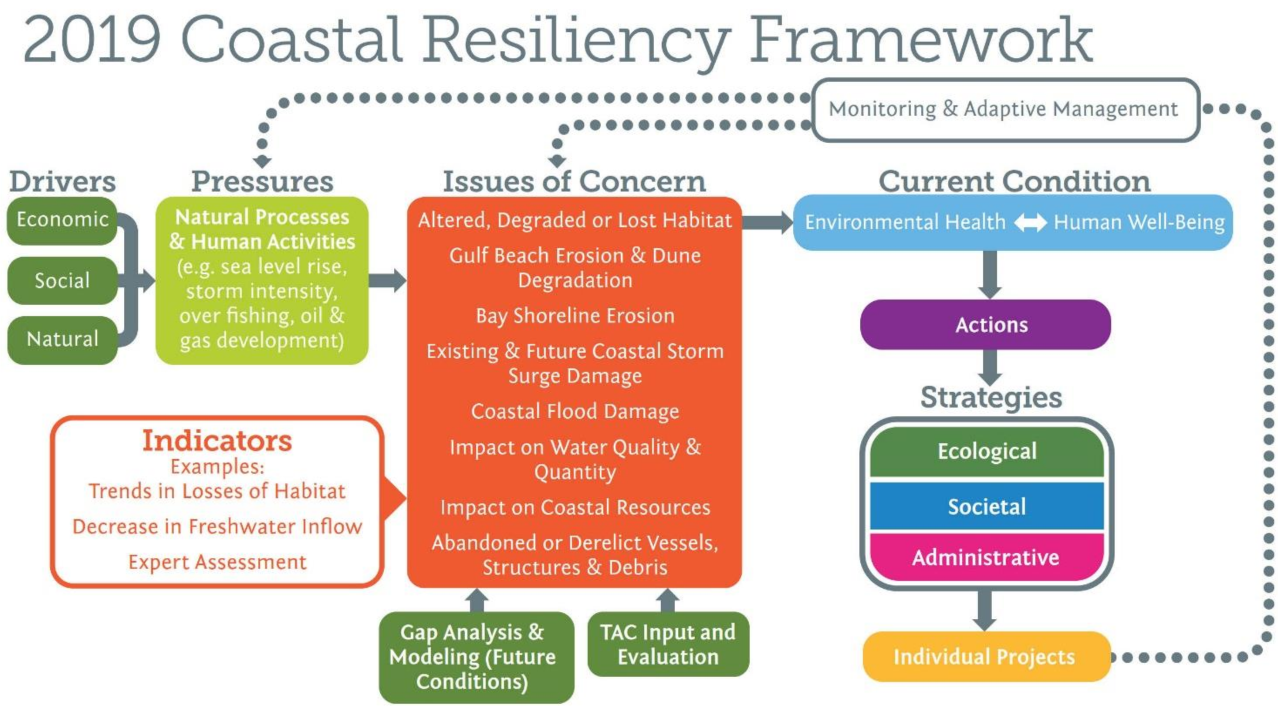

Figure 4-7: Coastal Resiliency Framework

- **Drivers** – Social, economic or natural influences on the current conditions of the coast that are largely external to the coastal system and are instigated by need, including demand for food, health, clean water and energy.
- **Pressures** – Pressures are the human activities and natural processes, typically large-scale and long-term, which may lead to the development of Issues of Concern along the coast. Examples of coastal pressures include coastal resource consumption (e.g. oil and gas extraction, fishing), population growth and relative sea level rise.
- **Indicators** – Indicators are the visible or quantifiable changes to the natural or built environments that are underlying symptoms suggestive of coastal Issues of Concern.
- **Issues of Concern** – Natural and human-induced disturbances which, if left unaddressed, will have or will continue to have adverse impacts on infrastructure, natural resources, economic activities, and the health and safety of Texas residents. Example Issues of Concern include altered, degraded or lost habitat and bay shoreline erosion.
- **Gap Analysis & Modeling (Future Conditions)** – The gap analysis (also known as the vulnerability assessment) was used to determine areas where significant risk of storm surge or land converted to open water were modeled to occur, and determine additional project needs according to that analysis. Future conditions models were also conducted to assess how various project types could respond to projected future land type and storm scenarios.

- **TAC Input and Evaluation** – The Technical Advisory Committee provided feedback on expected project performance, including priority, feasibility and ability to mitigate for or improve coastal Issues of Concern.
- **Current Condition –** The current conditions of the Texas coast, analyzed through physical and environmental assessments, literature, as well as anecdotal information about coastal communities and environments inform how resiliency strategies can be implemented to address the Issues of Concern identified. Current conditions bridge the relationship between the coast's environmental health and human well-being.
- **Actions** – Actions frame the concept of multiple projects functioning together to benefit coastal resiliency by identifying areas of need and groups of projects that suit that need. Each Action will include multiple projects that work together to mitigate the same coastal Pressures and associated Issues of Concern.
- **Strategies –** Categories of restoration and protection measures for coastal resiliency. Collectively, the Resiliency Strategies and their proposed projects address the Issues and Concerns identified over the course of the planning process. The Resiliency Strategies are classified into 3 primary categories: Ecological Resiliency, Societal Resiliency and Administrative Resiliency, described further in following sections.
- **Individual Projects –** Recommended Tier 1 projects to be implemented as part of the Resiliency Plan.

D. Strategies

Resiliency Plan development efforts – including TAC input, literature review and GLO Planning Team analyses – collectively produced a set of recommended projects proposed along the Texas coast. The similarity in project types recommended resulted in the development of eight Strategies, each representing a category of approaches or methodologies that can be used to restore and protect the Texas coast and enhance its resiliency. These Strategies provide a means to view coastal resiliency in a holistic manner that recognizes and elevates the synergies possible for future projects, based on physical, ecological, economic and social Drivers, Pressures and IOCs along the coast.

The Strategies were developed and proposed in order to provide focal areas for the GLO to target as it works to restore, enhance and protect the coast and to give stakeholders and interested parties an understanding of the methods recommended to enhance the coast, while allowing for flexibility in the types of projects that are used to achieve these goals. Collectively, the Strategies identify the need to restore specific coastal systems in Texas, pinpoint the areas of greatest need in these systems and present a number of proposed policy- or project-type solutions.

During the TAC's assessments of IOCs and projects in 2017 and 2019, several themes arose related to the interplay between coastal physical processes, ecological systems and potential project solutions. The interrelationship between individual projects and the greater picture of coastal resiliency was a frequent topic of discussion at the TAC meetings, particularly with regard to project feasibility. The eight Resiliency Strategies, although formulated by the GLO Planning Team during the technical assessment process, were largely a synthesis of the resiliency needs noted by the TAC during its various assessments of IOCs and proposed projects.

The eight Resiliency Strategies developed for the 2017 Resiliency Plan include:

- Restoration of Beaches and Dunes;
- Bay Shoreline Stabilization and Estuarine Wetland Restoration (Living Shorelines);
- Stabilizing the Texas Gulf Intracoastal Waterway;

- Freshwater Wetlands and Coastal Uplands Conservation;
- Delta and Lagoon Restoration;
- Oyster Reef Creation & Restoration;
- Rookery Island Creation and Restoration; and
- Plans, Policies and Programs.

In creating the list of eight Strategies, it was recognized that these are priority concerns at the time of Resiliency Plan development. Other Strategies not listed could be formulated and also play a role in coastal protection and may warrant inclusion in future iterations of the Resiliency Plan. Close coordination with ongoing study efforts and initiatives in Texas will be instrumental in this effort.

A key goal of the 2019 Resiliency Plan was to enhance the Strategies to clarify concepts, to more clearly define the purposes of individual strategies and to add new Strategies related to the 2019 Resiliency Plan goals (incorporating coastal infrastructure and designing for future conditions). Part of this enhancement is to define a primary Strategy category (Ecological, Societal and Administrative) with further definition at a secondary level, as described below.

Figure 4-8: 2019 Resiliency Strategies

I. Ecological Resiliency

Ecological Strategies are those that relate most directly to the enhancement (e.g. protection and restoration) of natural coastal environments.

Beach & Dune Enhancement – Provides renourishment of sediment to beach and dune complexes to address erosion, shoreline loss and limited sediment supply. This includes Gulf-facing and back bay beaches.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Gulf Beach Erosion and Dune Degradation; Bay Shoreline Erosion; Existing and Future Coastal Storm Surge Damage; Abandoned or Derelict Vessels, Structures and Debris
- Example Projects: Bolivar Peninsula Beach & Dune Restoration, City of South Padre Island Gulf Shoreline Restoration

Wetland Enhancement – Restores, conserves and protects ecologically significant wetlands through shoreline protection, material placement, hydrologic restoration and other conservation and restoration practices.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion; Coastal Flood Damage; Impact on Coastal Resources
- Example Projects: Old River Cove Restoration, Bessie Heights Marsh Restoration, Shell Point Ranch Wetlands Protection

Upland Enhancement – Restores, conserves and protects ecologically significant coastal uplands through land acquisition, hydrologic restoration and other conservation and restoration practices.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion; Coastal Flood Damage; Impact on Water Quality and Quantity; Impact on Coastal Resources
- Example Projects: Sargent Ranch Addition to San Bernard National Wildlife Refuge, Sabine Ranch Habitat Protection

Oyster Reef Enhancement – Provides for the identification and restoration or re-establishment of productive oyster reefs.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Impact on Water Quality and Quantity; Impact on Coastal Resources; Abandoned or Derelict Vessels, Structures and Debris
- Example Projects: Galveston Bay Oyster Reef Planning & Restoration

Rookery Island Enhancement – Provides for the identification and restoration or re-establishment of rookery island nesting habitats to support colonial waterbird populations.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion; Impact on Coastal Resources
- Example Projects: Dickinson Bay Rookery Island Restoration, Chester Island Restoration

Freshwater Inflow and Tidal Exchange Enhancement – Provides for the identification and mitigation of hydrologic and water quality impairments within the major delta, lagoon and bay systems along the coast.

- IOCs Potentially Addressed: Impact on Water Quality and Quantity; Impact on Coastal Resources
- Example Projects: Guadalupe River Delta Estuary Restoration, Bahia Grande Hydrologic Restoration

II. Societal Resiliency

Societal Resiliency Strategies are those that relate most directly to the enhancement (e.g., protection and improvement) of manmade coastal infrastructure and communities.

Water-based Transit Enhancement – Addresses water-based navigation infrastructure improvement needs along the coast and identifies new opportunities to support the beneficial use of dredged materials in State-owned waters.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion; Existing and Future Coastal Storm Surge Damage; Abandoned or Derelict Vessels, Structures and Debris
- Example Projects: North Pleasure Island Barrier Island Restoration, Little Bay Resiliency Initiative

Land-based Transit Enhancement – Addresses land-based transit infrastructure improvement needs in and around coastal communities and identifies opportunities to incorporate future conditions and ecological considerations into final design.

- IOCs Potentially Addressed: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion; Existing and Future Coastal Storm Surge Damage; Coastal Flood Damage
- Example Projects: Fulton Beach Road Restoration

Storm Surge Suppression – Relays results of federal, state, and regional storm surge suppression studies and identifies how other projects in the Plan interact with the proposed protections. Smaller-scale projects may also be included, if applicable.

- IOCs Potentially Addressed: Existing and Future Coastal Storm Surge Damage; Coastal Flood Damage
- Example Projects: Galveston Bay Storm Suppression System

Responsible Development – Proposes proactive, resilient planning opportunities in coastal communities and identifies projects to support communities' needs while considering future conditions.

- IOCs Potentially Addressed: All
- Example Projects: Elevating buildings and storm hardening structures, retrofitting and burying utilities, identifying alternative areas of development and conservation

III. Administrative Resiliency

Administrative Resiliency Strategies are those that relate most directly to the enhancement of policies, large-scale planning efforts and other non-structural solutions that nonetheless impact coastal resiliency.

Programs – Identifies GLO-administrated or supported programs related to coastal management for the purpose of proposing or requesting dedicated annual funding.

- IOCs Potentially Addressed: All
- Example Projects: Beach Monitoring and Maintenance Program, Derelict Structure and Vessel Removal Program, Community Education & Outreach Program

Policies – Identifies legislative and/or administrative changes to uphold coastal resiliency principles.

- IOCs Potentially Addressed: All
- Example Projects: Regulate adaptive management and data collection requirements for GLO-funded projects, Texas Coastal Nonpoint Source Pollution Program

Plans – Identifies completed, ongoing or proposed plans that guide the screening, design and/or implementation of proposed coastal resiliency projects.

- IOCs Potentially Addressed: All
- Example Projects: Sediment Management Plan, Beneficial Use of Dredged Materials Plan

E. Issues of Concern Assessment

In 2017, the TAC assessed the level of concern for each coastal subregion and each Issue of Concern through a survey process where the TAC was asked to assign a level of concern for all potential Issues of Concern within each of the 68 subregions that they were familiar with.

The 2017 levels of concern were determined by soliciting numerical values (0-4) from the TAC that weighed the level of concern for each Issue of Concern within a given subregion. Numerical results were used to establish threshold levels of concern based on statistical evaluations of the results.

The 2017 levels of concern were not reevaluated but were determined to be still characteristic of current conditions and carried forward into the 2019 Resiliency Plan. The Issue of Concern levels of concern are as follows:

- 0 – not at all concerned;
- 1 – slightly concerned;
- 2 – moderately concerned;
- 3 – very concerned; and
- 4 – extremely concerned.

The overall average Issue of Concern value for the coast was found to be 2.28, with a standard deviation of 0.63 (ADVSD, with a coastwide average of 0.98, is an outlier value and was removed from the evaluated dataset with regard to the average and standard deviation values to prevent a skew in the data). The resulting IOC statistics are summarized in Table 4-3. IOC abbreviations are defined as follows:

- **ADLH:** Altered, Degraded or Lost Habitat;
- **ADVSD:** Abandoned or Derelict Vessels, Structures or Debris;
- **BSE:** Bay Shoreline Erosion;
- **CFD:** Coastal Flood Damage;
- **EFCSSD:** Existing and Future Coastal Storm Surge Damage;
- **GBEDD:** Gulf Beach Erosion and Dune Degradation;
- **ICR:** Impact on Coastal Resources; and
- **IWQQ:** Impact on Water Quality and Quantity.

Table 4-3: Statistical Summary of Prioritized Issues of Concern

Issue of Concern	ADLH	ADVSD	BSE	CFD	EFCSSD	GBEDD	ICR	IWQQ
Subregion Average	2.70	0.98	1.91	2.09	2.15	2.80	2.42	2.36
Average w/out ADVSD[1]						2.28		
Standard Deviation w/out ADVSD[1]						0.63		

[1] The average and standard deviation values are not derived from the overall IOC subregion averages, as shown in the table, but instead from the average of all of the IOC scores from each subregion.

The tabular and graphical results for each subregion are included in **Appendix A** and the regional and coastwide averages for each IOC are presented in Table 4-4. Altered, Degraded or Lost Habitat was consistently a high concern for all regions, and was identified as the top concern in 47 of the 68 subregions. Its coastwide level of concern was second only to Gulf Beach Erosion and Dune Degradation (which is limited to one Gulf-facing subregion per region).

Table 4-4: Regional Averages of TAC Levels of Concern for IOCs

	ADLH	ADVSD	BSE	CFD	EFCSSD	GBEDD	ICR	IWQQ
Region 1	2.95	1.00	1.99	2.63	2.70	3.52	2.60	2.58
Region 2	2.68	1.04	2.20	1.93	2.04	2.58	2.47	2.38
Region 3	2.49	0.91	1.62	1.72	1.72	2.07	2.17	2.05
Region 4	2.58	0.98	1.77	1.93	1.97	3.04	2.44	2.44
Coastwide	2.70	0.98	1.91	2.09	2.15	2.80	2.42	2.36

In order to group the resulting average IOC level of concern for each subregion in a meaningful way, four brackets were determined statistically and are used to qualitatively describe the TAC survey results. The highest level of concern ("most concern") represents all subregional IOC values that were greater than one standard deviation above the average of the subregional values for that IOC. The second highest level of concern ("moderately high concern") represents the remaining subregional IOC values above the mean IOC value. The third ("moderately low concern") and fourth ("least concern") levels of concern were determined in the same manner but fall below the average IOC. This is represented graphically in Figure 4-8.

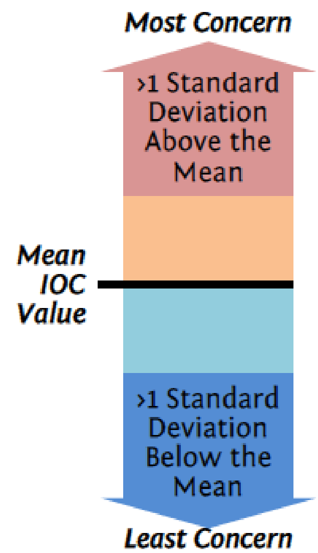

Figure 4-9: IOC Levels of Concern

F. Regional Issue of Concern Summaries

Summaries of the primary IOCs identified by the TAC for each region are provided below. These are some of the foremost challenges facing the regions but are by no means a comprehensive list of all issues that need to be addressed. Similarly, the set of priority projects included for each region are extensive but not all-inclusive, as other projects of similar importance and urgency may be identified as the planning process moves forward.

I. Region 1

Altered, Degraded or Lost Habitat was the issue of "most concern" in the majority of subregions in Region 1. GBEDD, EFCSSD, CFD and IWQQ were also of high concern. Subregion 1.14 (Buffalo Bayou-San Jacinto River) and Subregion 1.15 (Clear Creek-Frontal Galveston Bay) had the highest overall levels of concern across the entire Texas coast. IOCs with the highest concern in these subregions include ADLH, EFCSSD, CFD, IWQQ and ICR.

II. Region 2

In Region 2, only one subregion had an IOC recognized as meeting the "most concern" qualification. This occurred in Subregion 2.17 (San Antonio Bay-Espiritu Santo Bay), where ADLH was identified as an issue of most concern. Throughout the rest of the region, moderately high levels of concern were identified for most IOCs, with the exception of ADVSD. Subregion 2.11 (Cox Creek) and Subregion 2.12 (Keller Branch-Lavaca River) had the lowest levels of concern within the region.

III. Region 3

Region 3 had the lowest average level of concern overall among all regions. As in other regions, ADLH had an IOC rating of "most concern" in subregions 3.02 (Hynes Bay-San Antonio Bay) and 3.05 (Aransas Bay). In these two subregions, all other IOCs except ADVSD were identified as having moderately high concern. Subregion 3.17 (Chiltipin-San Fernando Creeks), Subregion 3.18 (Lower Santa Gertrudus Creek) and Subregion 3.19 (Jaboncillos Creek), all of which all feed into Baffin Bay's Cayo del Grullo, had the lowest levels of concern in Region 3.

IV. Region 4

GBEDD was identified as an issue of "most concern" for the Gulf-facing beaches and dunes subregion in Region 4. ADLH was also identified as "most concern" for Subregion 4.08, which includes the Brownsville Ship Channel and Bahia Grande, and this subregion scored the highest average level of concern in Region 4. In Subregion 4.09 (Outlet Rio Grande), ICR was identified as an issue of "most concern". Overall, Subregions 4.04, 4.07, 4.08 and 4.09 (Lower Laguna Madre, Laguna Atascosa, Brownsville Ship Channel and Outlet Rio Grande) had moderately high levels of concern for each IOC. All other subregions received moderately low levels of concern.

SECTION 5. Analyzing Existing Data and Information

Building upon the 2017 Resiliency Plan, the GLO Planning Team gathered updated documents, community plans, project databases, studies and datasets. This information was used to identify new projects to include in the project database and carry forward to project evaluation and prioritization.

A. Literature Review

The GLO Planning Team reviewed additional literature that had been produced since the publication of the 2017 Resiliency Plan. Similar to the 2017 literature review, this included gathering and analyzing reports, documents, databases and other materials of potential relevance to coastal resiliency, restoration and development. It also entailed reviewing past projects in the database that had been taken out of consideration due to the project goals, such as if the project related solely to an infrastructure-based solution, which were now viable project solutions under the Plan's new focus on Societal Resiliency Strategies and coastal infrastructure. The 2019 literature review is included in **Appendix B**.

B. Infrastructure Data Review

The GLO Planning Team reviewed the GLO Texas Coastal Resiliency Study Draft Final Report to assess the relevancy of the data for proposed projects with respect to the Resiliency Plan. An initial review was completed for the 2017 Resiliency Plan; since Phase 2 of the Resiliency Plan encompasses more infrastructure-based projects, a second review was required.

The scope of the study indicated identifying new or existing projects to mitigate damage to potentially vulnerable infrastructure throughout the 18 Texas coastal counties, based on high-level assessments of coastal hazards[1] and working group meetings with Councils of Government located in these counties. The study team identified 2556 potential infrastructure projects through the identification process outlined in the study, 2550 of which were provided in the data.

The Study organizes proposed infrastructure projects into the following overarching categories:

- Critical Facilities
- Transportation
- Energy/Industrial Facilities
- Communications
- Flooding
- Environmental
- Water Treatment/Waste

Based on the Team's review of the Texas Coastal Resiliency Study and its associated data, it was determined that some, but not all, of the potential projects identified by the study will be relevant for evaluation in the planning process. First, because the study limits extended beyond the limits of the Texas Coastal Zone (the study extents of the Resiliency Plan), only the proposed projects situated within the Texas Coastal Zone will be considered for possible evaluation. Second, the Resiliency Plan will only

[1] Identified coastal hazards include: Flooding, Storm Surge, Wave Impacts, Morphology and Winds.

consider projects that received a Consequence Scale score of 3 or greater (refer to Figure 5-1), using the study-determined values to serve as an initial screening mechanism. The intent of this stipulation is to remove from consideration projects that have "Insignificant" or "Minor" consequences that are more appropriately addressed by local plans than by the statewide Resiliency Plan.

Level	Descriptor	Consequence Scale
1	Insignificant	Little to no impact on communities and access to services. No or only minor injuries. Minimal environmental damage, local general response.
2	Minor	Minor short term impacts (mainly reversible) on community services. Minor injuries requiring hospital medical treatment. Mitigatable environmental damage with recovery time of less than 1 year with local response.
3	Moderate	Considerable impact upon services and infrastructure. Injuries and illnesses with hospitalizations. Mitigatable environmental damage with recovery time of 1-5 years with local response.
4	Major	Major asset damage, severe impact on community services and assets. Single fatalities, long term illnesses or multiple serious injuries. Mitigatable environmental damage recovery time of 5-10 years with regional and national response.
5	Catastrophic	Long term loss of community assets and infrastructure. Multiple fatalities or permanent disabilities or wide spread illnesses. Mitigatable environmental damage recovery time greater than 10 years with regional and national response. Irreversible environmental damage.

Consequence Type - F = Function Loss, S = Safety, E = Environment

The consequence scale has five levels that range from insignificant to catastrophic impacts. Each impact level is described in terms of the function loss, safety and environmental components. Ecological impacts are measured by anticipated recovery time, and the level of response required. Safety is measured in terms of the potential for illness, injury or loss of life. Function loss is a measure of the impact to services and infrastructure. The consequence ranking is, therefore, based on the types of projects identified. This insures that the appropriate measures are applied. The scale was applied after working with the communities and discussing perceived consequence of the no action alternative for the selected projects.

Figure 5-1: Texas Coastal Resiliency Study Consequence Scale

To ensure that selected projects pertain to the Resiliency Plan's guiding principles of improving Coastal Resiliency, the Resiliency Plan will consider study projects that are related to reducing, improving or helping coastal communities respond to and plan for coastal Issues of Concern as outlined in the Resiliency Plan. The following describe the general types of infrastructure projects that the Resiliency Plan will evaluate:

- <u>Water-Based Transit:</u> Dredging-related project needs that may have potential as beneficial use projects.
- <u>Land-Based Transit</u>: Roadway improvement projects that are large scale needs and/or allow for critical emergency transit related to coastal risks, such as storms.

- Storm Surge Suppression & Flooding: Smaller scale levees and similar storm surge suppression projects may be included, as applicable; discussion of the results of large-scale state and federal storm surge suppression systems will be overviewed in the Resiliency Plan. If a drainage or flood risk reduction structure is primarily proposed due to coastal risks, it will be evaluated for inclusion.
- Community Development: Utility and critical facility projects will be evaluated on a case-by-case basis to determine if there is justification for the project providing coastal resiliency benefits based on the IOCs.

In general, the Resiliency Plan will not evaluate the infrastructure projects described below:

- Local Drainage Improvements: Drainage improvements that are for communities in the coastal zone, but not tied directly to coastal based risks, will not be included. Drainage studies related directly to bay systems, rather than specific drainage projects or community needs, may be reviewed in an effort summarize the needs at the regional or coastwide level.
- Energy Industry Improvements: Coastal infrastructure projects targeting energy or industrial facilities, or their pipelines will not be included strictly in the sense of a project targeting these corporate assets, but if there is an applicable ecologically focused project available that benefits these facilities, they will be noted for the additional benefits.
- Ship Channel Improvements: Federally-maintained ship channel projects will not be included in the proposed projects of the Resiliency Plan.
- Capital Improvement Projects: Individual building-related projects (e.g. new emergency shelters, facilities) and other small-scale public projects will not be included in the projects to be reviewed. Rather, the Resiliency Plan will include discussion of best practices for communities to utilize along with discussing the GLO programs that provide opportunities for homeowners, businesses and communities with outreach and grant assistance under the Programs Resiliency Strategy.

AECOM identified 101 total projects that meet the evaluation criteria described above. Of these projects, 57 were incorporated for review during Phase 1 of the planning process, completed in 2017. The remaining 44 projects were incorporated for review during Phase 2 of the planning process and will continue under the evaluation procedures outlined by the Resiliency Plan. The 101 projects identified represent only those projects that did not duplicate or overlap with other proposed projects already in the Resiliency Plan database.

C. Coastal Grants and Projects Database Review

As part of the update of the projects included in the Resiliency Plan, the Team screened potential projects in the current version of the GLO Coastal Grants and Projects (CGAP) database. Within this database, the GLO has stored a record of coastal projects (completed, active or proposed) that were identified through several GLO programs (Coastal Management Program, Coastal Impact Assistance Program and Coastal Erosion and Protection Response Act Program) with names, project type, local sponsor and status, along with a specific or general spatial location.[2]

The new CGAP projects were grouped within a specific range of unique IDs to allow for simple tracking and transferred the CGAP database-specific ID to allow for connection to the CGAP database if needed.

[2] CMP – Coastal Management Program; CIAP – Coastal Impact Assistance Program; CEPRA – Coastal Erosion Planning and Response Act

Once imported, all active, in progress or completed projects were immediately removed from further evaluation under the Resiliency Plan screening processes. There were over 800 projects remaining that were classified as "proposed" or other miscellaneous statuses, requiring further evaluation.

An initial (conceptual level) screening of the remaining 800+ projects was performed to remove duplicates and projects that did not propose actions to directly improve coastal resiliency. After the initial screening, there were 136 projects from the CGAP database under consideration. These remaining projects were further defined by project type for continued consideration. It should be noted that the CGAP database does not include an initial submittal date for each project stored and some of the projects that progressed past the initial screening may be outdated. Through the remaining screening processes and the TAC review, it is anticipated that any concerns related to this issue would be sufficiently addressed. At this point in the process, the CGAP projects join in the screening of projects from all other sources.

To further inform the data gap analysis, the Team developed three heat maps to understand the history of coastal projects in Texas. These maps displayed:

- The number of project entries in the CGAP database for a specific local sponsor, with one map focused on communities and another on non-governmental organizations.
- The number of projects either completed or currently underway.
- Any CEPRA projects, as these are the most typically relatable to coastal resiliency projects of all projects included in the CGAP database. This map shows project locations, with offshore indicating regional or coastwide studies or programs, and indicates the associated CEPRA cycle. Projects that included multiple cycles are represented by their first CEPRA cycle.

All three maps are included in **Appendix B**.

D. Texas Department of Transportation Project Review

The GLO Planning Team recognizes that coastal roadways, particularly evacuation routes, are key elements of coastal resiliency. Although the ability to execute coastal roadway projects does not fall within the GLO's purview, it is nonetheless important for the GLO to identify the roadways that are slated for improvements in the near future and determine how these modifications might impact coastal resiliency planning. The GLO Planning Team reviewed Texas Department of Transportation (TxDOT) projects to assess opportunities for synergy and collaboration with the GLO for project development and funding.

The GLO Planning Team used TxDOT's Project Tracker, a public database showing current and future roadway projects in the state.[3] From the project tracker, the GLO Planning Team selected projects categorized as "Finalizing for Construction," "Long Term Planning" or "Under Development" for the 18 Texas coastal counties. Projects categorized as "Under Construction" were not included in this analysis. Projects in the TxDOT database are given priority classifications ranging from 1-Highest to 5-Low. Only projects with a priority greater than or equal to 3-Medium were selected for further review in the

[3] Project Tracker, Texas Department of Transportation, https://www.txdot.gov/inside-txdot/projects/project-tracker.html, accessed August 2017

Resiliency Plan. Using these criteria, a total of 45 projects were placed under consideration for the 2019 Resiliency Plan. The TxDOT project tracker outputs are shown on maps in **Appendix B**.

E. Coastal Storm Risk Management Project Review

The GLO Planning Team reviewed proposed Coastal Storm Risk Management (CSRM) projects within the state of Texas to inform planning decisions. These projects are undergoing study and review by the U.S. Army Corps of Engineers for prioritizing and recommendation and were **not** reviewed by the GLO Planning Team or TAC for the purposes of project prioritization. Progress of these projects will continue to be monitored by the GLO Planning Team. Projects that have received federal appropriations are included in the final Resiliency Plan as Tier 1 projects.

The Coastal Storm Risk Management studies/projects reviewed include:

- Sabine Pass to Galveston Bay, Texas CSRM and Ecosystem Restoration Study
    - Orange-Jefferson CSRM (Orange County Hurricane Flood Protection Levee)
    - Port Arthur and Vicinity Hurricane Flood Protection CSRM (Port Arthur Hurricane Flood Protection Levee)
    - Freeport and Vicinity Hurricane Flood Protection CSRM (Freeport Hurricane Flood Protection Levee)
- Coastal Texas Study
    - Houston-Galveston Storm Surge Suppression and CSRM (the "Coastal Spine")
    - South Padre Island Storm Surge Suppression and CSRM
- Matagorda Levee Drainage System Upgrades

In addition, some coordination was undertaken with the City of Corpus Christi to determine if there was a need to include considerations for the Corpus Christi levee certification process.

F. Project List Development

For the 2019 Resiliency Plan, the Tier 1 Project List from the 2017 Resiliency Plan was used as a starting point. Certain completed projects were removed from the list. Additional lower-tier projects were re-evaluated for significant changes to the project description or details that might warrant the project's re-inclusion into evaluation. New projects from the 2019 literature review, infrastructure data review, CGAP review and TxDOT project review were added to the evaluation list, in addition to new TAC-recommended projects. The Project Screening Process is described in SECTION 7.

SECTION 6. COASTAL MODELING AND VULNERABILITY ASSESSMENT

A. INTRODUCTION

In an ongoing effort to ensure that the Resiliency Plan continually adapts to future conditions and to promote long-term resiliency, modeling was performed to assess what potential future conditions might look like on the Texas coast. The two main considerations when looking at the future of the coast are relative sea level rise and storm surge inundation. This section describes the modeling that was performed and outlines the results. Supplemental materials can be found in **Appendix C**.

The intent of the modeling effort was to further understand and quantify the future impacts of relative sea level rise and storm surge events, comparing a no-action scenario (i.e. no additional coastal resiliency projects are implemented beyond current conditions) and a future with-project scenario (i.e., includes execution of some coastal resiliency projects). Additional datasets were also developed showing the changes or vulnerabilities relative to time due to these gradual (relative sea level rise) and immediate (storm surge) coastal changes.

Prior to beginning regional modeling, the GLO Planning Team conducted a coastwide gap and vulnerability assessment to determine areas with a higher probable future risk to land loss and storm surge impacts and identify if these areas had sufficient proposed projects to work to mitigate this potential future risk.

B. GAP AND VULNERABILITY ASSESSMENT

After the completion of the 2017 Resiliency Plan, a Gap Analysis was conducted to identify potential gaps in the coastal resiliency planning effort in addressing past and future coastal hazards. To accomplish this analysis, two Drivers of coastal change were assessed: 1) Past and future land-cover change due to sea level rise and coastal erosion; and 2) Storm surge inundation vulnerability both at present water levels and with 1 meter of sea level rise.

To address an area's susceptibility to land loss, historic and modeled future land-cover datasets were analyzed to identify areas of potential vulnerability. "Land loss" here is defined as land that was originally wetland or dry land that converted to open water. The 1956 National Wetlands Inventory (NWI) was compared to the 1999 NWI output to quantify historic land lost. To identify areas vulnerable to future sea level rise, Sea Level Affecting Marshes Model (SLAMM) output from the year 2100 was compared to 2001 inputs (inputs and outputs generated by the Gulf Coast Prairie Land Conservation Cooperative). The potential amount of land inundated by storm surge was determined using NOAA's output of Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model for a category 2 hurricane.

The areas of land analyzed correspond to U.S. Geological Survey (USGS) 3.75-minute quarter quadrangle (quarter quad) maps. The quarter quads were classified according to their relative vulnerability to storm surge and land loss. If a quarter quad's area of land inundated by storm surge is above the mean for all quarter quads (mean = 7,163 acres), but the amount of land lost to open water falls below the mean for all quarter quads (mean = 656 acres), it was classified in Cluster 1 ("Above average susceptibility to surge, less to land loss"), meaning that the area is low-lying and susceptible to storm surge but that the wetlands and shoreline are relatively stable. If both acreages are above the mean, it is classified in Cluster 2 ("Above average susceptibility to surge and land loss"), meaning that the area is vulnerable to storm surge and the wetlands and shorelines there are unstable. If the quad is less susceptible to surge but has unstable wetlands and shorelines, it is in Cluster 3 (“Above average susceptibility to land loss, less to surge”). Lastly, if the quad is both less vulnerable to surge and has stable wetlands and shorelines, it is in Cluster 4 (“Below average susceptibility to surge and land loss”). The results of the cluster analysis are shown in Figure 6-1 and spatially in Figure 6-2.

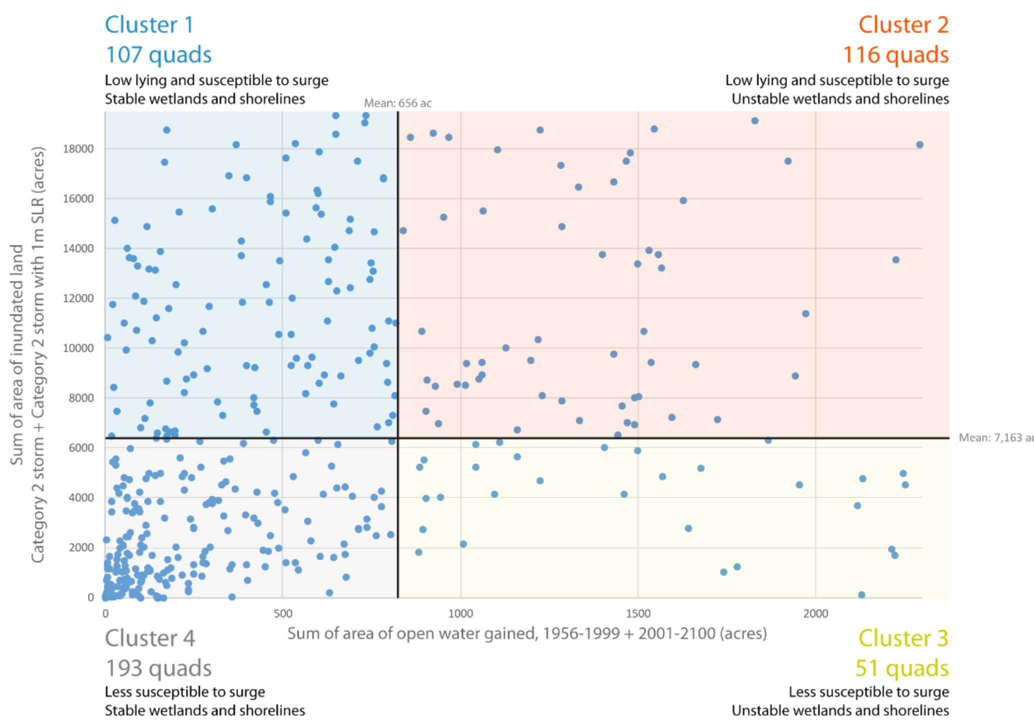

Figure 6-1: Relative Vulnerability of Quarter Quads to Storm Surge and Land Loss

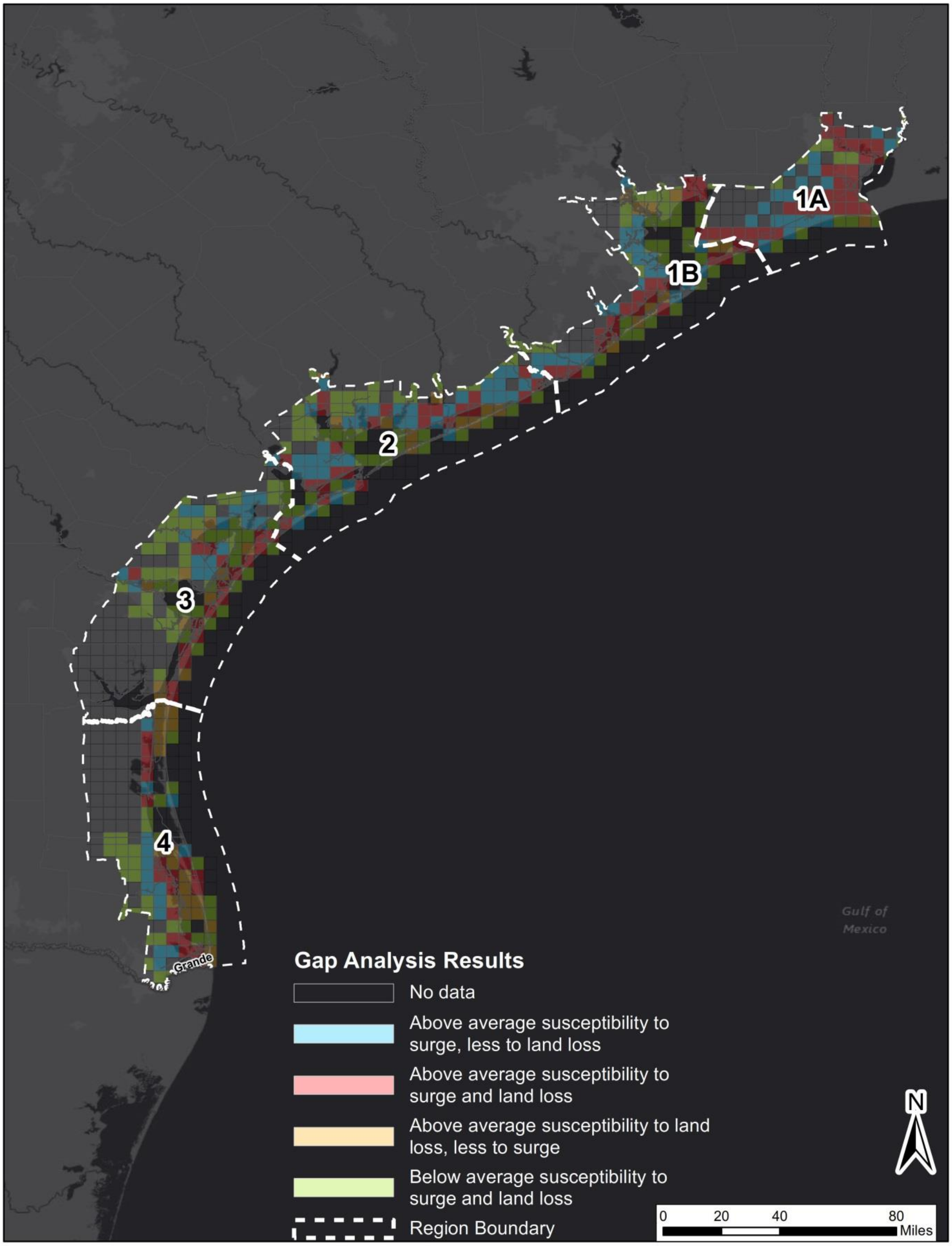

Figure 6-2: Relative Vulnerability of Quarter Quads to Storm Surge and Land Loss to Open Water by Region

The data used to generate the areas of potential vulnerability are shown in Table 6-1.

Table 6-1: Gap Analysis Component and Source Data

Gap Analysis Component	Source Data	Details
Areas of Analysis	U.S. Geological Survey (USGS) 3.75-min quarter quad maps	Acreage of past and future change in open water was summed per USGS quarter quad to represent total change in open water. Acreage of inundated land was calculated per USGS quarter quad for both category 2 and category 2 plus 1-meter of sea level rise storm scenarios.
Past and Future Change in Open Water (Wetland Loss)	Historical National Wetlands Inventory (NWI)	Open water features from historic NWI for years 1956 and 1999 were extracted for SLAMM classes 15 through 19. Area (in acres) of open water features in both time periods was calculated per USGS quarter quad and the difference in area was used to represent past change in open water.
	Sea Level Affecting Marshes Model (SLAMM)	Version 6.5, scenario years 2001 and 2100, 1-meter of sea level rise. Classes 15 through 19 represent open water. Area (in acres) of open water features in both time periods was calculated per USGS quarter quad and the difference in area was used to represent future change in open water.
Storm Surge Inundation	Sea, Lake, and Overland Surges from Hurricanes (SLOSH)	Category 2 storm inundation layers were produced from SLOSH water surface elevation output generated by NOAA's National Hurricane Center for four basins: Galveston Bay, Matagorda Bay, Corpus Christi Bay and the lower Laguna Madre for Category 2 and Category 2 plus 1-meter of sea level rise. The Maximum of the Maximum Envelopes of Water (MOMs) were used to provide a snapshot of the worst-case high-water scenario.
	National Elevation Dataset	The land elevation was subtracted from the maximum water surface to determine areas that would be inundated from a worst-case scenario Category 2 storm surge in each basin at a 1 arc-second resolution.
	Shuttle Radar Topography Mission (SRTM)	A land-water delineation layer was developed using the Shuttle Radar Topography Mission elevation dataset to classify results as either open water or inundation.

C. Existing Model Review

Before the modeling process started, several existing or ongoing models were assessed to inform the Resiliency Plan model goals, validate Resiliency Plan model results and prevent duplication of efforts. These models were:

- Gulf Coast Community Protection and Recovery District (GCCPRD) – ADCIRC2D/UnSWAN
- USACE – ADCIRC 2D
- USACE – 3D ADH-SW3
- Texas A&M University-Galveston – Delft3D
- Severe Storm Prediction, Education, & Evacuation from Disasters (SSPEED) Center – ADCIRC 3D
- National Oceanic and Atmospheric Administration (NOAA) – ADCIRC-MEM Northern Gulf Coast

D. Modeling Process Overview

A high-level explanation of the interactions between the different models is displayed in Figure 6-3:

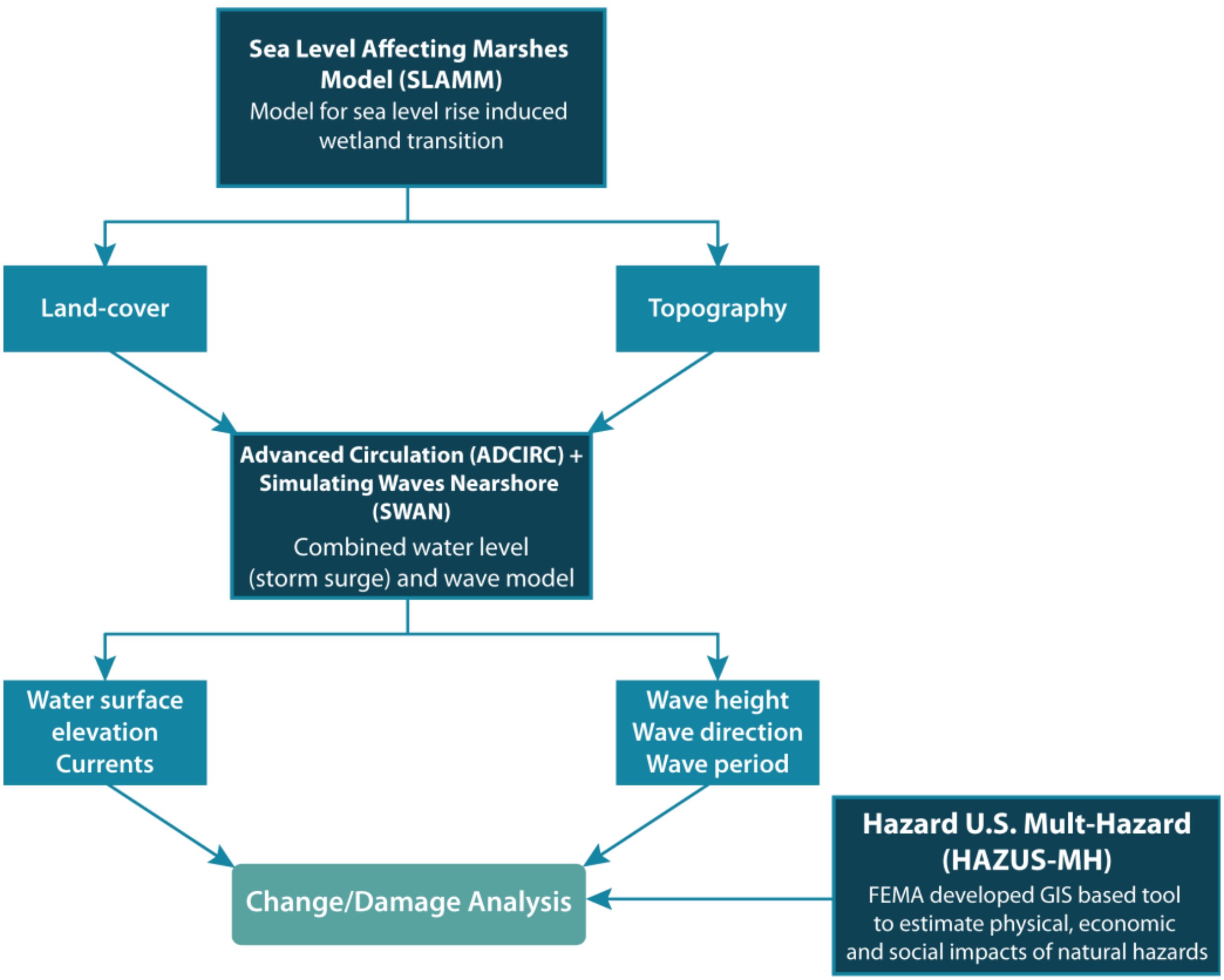

Figure 6-3: Physical Modeling Process

E. Sea Level Rise, Storm Surge and Wave Modeling

The Harte Research Institute (HRI) used sea level rise, storm surge, and wave modeling to provide quantitative information regarding the impacts of relative sea level rise (RSLR) and enhanced storm surge caused by higher sea level and changes in land cover. Through modeling of these major hazards, this work shows the relative susceptibility to negative impacts on the natural and built environments along the coast. The work also simulates how the implementation of certain coastal resiliency projects and strategies may mitigate those impacts.

I. Methods

To assess the vulnerabilities to RSLR and associated enhanced storm surge caused by higher sea level and changes in land cover in the year 2100, the Sea Level Affecting Marshes Model (SLAMM) and the coupled Advanced CIRculation (ADCIRC) and Simulating Waves in the Nearshore (SWAN) model were used (Figure 6-4) (Booij *et al.*, 1999 (SWAN); Clough et al., 2010 (SLAMM); Luettich et al., 1992 (ADCIRC)). In addition to these two modeling tools, a third software package called Hazards U.S. Multi-Hazard (Hazus) was used to estimate economic impacts of storm surge flooding (Figure 6-4) (Scawthorn *et al.,* 2006). All these modeling tools have been widely used by the Environmental Protection Agency (EPA), Federal Emergency Management Agency (FEMA), U.S. Fish and Wildlife Service (USFWS), USACE, NOAA and many state, local and academic institutions for multiple applications in various geographical locations and are well-documented.

A number of map-based inputs and numeric parameters along with a 1 m global mean sea level rise scenario (GMSLR) by the year 2100 were required to run the SLAMM model that simulates the dominant processes involved in wetland conversion and shoreline change for the sea level rise scenario. SLAMM provides maps of updated elevations and land cover classes in the year 2100 along with other numerical outputs. The future topographic surface predicted by the SLAMM model was used to update the ADCIRC model computational mesh. The future land cover conditions predicted by the SLAMM model, combined with the 2100 land cover dataset developed by the US Geological Survey (Sohl *et al*., 2014), were used to generate ADCIRC model friction parameters (Manning's *n*) representative of future conditions. The GMSLR scenario of 1 m by 2100 was incorporated in the SWAN+ADCIRC model setup by increasing the initial water surface elevation from the current sea level condition.

The ADCIRC and SWAN models are tightly coupled as an integrated wave and circulation model that operates on the same unstructured finite element mesh allowing for interaction of waves and circulation. This coupled SWAN+ADCIRC model provides the time and spatially varying water surface elevation, currents, wave height, wave direction and wave period. The SWAN+ADCIRC model was forced using meteorological wind and pressure fields of 6 selected hypothetical Category 2 hurricane events making landfall in different parts of the Texas coast. A total of 14 SWAN+ADCIRC simulations were performed. The same 6 hurricane events were forced to both the present-day condition to assess the storm surge impact in present land cover and topography, and the future condition (2100) to assess the combined impact of RSLR and future land cover and topography. In addition, two storms were modeled with simulated resiliency projects in the future condition to assess how these projects can change storm surge patterns in comparison to the future landscape without any resiliency projects along the coast. From these simulations, the storm surge inundation grid was derived for each region by subtracting the ground elevation value from the water surface elevation value obtained from the SWAN+ADCIRC simulation. Each of these storm surge inundation grids was given as flood depth input to Hazus to estimate potential building losses due to storm surge and to compare the damage between present and future conditions.

The details of each of these modeling tools, their inputs and outputs and processing steps as outlined in Figure 6-4 are explained in the following sections.

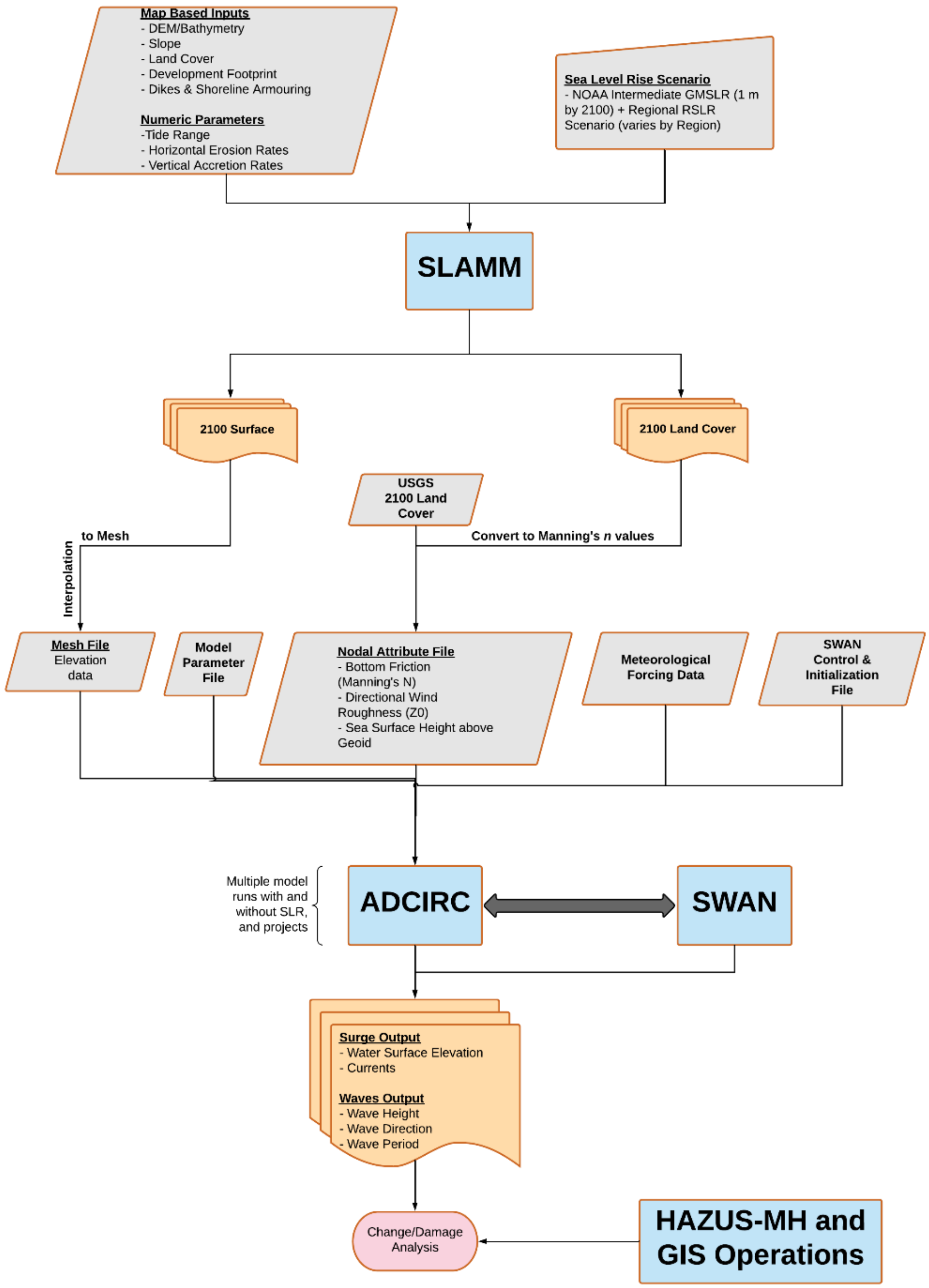

Figure 6-4. Modeling framework implemented in this study. The schematic shows the input/output data, processes and modeling tools used in this study

Sea Level Rise and Landscape Change Modeling

This study employs the Sea Level Affecting Marshes Model (SLAMM) to project future changes in the distribution of estuarine, palustrine, and upland environments. SLAMM is a rule-based spatial model built for predicting land cover changes induced by sea level rise in coastal areas at a local or regional scale (Clough et al., 2010). SLAMM uses an intricate decision tree that incorporates geometric and qualitative relationships to determine transitions among habitat classes as sea level rises. SLAMM includes twenty-one different land cover classes covering marine, estuarine and palustrine systems derived from U.S. Fish and Wildlife Service's National Wetland Inventory. The model simulates the dominant processes involved in land cover changes and shoreline modifications caused by RSLR. SLAMM assesses the relationship between inundation, elevation, slope, habitat type, vertical accretion, erosion and the presence or absence of dikes to determine how one land cover type converts to another. Wetlands are transferred to another land cover class if the lower elevation boundary of the wetland class falls below its set minimum elevation. The land cover change is determined by the location of the cell relative to open water and the maximum fetch distance across that water body. To simulate inundation, SLAMM tracks the rise of water levels and the salt boundary by reducing the elevation of each cell as sea level increases. Relative sea level change is adjusted at each time step based on the local subsidence or uplift in that cell and the increase in sea level based on the GMSLR scenario being modeled. Model outputs consist of maps of updated elevations (accounting for sea level rise, vertical accretion and uplift/subsidence), habitat classes and tabular files with summary statistics of land cover change.

SLAMM is neither the most simplistic nor the most complex modeling tool available for predicting land cover changes due to sea level rise. Choosing a model involves considering trade-offs between complexity, scale, cost, accessibility, required expertise and scientific accuracy. SLAMM presents an improvement over relatively simple inundation models, commonly referred to as "bathtub models", which require only an elevation dataset and an increase in water level to project potential inland extent and depth of flooding. Unlike SLAMM, bathtub models do not consider feedbacks of physical and biophysical processes that affect changes in elevation and shorelines, including edge erosion, land subsidence, and vertical accretion of the marsh platform. A more comprehensive wetland transition model than SLAMM could include complex ecological feedbacks that SLAMM does not account for, requiring input data such as air temperature, precipitation, river discharge, sediment load, regional salinity, plant growth and mortality rates, and salinity tolerances of marsh vegetation. Although including these important and complex feedbacks would make for a more comprehensive model, it would have a much higher computational cost than SLAMM and the required input data are not available everywhere. A major benefit of SLAMM is its accessibility to both modelers and those who use its output – it is widely used, well documented and open source, requires relatively minimal computational time and data demand, and provides spatially explicit map-based output.

SLAMM is not a hydrodynamic model, thus incapable of representing important future changes in hydrodynamics that will affect suspended sediment, tide ranges, freshwater inflows, and erosion. SLAMM's erosion model is also very simplistic, incorporating only horizontal erosion at the land-water interface of marshes, swamps and tidal flats. Additionally, SLAMM's ocean beach modelling is limited, not accounting for complex feedbacks between storms, currents, waves and sediment supply that shape beaches and dunes.

SLAMM includes a "soil saturation" module that allows for some fresh water environments to migrate. However, it only works properly at very low-resolution model runs (> 30 m). At high resolutions, like this study at 3 m, it significantly overestimates the current fresh water marsh land cover and causes horizontal streaking of the distribution of inland fresh marshes in the future output. Therefore, the soil saturation module was turned off in the SLAMM modeling.

To run the SLAMM model, a number of map-based inputs and numeric parameters are required. The following subsections describe these inputs along with any pre-processing steps that took place.

Model Inputs

Map Based Inputs

Digital Elevation Model (DEM)

A seamless high resolution, 3 m, topographic digital elevation model (DEM) of the Texas coast was developed for the land-surface elevation and slope inputs required for SLAMM. The elevations in the DEM represent the topographic bare-earth surface. The dataset is a fusion of 35 airborne topographic light detection and ranging (lidar) surveys acquired by various surveyors (Table 6-2) between the years 2005 – 2016. The landward extent of the lidar surveys selected for creation of this DEM was determined by the boundary of the ADCIRC computational mesh used for the storm surge simulation in this study. All bare-earth elevations were referenced to the North American Vertical Datum of 1988 (NAVD88).

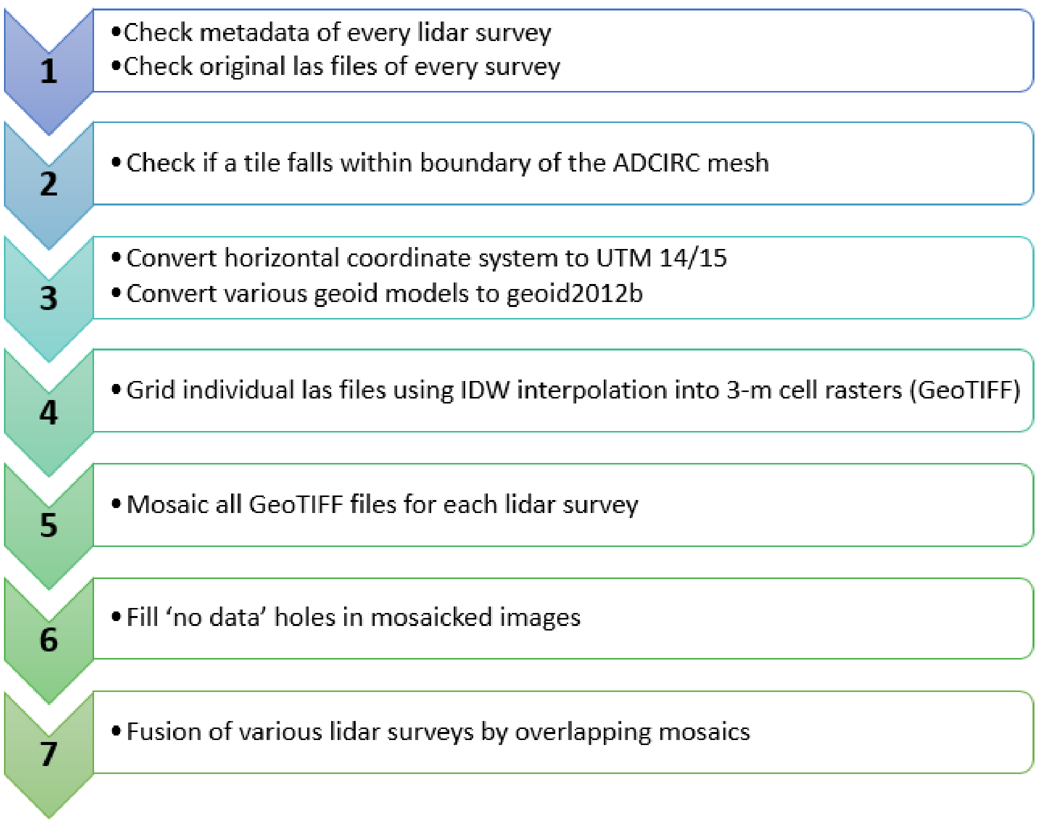

Figure 6-5: Workflow diagram for creating the seamless DEM of the Texas coast fusing several different lidar surveys

The lidar data (in las format) were first checked if they fall in the boundary of the ADCIRC mesh for further processing. A las file was considered for further processing if any one of its four corners fell within the ADCIRC boundary. All necessary las file's horizontal coordinates were converted to Universal Transverse Mercator (UTM) 14 or UTM 15 and vertical coordinates to NAVD88. Furthermore, any files that used geoid1999, geoid2003, or any other geoids were converted to geoid2012b.

The las files were then gridded by inverse distance weighting (IDW) interpolation method with the three nearest points to produce 3-m cell resolution raster files (GeoTIFF File Format). IDW is a type of deterministic method for multivariate interpolation with a known scattered set of points. The assigned values to unknown points are calculated with a weighted average of the values available at the known points. While gridding, if no lidar points were within the search range, the cell was assigned no data. A lidar survey usually had 10 to 2000 las files. Therefore, gridding lidar points in a las file resulted in 10 to 2000 raster tiles. The tiles were then mosaicked into larger images. The algorithm to mosaic these tiles first collected the geographic range of all tiles and also gathered the extent of each lidar survey. If the extent of the survey was larger than 20,000 x 20,000 cells, it was divided into 2 to 10 sub-ranges, so that each sub-range was smaller than 20,000 cells (one cell is 3 x 3 m). After obtaining the geographic extent of each sub-range, all tiles within a sub-range were mosaicked if the left-upper corner of a tile was in the geographic extent of a sub-range. This finally gave 2 to 10 mosaic images based on the number of sub-ranges obtained earlier.

The mosaicked images had no data holes caused by the following: a) low density of lidar points; b) problematic las files; c) presence of water bodies; and d) gaps between the raster tiles in a mosaic image. A morphology closing operation was used to close all holes that were less than 41 x 41 cells occurring within the mosaicked images. To fill in these internal holes of size equal to or less than 120 x 120 m, a buffer of 50 cells from the boundary of any no data area was generated. The generated buffer extended toward the no data region starting from the boundary. The no data cell next to valid elevation data were assigned as buffer cell number 1, the no data cells next to cell number 1 was assigned as buffer cell number 2, and so on. The elevation for a buffer cell is computed as the average elevation of its 3 x 3 m neighboring cells. So, the elevation of buffer cell number 1 was computed first considering its neighboring cells, then elevation of buffer cell number 2, and so on until all no data cells were filled within the 50 buffer cells. Therefore, if the holes in the mosaicked image within the extent of survey were bigger than 40 cells (120 m), they were not completely filled.

There were multiple lidar surveys (Table 6-2) used to develop the seamless DEM. The las files in each survey were separately gridded into raster tiles and mosaicked to get 2 to 10 mosaic images of each survey. The mosaic images obtained from multiple surveys were combined to get the final seamless DEM. It was necessary to make sure that the edges between images of multiple surveys be smooth without sharp change in elevation between the surveys and also the best data be used if there was an overlap between the surveys. Therefore, in order to make a smooth surface along the edges of the lidar surveys, a similar method to that used to fill no data holes was used by considering a buffer of 10 cells instead of 50 cells. However, if multiple surveys were available and there was an overlap along the edges, a weighted average method was used to compute the elevation for 10 cells along the edges.

Finally, it was found that most of the 2006 Texas Water Development Board (TWDB) surveys (a total 13) were of lower quality in comparison to other surveys listed in Table 6-2. Therefore, the low-quality surveys were excluded in the fusion if a newer survey was available in that area. If there were more than one newer survey available without considering 2006 TWDB, the weighted average method was used to calculate an elevation at overlapping cells. The final DEM was clipped to the SLAMM modeling study area and was then re-projected to Albers Conical Equal Area, along with all other map-based inputs, for input to SLAMM (Figure 6-6).

Table 6-2: List and description of lidar surveys used to develop bare-earth topographic surface of Texas coastal zone

NAME	UTM ZONE
2005-2006 INTERNATIONAL BOUNDARY & WATER COMMISSION (IBWC) LIDAR: HIDALGO, DEL RIO/ EAGLE PASS TX	14
2005-2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: NORTH CAMERON AND WILLACY COUNTIES	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: MATAGORDA COUNTY (UTM 14)	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: ARANSAS AND REFUGIO COUNTIES	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: CALHOUN COUNTY	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: VICTORIA COUNTY	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: JACKSON COUNTY	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: SAN PATRICIO COUNTY	14
2007 TX COASTAL LIDAR: KENEDY AND KLEBERG COUNTIES	14
2009 USACE NCMP TOPOBATHY LIDAR: POST HURRICANES GUSTAVE AND IKE (AL, LA, MS, TX)	14
2011 USGA ARRA TEXAS LIDAR: CALHOUN COUNTY	14
2011 USGA ARRA TEXAS LIDAR: NUECES COUNTY	14
2010-2011 INTERNATIONAL BOUNDARY & WATER COMMISSION (IBWC) LIDAR: RIO GRANDE FLOOD CONTROL PROJECT	14
2011 USGS ARRA TEXAS LIDAR: HIDALGO COUNTY	14
2011 USGS ARRA TEXAS LIDAR: WILLACY COUNTY	14
2012 UNIVERSITY OF TEXAS LIDAR: LOWER TEXAS COAST	14
2013 UNIVERSITY OF TEXAS LIDAR: GUADALUPE DELTA	14
2013 UNIVERSITY OF TEXAS LIDAR: SAN ANTONIO BAY	14
2014 UNIVERSITY OF TEXAS LIDAR: COPANO AND ARANSAS BAY	14
2015 UNIVERSITY OF TEXAS LIDAR: MATAGORDA	14
2016 USACE NCMP TOPOBATHY LIDAR: GULF COAST (AL, LA, MS, TX)	14
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: BRAZORIA COUNTY	15
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: CHAMBERS COUNTY	15
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: MATAGORDA COUNTY (UTM 15)	15
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: ORANGE COUNTY	15
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: JEFFERSON COUNTY	15
2006 TEXAS WATER DEVELOPMENT BOARD (TWDB) LIDAR: GALVESTON COUNTY	15
2008 HOUSTON - GALVESTON AREA COUNCIL (H-GAC) LIDAR: HARRIS COUNTY AND ITS WATERSHEDS	15
2009 USACE NCMP TOPOBATHY LIDAR: POST HURRICANES GUSTAVE AND IKE (AL, LA, MS, TX)	15
2011 FEMA LIDAR: LIBERTY COUNTY	15
2012 UNIVERSITY OF TEXAS LIDAR: UPPER TEXAS COAST	15
2014 TEXAS NATURAL RESOURCES INFORMATION SYSTEM (TNRIS) LIDAR: FORT BEND	15
2015 UNIVERSITY OF TEXAS LIDAR: MATAGORDA	15
2015 TEXAS PARKS AND WILDLIFE LIDAR: GALVESTON ISLAND STATE PARK	15
2016 USACE NCMP TOPOBATHY LIDAR: GULF COAST (AL, LA, MS, TX)	15

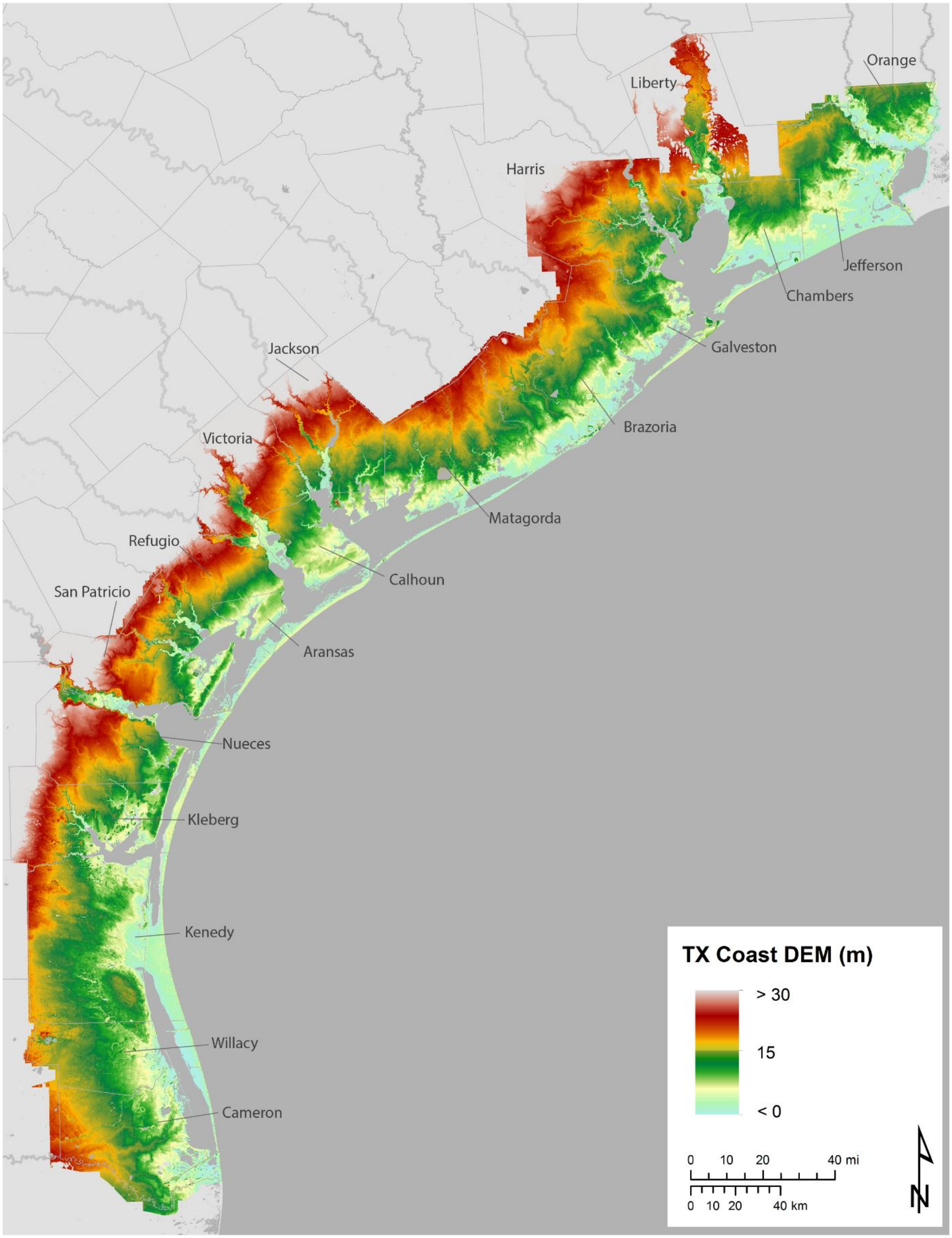

Figure 6-6: Bare-earth topographic surface developed using lidar along the Texas coast with coastal county labels. Elevations are referenced to NAVD88.

Slope

The slope raster was developed from the final mosaicked 3-m DEM. Slope is the rate of maximum change in z-value from each cell of the DEM. The inclination of slope is calculated in degrees.

Land cover

The wetland land cover raster was generated from the latest U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) habitat delineations (U.S. Fish and Wildlife Service, 2017). The feature data were clipped to the sea level rise modeling study area. The NWI utilizes the Cowardin classification system where wetland classes describe generic habitat type more than specific species composition (Cowardin *et al.,* 1979*)*. The NWI Cowardin land cover attributes were cross walked to SLAMM land cover codes using a crosswalk guide which is installed with the SLAMM executable. Using SLAMM's crosswalk guide, each polygon was given its proper numeric SLAMM land-cover classification. Since SLAMM requires ASCII raster files as inputs, the polygon shapefile was converted to a 3-m raster using the "SLAMMCODE" attribute as the field used to assign values to the output raster and the environments were set to have the same resolution, processing extent and snapping as the DEM. All areas within the study region polygon that contained no NWI data were assigned a value of 2, which corresponds to the Undeveloped Dry Land SLAMM class. The Gulf open water was also filled in with its proper SLAMM classification (see Table 6-8 for description of SLAMM classification codes).

Development footprint

The development footprint was determined from the 2011 National Land Cover Database (NLCD) percent impervious raster. Cells in the NLCD raster which contained values greater than or equal to 25 were considered developed area. In the land cover raster wherever cells = 2 (Undeveloped Dry Land SLAMM class), and are considered developed by the NLCD raster, they are given a SLAMM land cover class of 1 (Developed Dry Land). All other values remain Undeveloped Dry Land (2).

Dikes & Shoreline Armoring

Cells protected by dikes, levees, or hardened shorelines were identified using a combination of the NWI input file and shoreline information from the Environmental Sensitivity Index (ESI) mapped by the Harte Research Institute (Gibeaut *et al*., 2013). In the NWI shapefile, diked areas are signified by a "1" value in the 'DIKE' column of the attribute table. The polygons with this signifier were selected and exported into a new shapefile. In the ESI shoreline shapefile, the shorelines designated as armored were selected and also extracted into a new shapefile. The dikes and armored shorelines shapefiles were then individually rasterized at a 3 m resolution using a constant value of '1' as the input field. These rasters were then mosaicked together to get the final dikes & shoreline armoring raster.

Subsidence Rate Grid

To include the effects of land-surface subsidence in the Galveston Bay system area, a subsidence rate grid was developed by Subedee *et al*., 2016 using the data collected by Harris-Galveston Subsidence District (HGSD) and National Geodetic Survey (NGS). HGSD and NGS have been using Global Positioning System (GPS) to measure and document land-surface elevation changes in the region based on elevation data measured by borehole-extensometer, Continuously Operating Reference Station (CORS), and GPS Port-A-Measure (PAM) (Zilkoski *et al*. 2003). The subsidence data from 27 PAM sites, 9 CORS sites and 8 extensometer sites obtained from HGSD were used to develop the subsidence rate grid (Figure 6-7). For all 44 sites, the vertical datum of the dataset was converted from National Geodetic Vertical Datum of 1929 (NGVD 1929) to NAVD88 using Vertical Datum Transformation (VDATUM) software and observed subsidence values were plotted against time. A subsidence rate in mm/year was calculated using a linear regression approach. These data all have varying time-spans and numbers of observations, with the oldest data source beginning in 1974. Sites are more concentrated in the northwest region of the study area where development is denser, with very few available sites in the more rural eastern and southern regions. Since the HGSD implemented a groundwater withdrawal regulatory plan in 1999, only subsidence data from that year or later was included in the interpolated grid.

In order to fill in spatial data gaps, relevelling data collected by NGS were also included in the analysis. These benchmark measurements provided additional elevation information of 23 releveling sites on Galveston Island and Bolivar Peninsula (Figure 6-7). Observations from each releveling site varied from 2 to 10 measurements, with dates ranging from 1905 to 1987. Each PAM and CORS site was processed against three reference CORSs (Addicks CORS, Northeast CORS and Lake Houston CORS), providing three values associated with each site every day of data collection. Therefore, the average subsidence rate (mm/year) for 36 PAM and CORS sites were calculated by weighted mean of the three rates where the weight is defined by the total observations per reference CORS. However, the average subsidence rate for the 8 extensometers was calculated without using the weighted mean approach as they only have one reference frame unlike PAM and CORS.

Among different interpolation methods tested, Kernel Smoothing appeared to give the best result based on the comparison of root-mean-square error (RMSE) to average standard error, which indicates that the predicted values do not deviate much from the measured values. Additionally, the optimal result should have a mean prediction error as close to 0 as possible and a RMSE Standardized value close to 1, indicating that the prediction is unbiased, and the standard errors are accurate. For Kernel Smoothing, the best method tested was 1st order polynomial interpolation weighted by the frequency of sampling at each site. The kernel function used was the fifth-order polynomial function. This interpolation was done at a 10-meter resolution. This method is considered as a good option for mapping data regularly collected from the environmental monitoring networks where data location density varies in the study site (Gribov and Krivoruchko, 2011).

For this study, the 10 m subsidence rate grid was resampled to 3 m, data were converted from mm/year to cm/year and were re-projected to Albers Conical Equal Area for input into SLAMM.

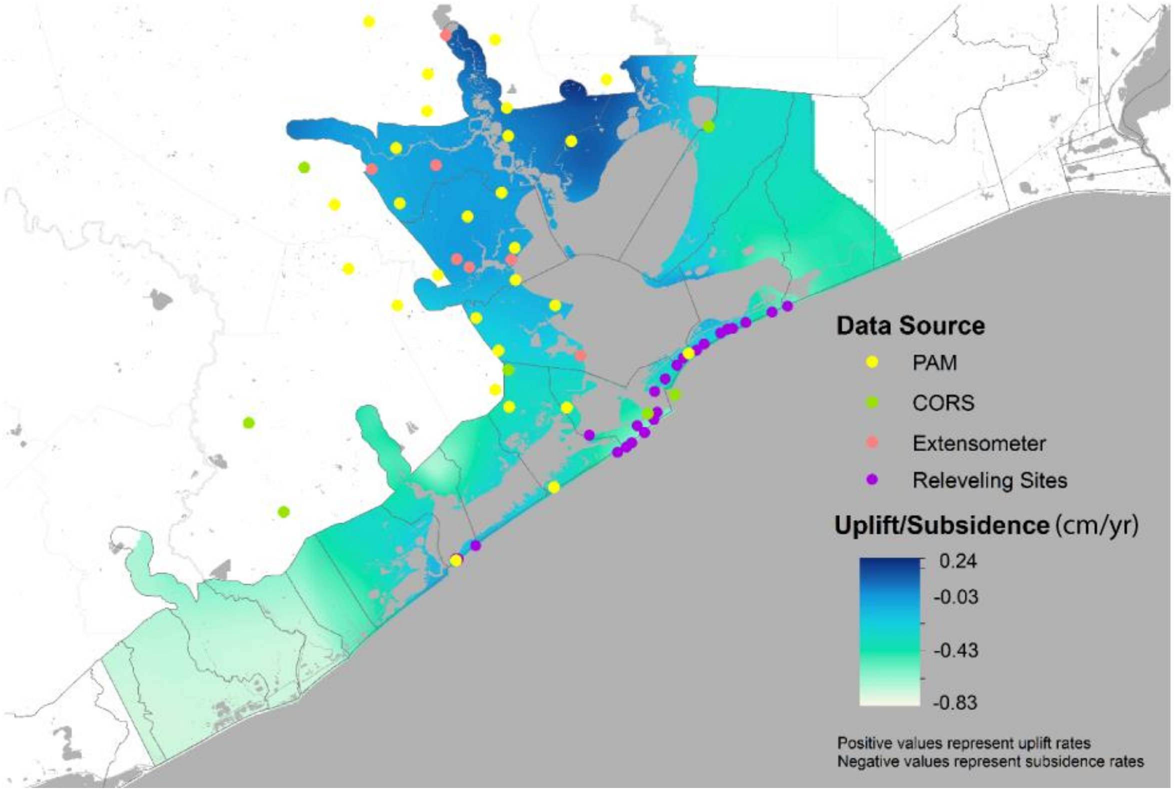

Figure 6-7: Subsidence rate grid in cm/yr. The dark blue color shows the rate of uplift and the light blue to light green shows the rate of subsidence in cm/yr. Elevations are referenced to NAVD88.

Numeric Parameters

Tide Range

NOAA VDATUM tidal datums were used to define the input tide ranges for the study area and the values were verified using nearby NOAA CO-OPS tidal datums. VDATUM's mllw.gtx (Mean Lower Low Water) was subtracted from mhhw.gtx (Mean Higher High Water) to get the great diurnal tide range (GT). Since tide range is input in SLAMM as a site-specific value, the study area was divided into subsites based on tide ranges. The Texas coast study area was already divided into 69 subregions based on the Hydrologic Unit Codes (HUC) developed by the U.S. Geological Survey (USGS) from previous Resiliency Plan planning efforts. These subregions were then manually edited to delineate the different tide ranges up and down the coast. To accomplish this, the GT raster was symbolized by classifying the raster by equal intervals of 1 cm or 5 cm. Lines were drawn subjectively where the tide range began to change, aiming to keep the variation in tide range within each subregion less than 5 cm. This methodology produced over 100 subsites. In order to reduce computational expenses, subsites with similar tide ranges were merged together. A sensitivity analysis was run to see how the variation in tide range affected the model output. The analysis concluded that subregions should not be merged where the tide range difference between two adjacent subsites is greater than 6 cm. Also, when merging the subsites, the size of the subsite was limited to a maximum of approximately 250 square miles, due to computational constraints of large areas. The final product included 78 subregions with unique GT (Figure 6-8). Using the Zonal Statistics tool, the mean zonal statistics of the GT raster was calculated using the edited subregion shapefile as the feature zone data. The Feature to Point tool was used to create a point inside each subregion. The Extract Values to Point tool was used to extract the value of the mean GT raster to the point shapefile, which was then joined to the SLAMM inputs attribute table.

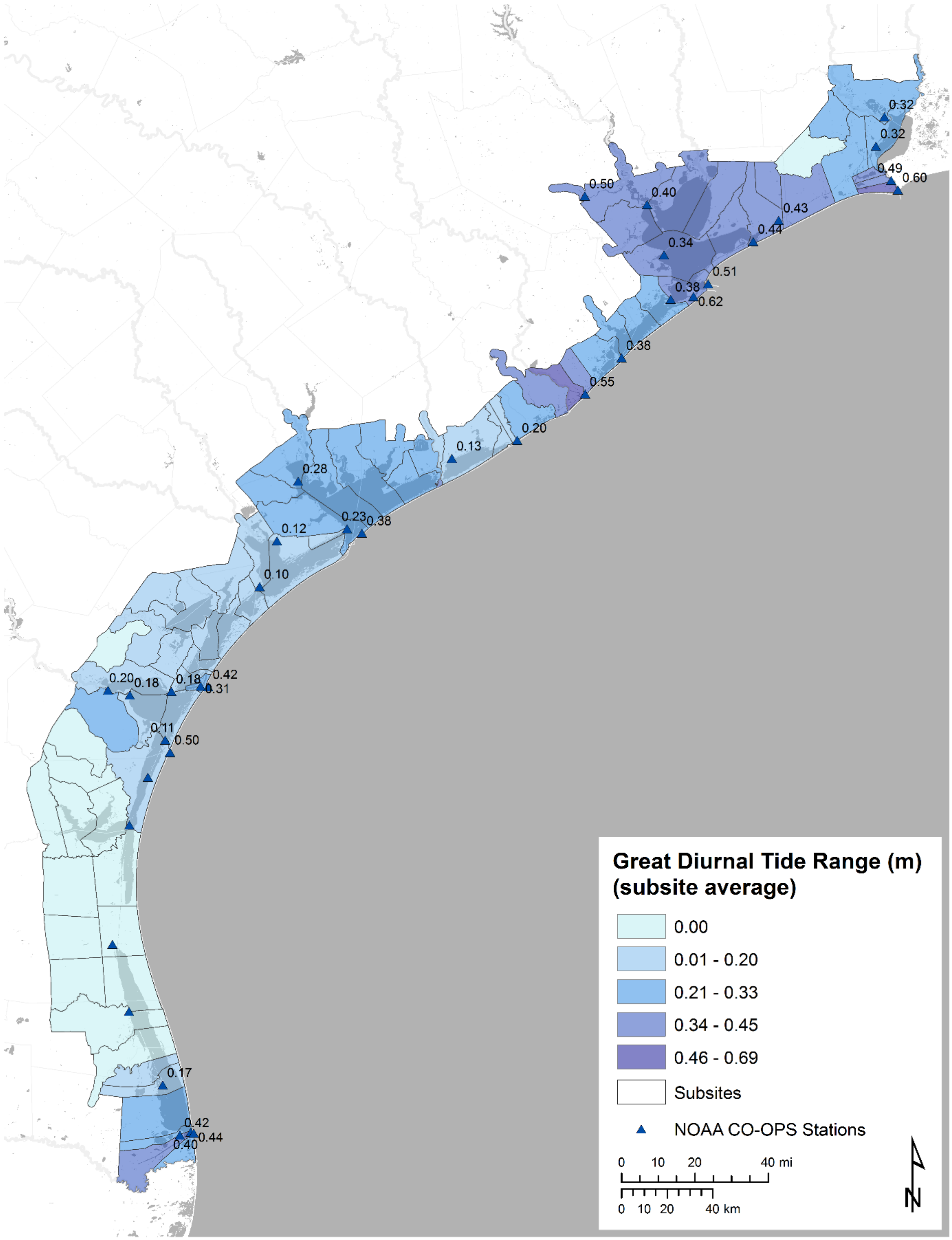

Figure 6-8: Great diurnal tide ranges used to convert the input elevation data's vertical datum from NAVD88 to Mean Tide Level as modeling input for SLAMM.

MTL-NAVD88

SLAMM uses the vertical tidal datum Mean Tide Level (MTL) while the input DEM uses the orthometric NAVD88 datum. Therefore, a NAVD to MTL correction must be applied to the input elevation product. SLAMM allows for either a site/subsite constant MTL-NAVD88 value or for a cell-by-cell correction. For this study, a correction grid was first created using the NOAA VDATUM products from all the Texas bays, and then a subsite constant value was derived.

The topography of sea surface (TSS) VDATUM product represents the difference between the NAVD88 datum and the Local Mean Sea Level (LMSL) tidal datum; the MTL VDATUM product represents the difference between the MTL tidal datum and the LMSL tidal datum.

$$MTL.gtx = MTL - LMSL$$

$$TSS.gtx = NAVD88 - LMSL$$

Therefore, to get MTL-NAVD88: $(-1)[(TSS.gtx) - (MTL.gtx)] = [(NAVD88 - MTL)(-1)]$

Only the values near the shoreline and the landward extent of the VDATUM product were needed, so the values within the water bodies were clipped out of the MTL-NAVD88 raster. Zonal statistics were calculated to get the mean MTL-NAVD88 value for each subregion (Figure 6-9). The Feature to Point tool was used to create a point inside each subregion. Extract Values to Point tool was used to extract the value of the mean MTL-NAVD88 raster to the point shapefile, which was then joined to the SLAMM inputs attribute table.

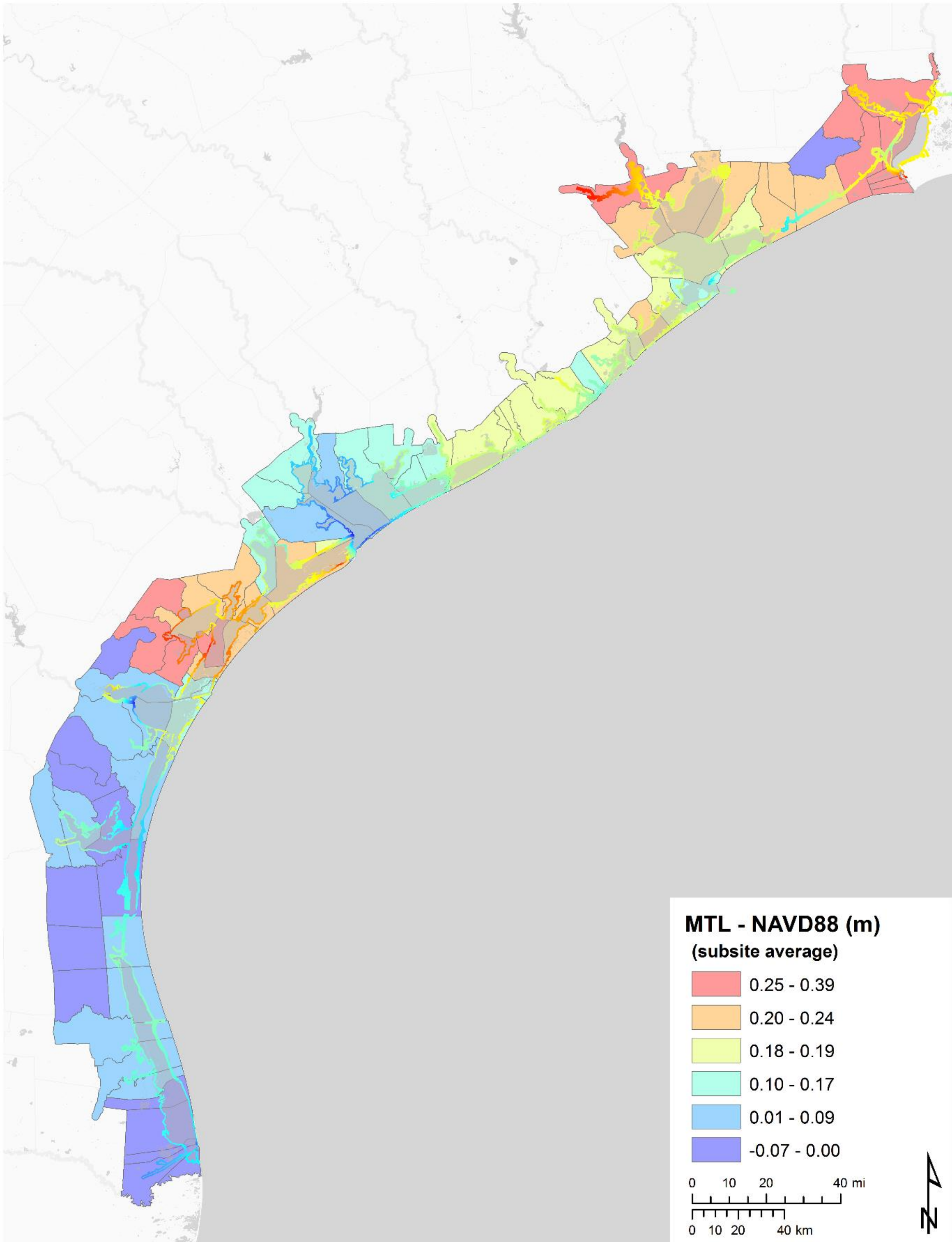

Figure 6-9: The vertical datum correction factor for each subsite

Horizontal Erosion Rates

Erosion rates used in SLAMM were derived from the Bureau of Economic Geology (BEG) shoreline change rates from 1931-2000 for Galveston, Corpus Christi and Baffin bays (Paine *et al*., 2014). The middle coast bays (East Matagorda, Matagorda, San Antonio and Copano bays) erosion rates were derived from a more recent BEG 2016 dataset which has change rates from either 1930's-2010 or 1950's-2012 (Paine *et al*., 2016). In West Bay, spatially denser erosion rates were available from the BEG, so these rates were used as inputs for the West Bay sub-regions (Gibeaut *et al*., 2003). These shoreline erosion products provided by the BEG are point shapefiles where each point contains a shoreline change rate in m/year.

SLAMM allows for horizontal erosion rates (m/year) to be specified for marsh, swamp, and tidal flat habitat classes (Figure 6-10). SLAMM applies the tidal flat erosion rate to ocean beaches when not using the Bruun Rule, as was chosen for this study. To determine erosion rates for each habitat type in each of the subsites, the change rate shapefile was first snapped to the ESI shoreline shapefile. The Intersect tool was used to join the two shapefiles, then only points where erosion was occurring were exported to a new file. A query was performed to select points where the ESI shoreline is classified as marsh and then exported. This is done for each of the three habitat classes. A spatial join was performed with the subregion shapefile using the mean merge rule for each habitat class. The attribute tables were then joined to the SLAMM model inputs file. If a subregion did not have erosion rate data, the average for the region was used. There was no erosion rate data for region 4, so the averages for region 3 were used.

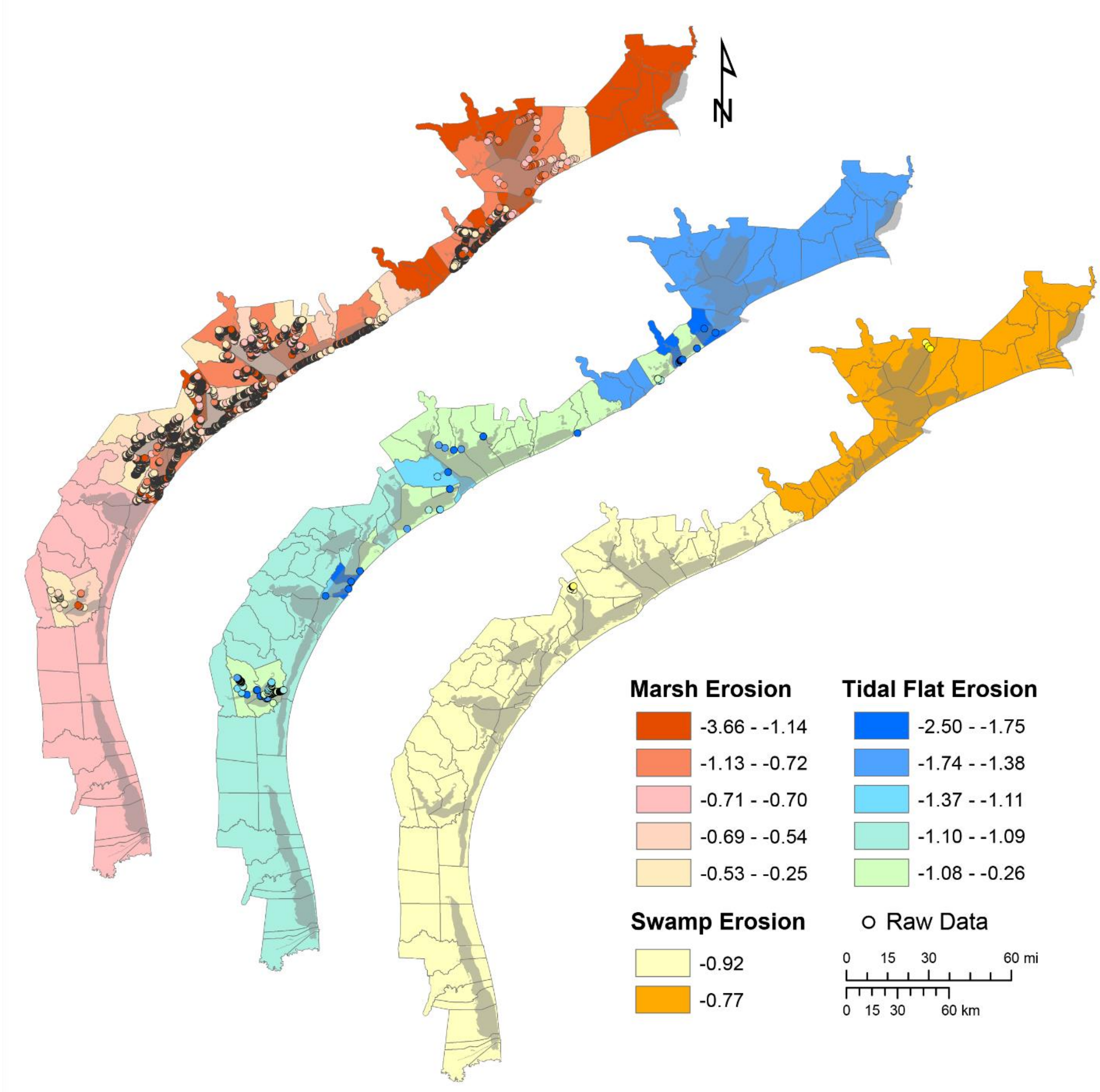

Figure 6-10: Marsh, tidal flat, and swamp shoreline erosion rates (m/year) for each SLAMM subsite. Rates are based on published studies by the BEG and are referenced to NAVD88 vertical datum.

Vertical Accretion Rates

Accretion rates in SLAMM are input based on habitat type. There are separate inputs for low marsh, high marsh, tidal-fresh marsh, inland-fresh marsh and mangroves. Additionally, there is a beach sedimentation rate parameter that applies to beaches (marine and estuarine) and tidal flats. Accretion values were determined based on a review of several peer-reviewed studies (Table 6-3). Average accretion rates (mm/year) were calculated on a regional basis and were manually input into the SLAMM input tables for each subregion.

Table 6-3: Peer-reviewed studies used to determine average accretion rates for different habitat types in each region.

Region	Habitat Type	Source
1	Low Marsh	White and Calnan, 1990
		Callaway *et al.*, 1997
		Feagin and Yeager, 2008
		Ravens *et al.*, 2009
		Williams, 2003
	High Marsh	White and Calnan, 1990
		Callaway *et al.*, 1997
		Williams, 1995
	Tidal Fresh Marsh	Williams, 2003
		White *et al.*, 2002
2	Low Marsh	White and Calnan, 1990
		Callaway *et al.*, 1997
		Feagin and Yeager, 2008
	High Marsh	White and Calnan, 1990
		Callaway *et al.*, 1997
		Williams, 1995
	Tidal Fresh Marsh	White *et al.*, 2002
3	Low Marsh	White *et al.*, 2002
		Callaway *et al.*, 1997
		Radosavljević, 2011
	High Marsh	White *et al.*, 2002
		Callaway *et al.*, 1997
		Radosavljević, 2011
	Tidal Fresh Marsh	White *et al.*, 2002
4	NO DATA Used Averages from Region 3	

Table 6-4: Average accretion rates of each habitat type in each region.

Habitat Type	Region	Average Accretion Rate (mm/yr)	Source
High Marsh	1	3.57	See Table 2
	2	3.03	See Table 2
	3	1.72	See Table 2
	4	1.72	See Table 2
Low Marsh	1	6.55	See Table 2
	2	7.82	See Table 2
	3	4.35	See Table 2
	4	4.35	See Table 2
Tidal Fresh Marsh	1	4.04	See Table 2
	2	4.04	See Table 2
	3	4.04	See Table 2
	4	4.04	See Table 2
Inland Fresh Marsh	1	1.6	Yeager *et al.*, 2007
	2	1.6	Yeager *et al.*, 2007
	3	1.6	Yeager *et al.*, 2007
	4	1.6	Yeager *et al.*, 2007
Mangrove	1	6.55	Same as low marsh average for region 1
	2	6.55	Same as low marsh average for region 1
	3	6.55	Same as low marsh average for region 1
	4	6.55	Same as low marsh average for region 1
Tidal Swamp	1	1.1	Clough *et al.*, 2011
	2	1.1	Clough *et al.*, 2011
	3	1.1	Clough *et al.*, 2011
	4	1.1	Clough *et al.*, 2011
Swamp	1	0.3	Clough *et al.*, 2011
	2	0.3	Clough *et al.*, 2011
	3	0.3	Clough *et al.*, 2011
	4	0.3	Clough *et al.*, 2011

Since the elevation range of the low and high marsh overlaps, adjustments were made to minimum and maximum accretion rates keeping the average rate constant so that at the same elevation, the low marsh's accretion rate is roughly equal to (or slightly higher than, if equality not possible) to the high marsh rate. The high and low marsh curve shapes are derived from Gibeaut, 2006 (Figure 6-11). Figure 6-12 and Figure 6-13 show example accretion rate curves for the high and low marshes in Region 1.

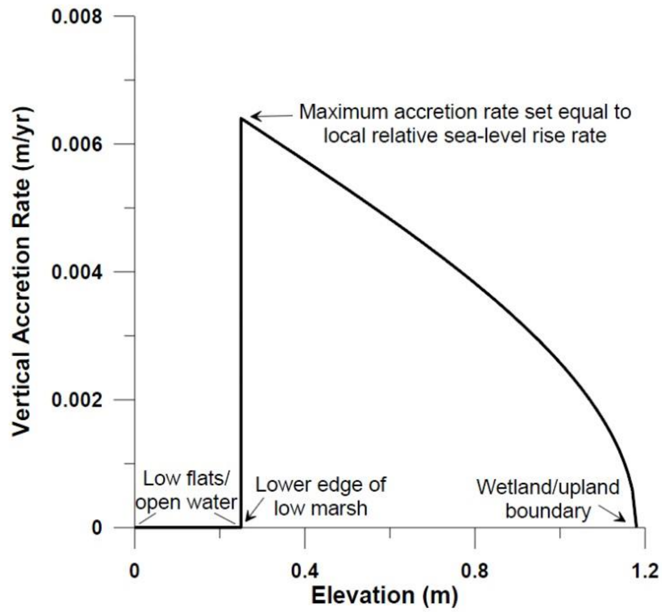

Figure 6-11: The relationship between salt marsh vertical accretion rates and elevation, from Gibeaut, 2006

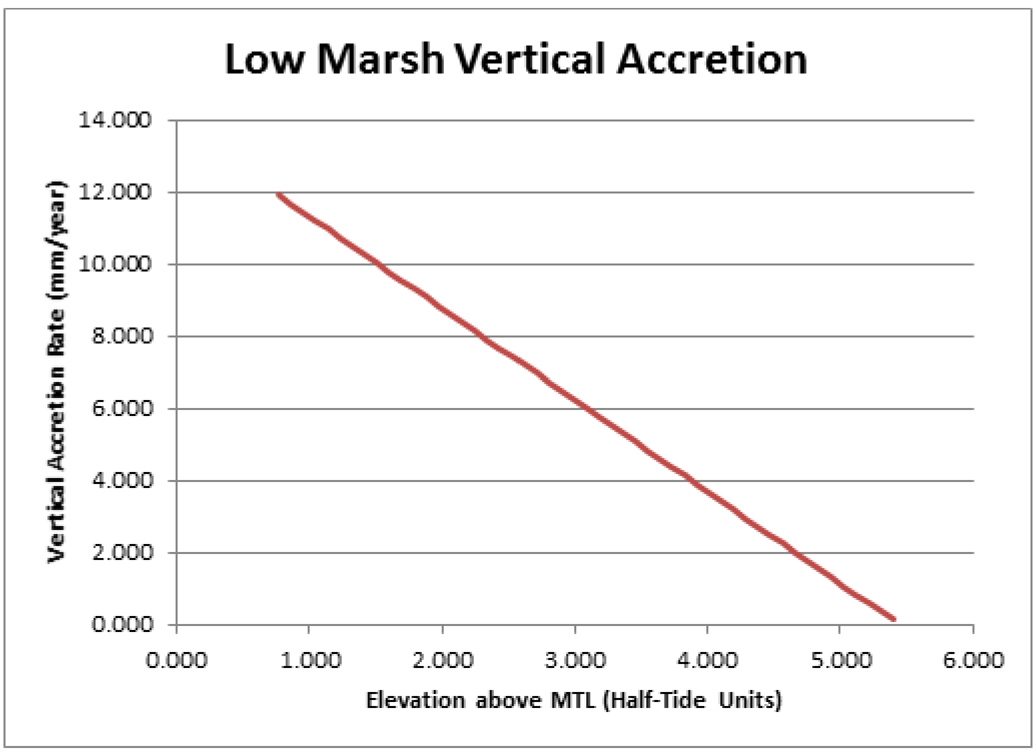

Figure 6-12: The relationship between low (regularly flooded) salt marsh vertical accretion rate and elevation used in the SLAMM model for Region 1.

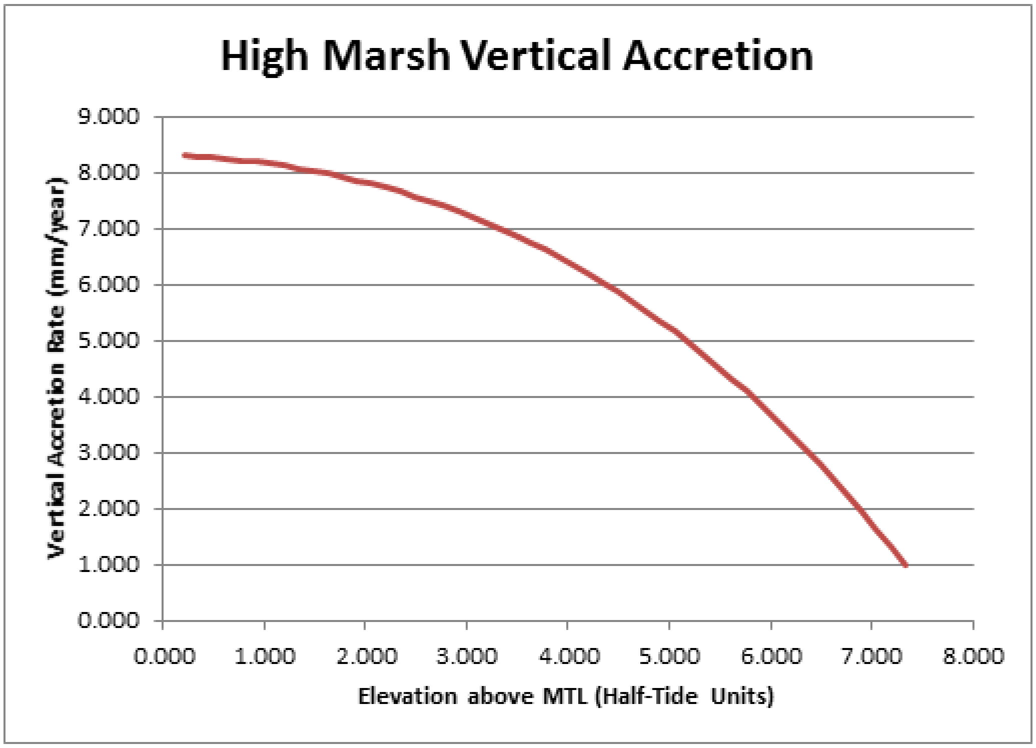

Figure 6-13: The relationship between high (irregularly flooded) salt marsh vertical accretion rate and elevation used in the SLAMM model for Region 1.

Model Sea Level Rise Scenarios

Relative sea level rise (RSLR) is a term that refers to both global changes in the oceans' water volume as well as local changes in land surface elevation. Tide gauge and satellite altimetry data indicate that the increase in global mean sea level has been accelerating over time. The mean rate of global eustatic sea level rise averaged 1.7 mm/yr from 1901 to 2010, 2.0 mm/yr from 1971 to 2010, and 3.2 mm/yr from 1993-2010 (Church *et al.*, 2013). Rates of global sea level rise are predicted to continue to increase beyond the end of this century due to ongoing global climate change (Church et al., 2013; Parris et al., 2012; Zervas, 2009). Rates of RSLR along the Texas coast are some of the highest in the nation: 3.64 mm/yr at Port Isabel, 5.16 mm/yr at Rockport and 6.84 mm/yr at the Galveston Pleasure Pier (Zervas, 2001). Some of the variance in RSLR is caused by differing geological settings and some higher rates of RSLR in Texas are linked to subsidence exacerbated by the extraction of subsurface groundwater, oil and gas (Morton, 2003; White and Morton, 1997; White and Tremblay, 1995).

NOAA Technical Report NOS CO-OPS 083 provides a scenario range for possible global mean sea level rise (GMSLR) for the 21st century and a set of 1-degree (~70 miles) gridded RSLR rates along the United States coastlines where no gauge data is available (Sweet *et al.*, 2017). To address the impacts of RSLR through the year 2100, this study used Sweet *et al.*, 2017's GMSLR intermediate scenario of 1 meter by 2100, plus regional RSLR scenarios from the same report (Figure 6-15, Table 6-5). Assuming emissions consistent with the RCP8.5 scenario, there is an 83% chance that GMSLR will not exceed 1m by 2100 (Sweet *et al.*, 2017). This is shown in Table 4, excerpted from the NOAA Technical Report NOS CO-OPS 083.

Table 4. Probability of exceeding GMSL (median value) scenarios in 2100 based upon Kopp et al. (2014).

GMSL rise Scenario	RCP2.6	RCP4.5	RCP8.5
Low (0.3 m)	94%	98%	100%
Intermediate-Low (0.5 m)	49%	73%	96%
Intermediate (1.0 m)	2%	3%	17%
Intermediate-High (1.5 m)	0.4%	0.5%	1.3%
High (2.0 m)	0.1%	0.1%	0.3%
Extreme (2.5 m)	0.05%	0.05%	0.1%

Figure 6-14: Probability of Exceeding GMSL Scenarios in 2100 (Table 4 from NOAA Technical Report NOS CO-OPS 083)

To estimate the long-term contribution of non-climatic processes such as vertical land movement, tectonics, and sediment compaction to RSLR, results from a spatiotemporal statistical model of tide gauge data based upon methods described in Kopp *et al*. (2014) were used. In the statistical model, the spatiotemporal field of regional sea level change over 1900–2012 is represented as the sum of three signals: 1) a globally uniform sea level change, 2) a constant-rate average, long-term, regionally varying trend, and 3) temporally and spatially varying regional sea-level contributions (Sweet *et al*., 2017). The statistical model is separately fitted to tide gauge data in several different regions and calculated for grid cells between tide gauges.

Table 6-5: GMSLR intermediate scenario height in meters for 19-year averages centered on decade through 2200 (showing up to 2100) initiating in year 2000. Only median values are shown.

	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
SLC (m)	0	0.04	0.10	0.16	0.25	0.34	0.45	0.57	0.71	0.85	1

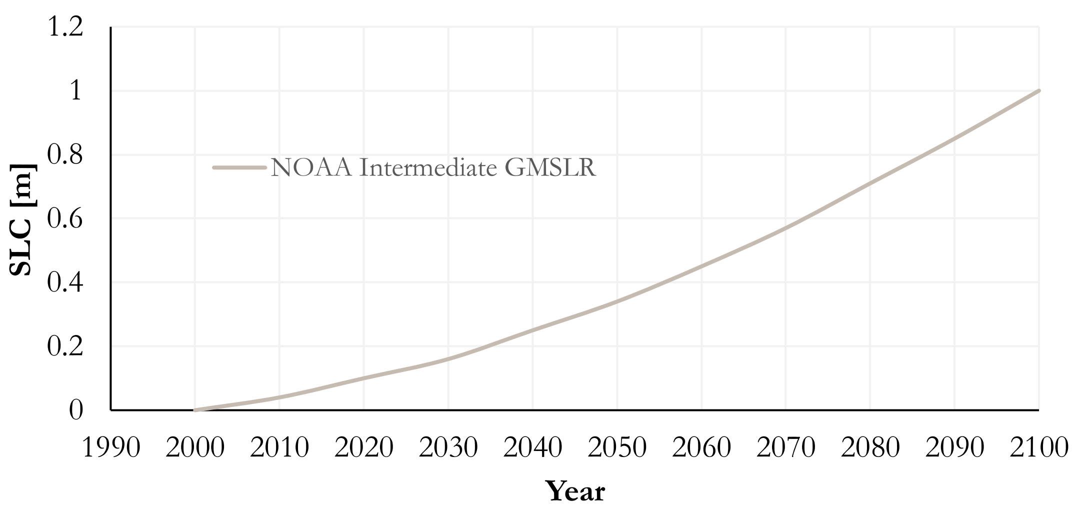

Figure 6-15: NOAA Intermediate global mean sea level rise scenario from 2000 to 2100

For each tide station and grid cell, three rates of sea level rise are given to represent the following emission scenarios: RCP2.6 (low), RCP4.5 (moderate) and RCP8.5 (high). NOAA recommends using both an intermediate and likely upper-bound for RSLR for planning purposes. To simplify, this Plan uses a compromise approach by assuming a moderate amount of global mean sea level rise (3.3 feet by 2100), but a high scenario of RSLR based on the RCP8.5 emissions scenario (RCP8.5), which assumes increasing greenhouse gas emissions into the year 2100 (Sweet *et al*., 2017). Upper estimates of land subsidence are also used in the RSLR scenario. Due to the variability of regional sea level change, several unique RSLR values are used for each of the Texas coastal regions, varied by location. A different approach was chosen for Region 1, given the stated limitations of Sweet *et al*., 2017 for RSL changes driven by anthropogenic activities. See the following section for RSLR scenarios used in this study for each region.

Region 1

Because Region 1's change in RSLR is mostly driven by anthropogenic disturbances, the subsidence rate grid developed by the Coastal and Marine Geospatial Lab at HRI was used (Subedee *et al*., 2016). The RSLR rates from NOAA use background RSLR rates determined from tide gauge records instead of GPS-derived rates since background rates and rates driven by vertical land movement (VLM) were shown to be similar in most places. However, "larger discrepancies between background RSL and GPS VLM trends occur in regions where rates are high and likely influenced by human activities that have varied through time, such as pumping of groundwater/fossil fuels" (Sweet *et al*., 2017). Also, given that the degree of subsidence has changed in the region after groundwater withdrawal regulations went into effect in the 1990s, projecting subsidence into the future should use the rates from 1990 to 2016 that were developed for the subsidence grid rather than the determined background rate from 1900 to 2012 from Sweet *et al*., 2017. Additionally, the data from the selected measurement sites are much more spatially dense than the tide gauges used to determine RSL change by Sweet *et al*., 2017. The green, blue and pink dots in Figure 6-16 represent the GPS Continuously Operating Reference Stations, Extensometer and Port-A-Measure sites (respectively) used to develop the grid.

The tide gauges shown include Sabine Pass North (1.6m), Galveston II (1.67m), Galveston I (1.68m) and Freeport (1.82m). There is also one grid point, NOAA Grid 29.5_265.5 (1.62m). Amounts in black represent RSLR from the high NOAA RSLR rate (RCP8.5) plus a GMSL rise of 1m. Amounts in blue represent RSLR with the rate of RSLR derived from the subsidence rate grid plus 1 m of GMSL rise. Where there is no subsidence data available, the NOAA rate was used.

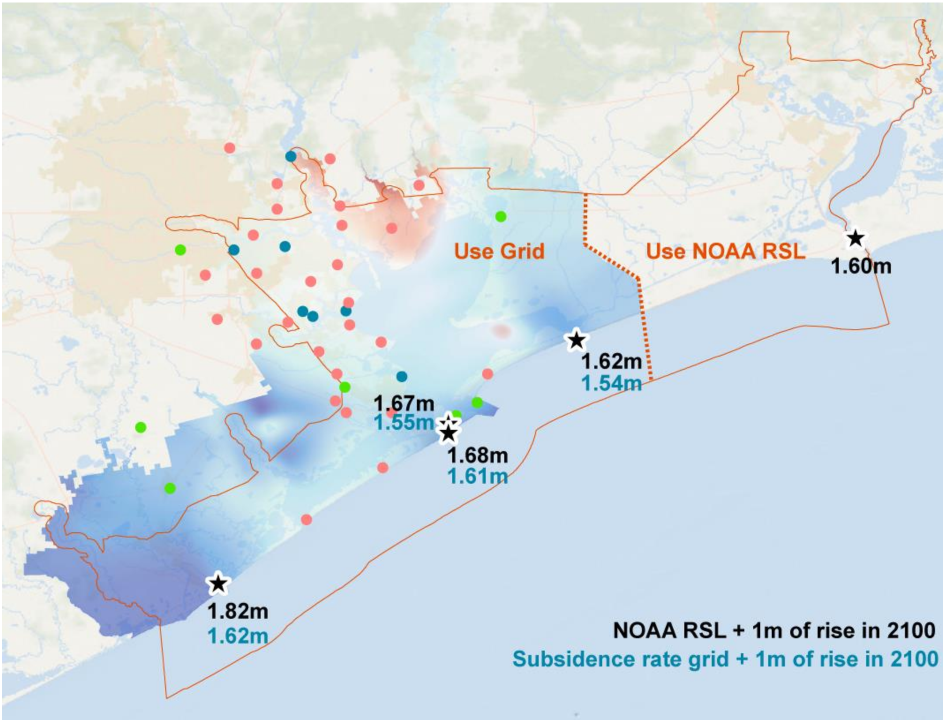

Figure 6-16: Comparison at each data point between amounts of RSLR in 2100

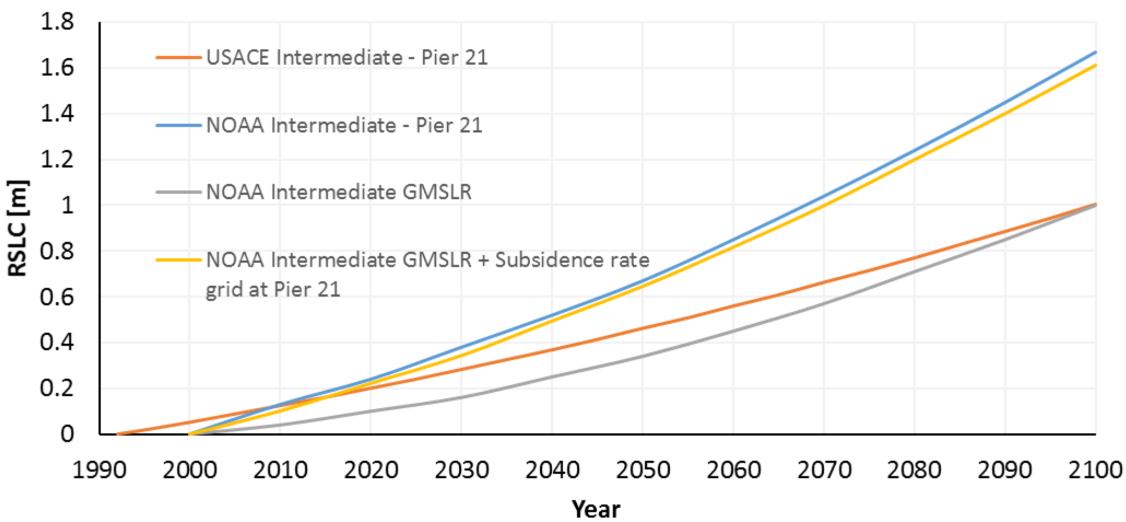

Figure 6-17: Comparison at Pier 21 between USACE intermediate rate, Sweet *et al.*, 2017 (NOAA) intermediate rate with and without the relative component, and the Sweet *et al.*, 2017 intermediate GMSL rise rate with the relative component determined from the subsidence rate grid.

Region 2

For Region 2, data from the Rockport tide gauge, which is in Region 3, was used to determine RSLR by 2100. There is no tide gauge in Region 2, but there is a grid point from Sweet *et al.*, 2017. The Sweet *et al.*, 2017 RSLR rate amounts to 1.8m of RSLR in this region by 2100. This is a very high and likely unrealistic value for this region. The spatiotemporal statistical model used by Sweet *et al.*, 2017 to estimate change at this grid point was likely influenced by the Freeport tide gauge in Region 1 where there is significant subsidence that does not extend into Region 2. See the comparison between the rates below (Figure 6-19).

Figure 6-18: Location of the data point in Region 2. There is no tide gauge in this region, but there is a grid point, seen here.

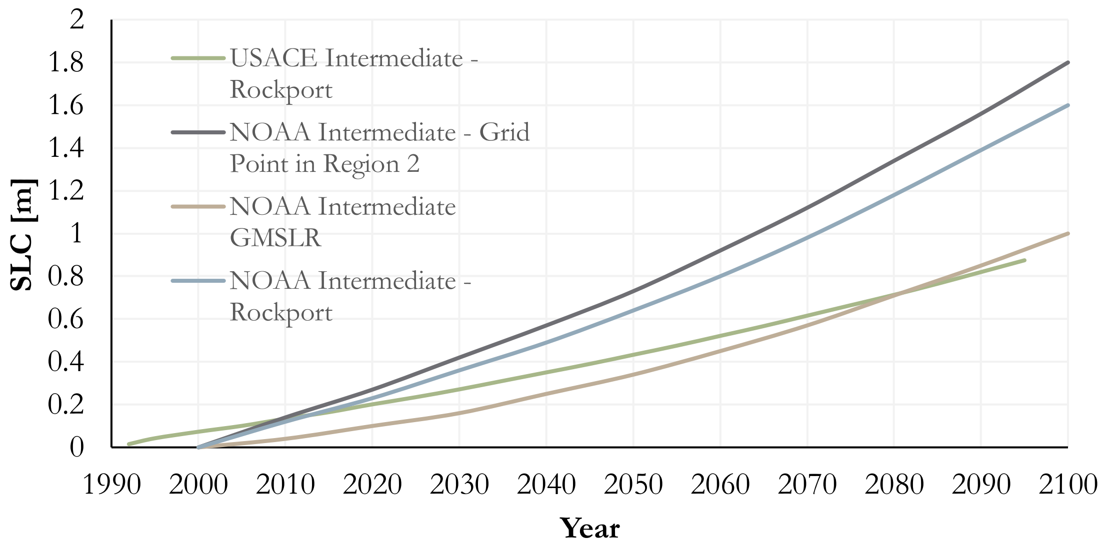

Figure 6-19: Comparison between USACE intermediate rate at the Rockport gauge and the Sweet *et al.*, 2017 (NOAA) intermediate rate with and without the relative component at the data point.

Region 3

Region 3 contains two tide gauges; Rockport (1.60m) and Corpus Christi (1.51m), and one grid point; NOAA Grid Point 27.5_262.5 (1.45m). The study area was divided, and the individual rates were used for the sub-regions as seen in Figure 6-20.

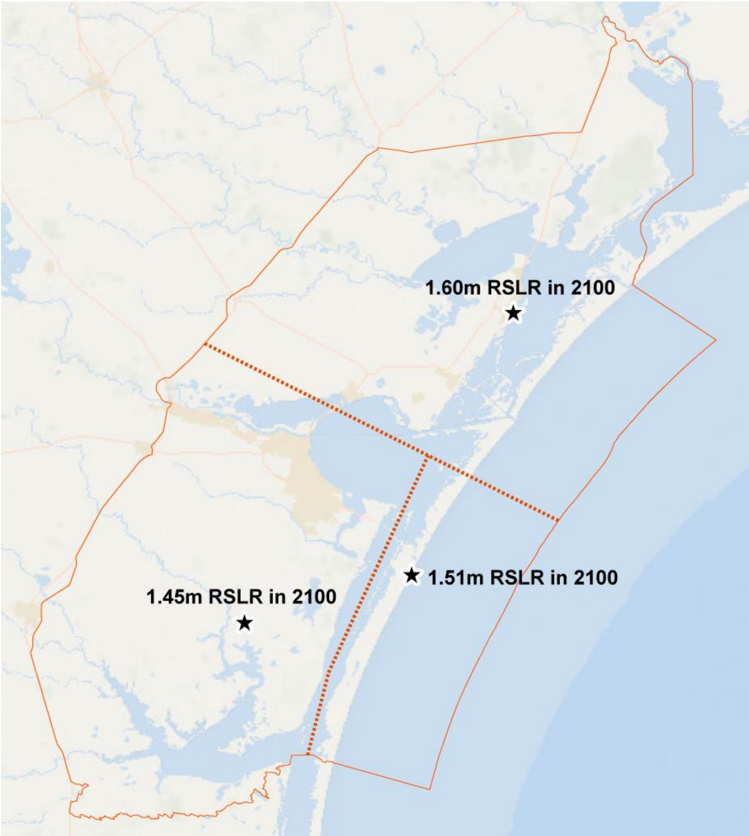

Figure 6-20: Location of tide gauges and grid point in Region 3.

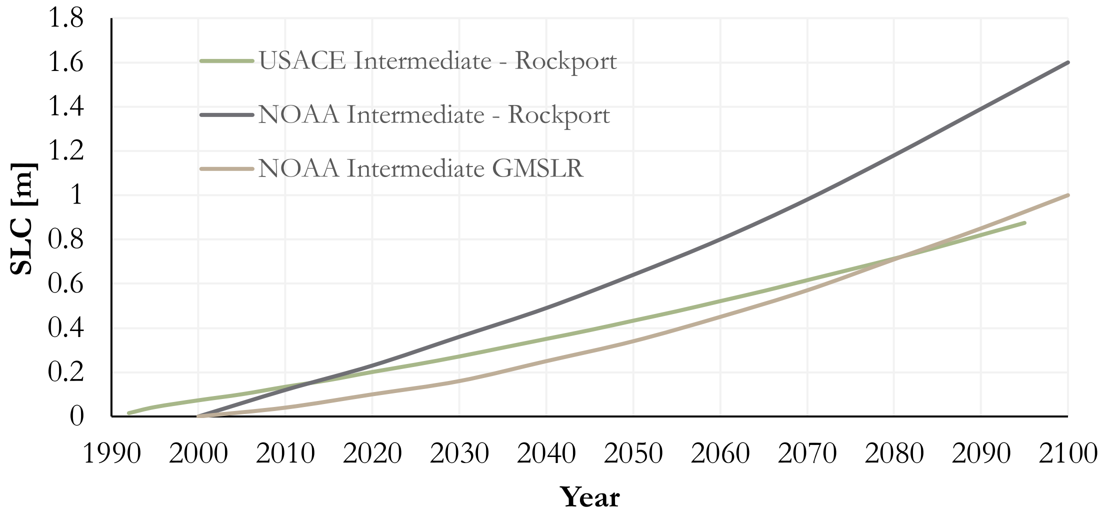

Figure 6-21: Comparison at the Rockport tide gauge between USACE intermediate rate and the Sweet *et al.*, 2017 (NOAA) intermediate rate with and without the relative component.

Region 4

Region 4 contains 3 tide gauges; South Padre Island (1.43m), Port Mansfield (1.38m) and Port Isabel (1.42m), and one grid point; NOAA Grid 26.5_262.5 (1.37m). The region was divided into 2 sub-regions and averaged the RSLR rates from the 2 data points contained in each sub-region.

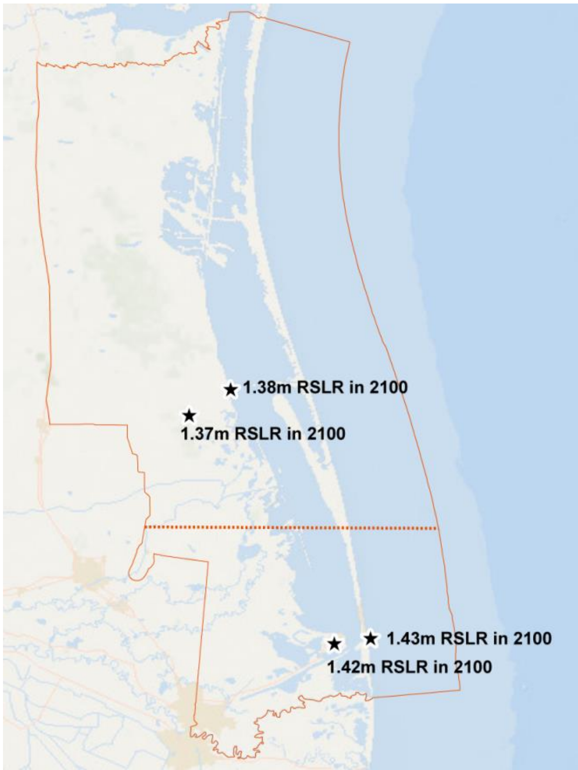

Figure 6-22: Location of tide gauges (3) and grid data point (1) in Region 4.

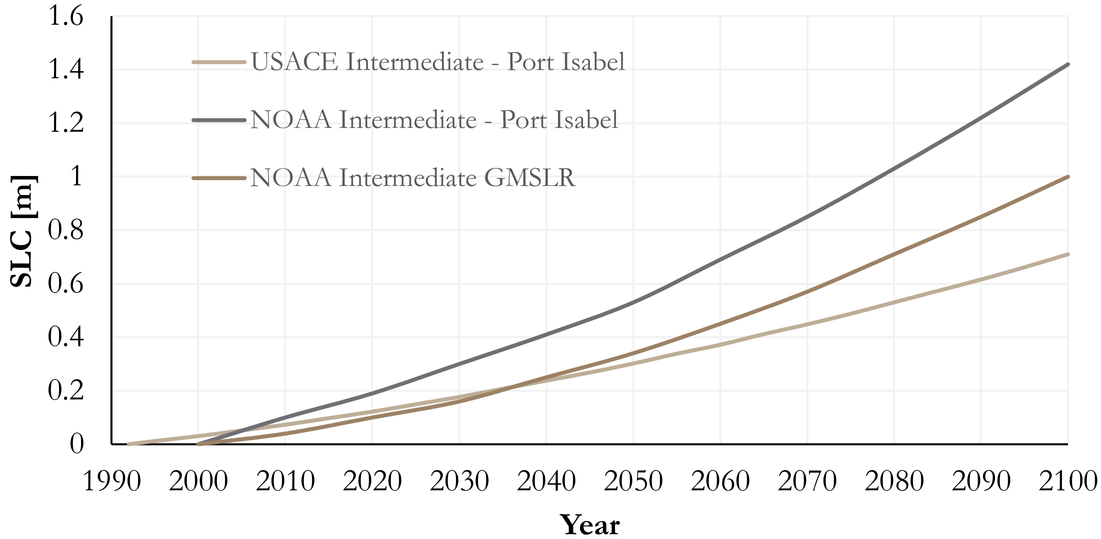

Figure 6-23: Comparison at the Port Isabel tide gauge between USACE intermediate rate and the NOAA intermediate rate with and without the relative component.

Resiliency Plan Regional Relative Sea Level Rise Summary

Based on the above assessments, Table 6-6 gives a summary of the relative sea level planning values, compiled from the various gauge and grid point data that were used as inputs to the SLAMM models by region. These data are shown geographically in Figure 6-24 for Region 1A, Region 2, Region 3 and Region 4. Averages of these values are presented in the 2019 Resiliency Plan.

Table 6-6: Relative Sea Level Rise Planning Values from 2000 to 2100 by Region (ft)

Tide Gauge or Grid Point	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Region 1A											
Sabine Pass North Gauge	0.0	0.4	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.5	5.2
Region 2*											
Rockport Gauge (Region 3)	0.0	0.4	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.6	5.2
Region 3											
Rockport Gauge	0.0	0.4	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.6	5.2
Corpus Christi Gauge	0.0	0.4	0.7	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.0
NOAA Grid Point 27.5_262.5	0.0	0.3	0.7	1.0	1.4	1.8	2.3	2.9	3.4	4.1	4.8
Region 4											
Average of Port Mansfield Gauge & NOAA Grid Point 26.5_262.5	0.0	0.3	0.6	0.9	1.3	1.7	2.2	2.7	3.3	3.9	4.5
Average of South Padre Island & Port Isabel Gauges	0.0	0.3	0.6	1.0	1.3	1.8	2.3	2.8	3.4	4.0	4.7

*There is no tide gauge in Region 2. The grid point (interpolated value derived from nearby data) is likely over-influenced from the Freeport tide gauge, where subsidence is extremely high. As a result, only

Rockport data was used here.

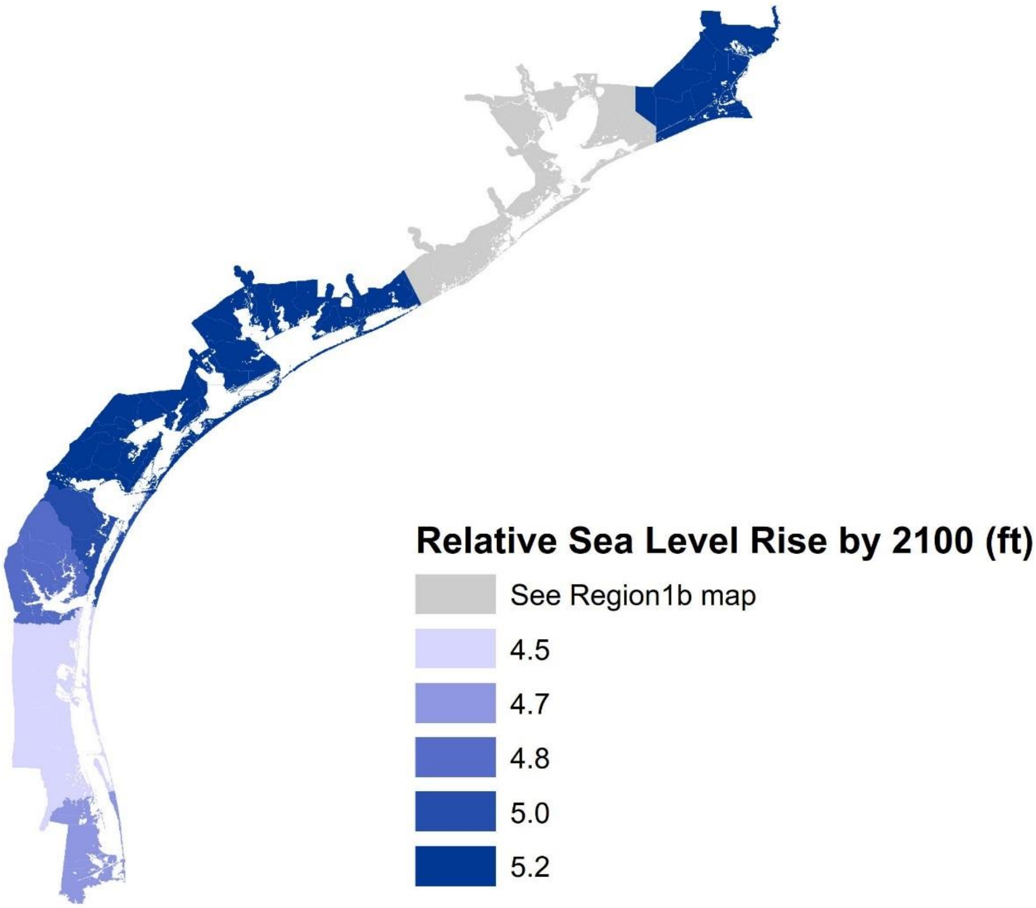

Figure 6-24: Relative Sea Level Rise by 2100, Region 1A and 2 to 4 (ft)

Region 1B relative sea level data are spatially variable based on a subsidence rate grid. The Region 1B tide gauge and grid point data shown in Table 6-7 were coupled with the subsidence rate grid, resulting in variable relative sea levels across the region. A map of the subsidence rate grid coupled with the tide gauge and grid data is shown in Figure 6-25.

Table 6-7: Relative Sea Level Rise Planning Values from 2000 to 2100 for Region 1B (ft)

Tide Gauge or Grid Point by Region	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Region 1B											
Baytown Grid Point	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.3	1.7	2.1	2.5
Galveston Bay Entrance / Bolivar Gauge	0.0	0.4	0.8	1.2	1.6	2.1	2.7	3.2	3.9	4.6	5.3
Average of Galveston Gauges	0.0	0.4	0.8	1.2	1.7	2.2	2.8	3.4	4.1	4.8	5.5
Freeport Gauge	0.0	0.5	0.9	1.4	1.9	2.5	3.1	3.7	4.4	5.2	6.0

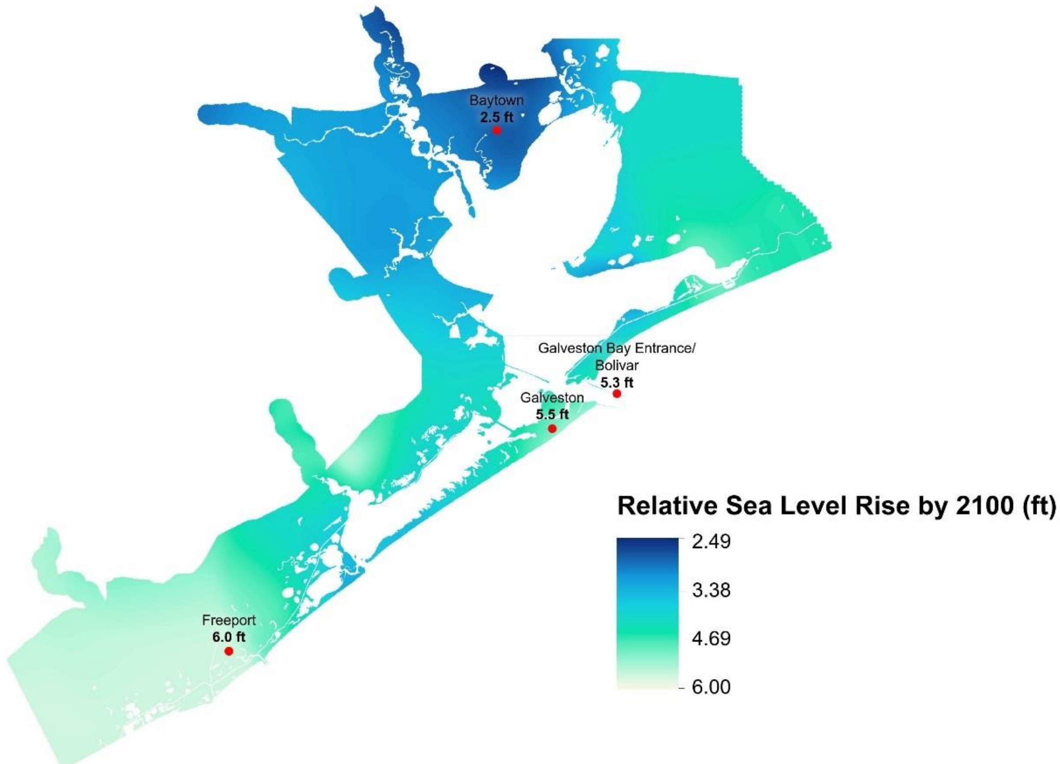

Figure 6-25: Relative Sea Level Rise by 2100, Region 1B including Subsidence Grid Data (ft)

Initializing SLAMM

Once all the map-based inputs and numeric parameters are gathered, the area of each subsite is extended with a 3 km buffer to allow for a seamless output between subsites. For the map-based inputs, each raster is clipped and divided into the buffered subsites. Each subsite is run separately for each region, then the output is stitched together for visualizing coastwise results. A quality assessment is performed post-simulation by insuring realistic wetland habitat transitions are occurring. Because these habitats are sensitive to several of the numeric parameters, adjacent subsites with a different tide range or accretion rate can produce different results along the buffered subsite boundary. When stitching together the results, the subsite that contained a larger portion of the wetland habitat had precedence over the adjacent subsite.

Storm Surge Modeling

A coupled hydrodynamic storm surge model called ADvanced CIRCulation (ADCIRC) and Simulating Waves in the Nearshore (SWAN) model was employed to model the enhanced storm surge caused by higher sea level and changes in land cover. ADCIRC is a hydrodynamic circulation numerical model that simulates water level and currents over a highly flexible, irregularly spaced mesh. It is a physics-based model that uses traditional hydrostatic pressure and Boussinesq approximations in solving the equations of motion for a moving fluid on a rotating earth (Luettich *et al.*, 1992). It solves the generalized wave continuity equation on an unstructured triangular mesh with a continuous Galerkin finite element method. SWAN, on the other hand, is a third-generation spectral wave model that gives realistic estimates of random, short-crested wind-generated waves in coastal regions (Booij *et al.*, 1999). It solves the wave-action balance equation and simulates the energy contained in waves as they travel over the ocean surface towards the shore. Both ADCIRC and SWAN have been closely coupled as an integrated system that share the same unstructured finite element mesh for modeling nearshore and inland hydrodynamics during a storm event. The ADCIRC model first runs to calculate water levels and currents by interpolating the input wind spatially and temporally at each triangle vertex, referred to as nodes. The wind velocities, water level, and currents are then passed to the SWAN model, which uses those quantities to force its computation of wave radiation stresses by solving the wave-action density balance equation (Deitrich *et al*., 2011). The radiation stresses due to the presence of surface gravity waves are then passed to the ADCIRC model to predict the water levels and currents (Deitrich *et al*., 2011). The integrated SWAN+ADCIRC model has been extensively used by FEMA, USACE and other local agencies for a number of applications, including evaluating coastal storm surge and flooding risk. It has also been validated for several hurricanes in the Gulf of Mexico (Bunya *et al*., 2010; Dietrich *et al*., 2010; Hope *et al*., 2013).

The coupled SWAN+ADCIRC model solves the shallow-water equations on the nodes of a computational mesh, and requires a variety of inputs including topography, bathymetry, bottom friction, astronomical tides, and meteorological forcing. The nodes communicate with each other via linear triangular finite elements. The unstructured finite element mesh can have varying resolution with element sizes ranging from kilometers in the open ocean to as fine as meters in the nearshore and in other critical areas like levees and channels. The model requires the physical system to be accurately described and characterized at the nodal locations by providing the topographic and bathymetric elevations along with land cover information. The input files are also required to describe the characteristics of the mesh and the surface, boundary conditions, and forcing mechanisms such as meteorological forcing or wave radiation stress forcing. The coupled model outputs the time and spatially varying water surface elevation, water velocity, wave height, wave direction, and wave period.

For this study, the coupled SWAN+ADCIRC model used the computational mesh developed for Coastal Texas Flood Insurance Study conducted by USACE and FEMA (USACE, 2011), referred to as *TX2008_R35H*, and obtained from the Computational Hydraulics Group at The University of Texas at Austin. The computational mesh domain includes the western North Atlantic Ocean, Caribbean Sea and Gulf of Mexico, and the element sizes varies from multiple kilometers in the open ocean to resolutions as fine as 15 m in the channels and rivers (Figure 6-26 and Figure 6-27). The maximum element size is around 200 m along the nearshore wave transformation zones and 5 km in the deep Gulf of Mexico. The *TX2008_R35H* has 3,352,598 nodes and 6,675,517 elements, and more than ninety percent of the computational nodes of the mesh reside in the Texas coast. The mesh was used and validated for simulating Hurricane Ike waves and storm surge (Subedee *et al*., 2018).

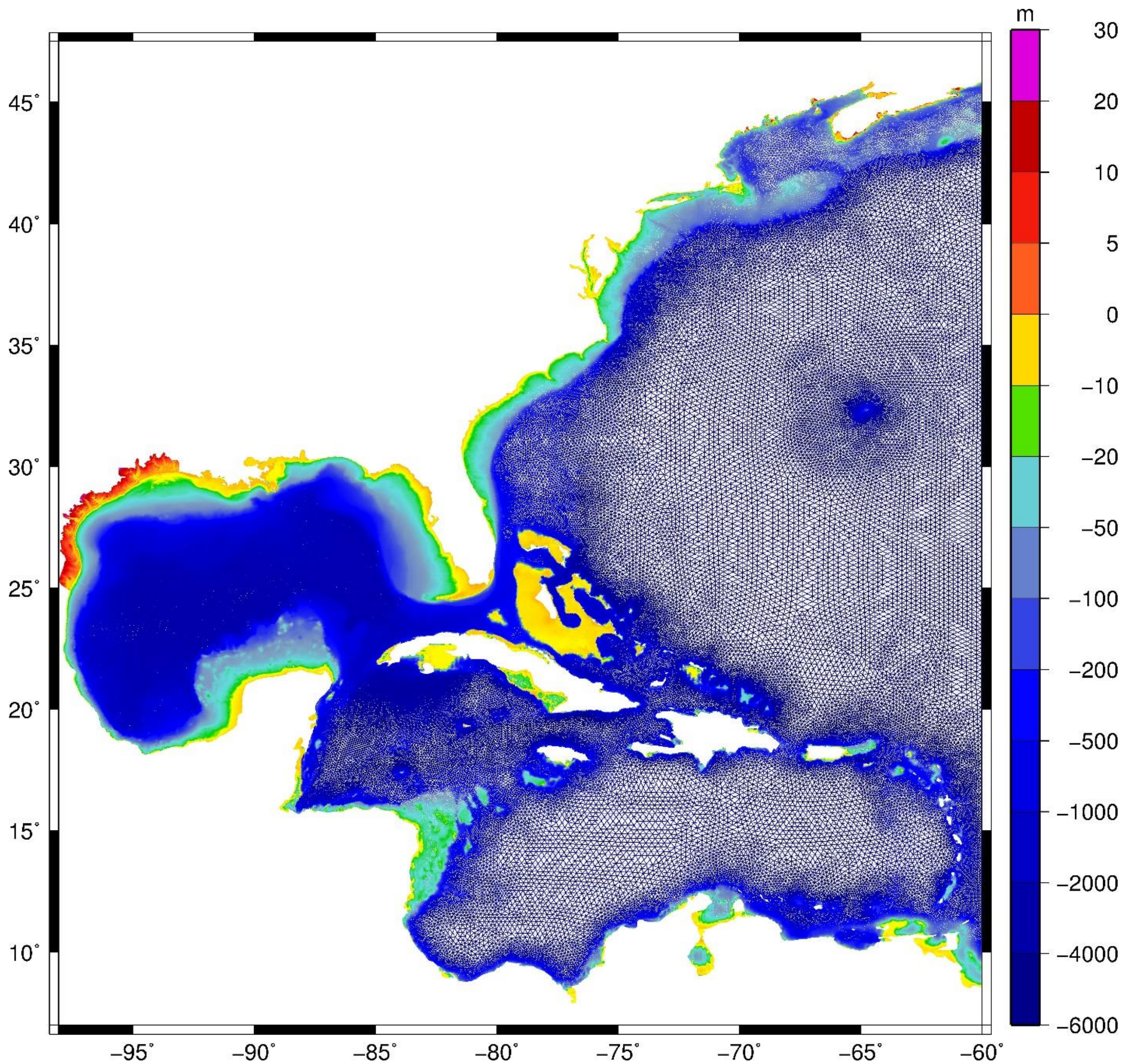

Figure 6-26: ADCIRC Mesh Domain, and topographic and bathymetric contours in meters. The larger triangular elements in the deep ocean can be seen in the mesh.

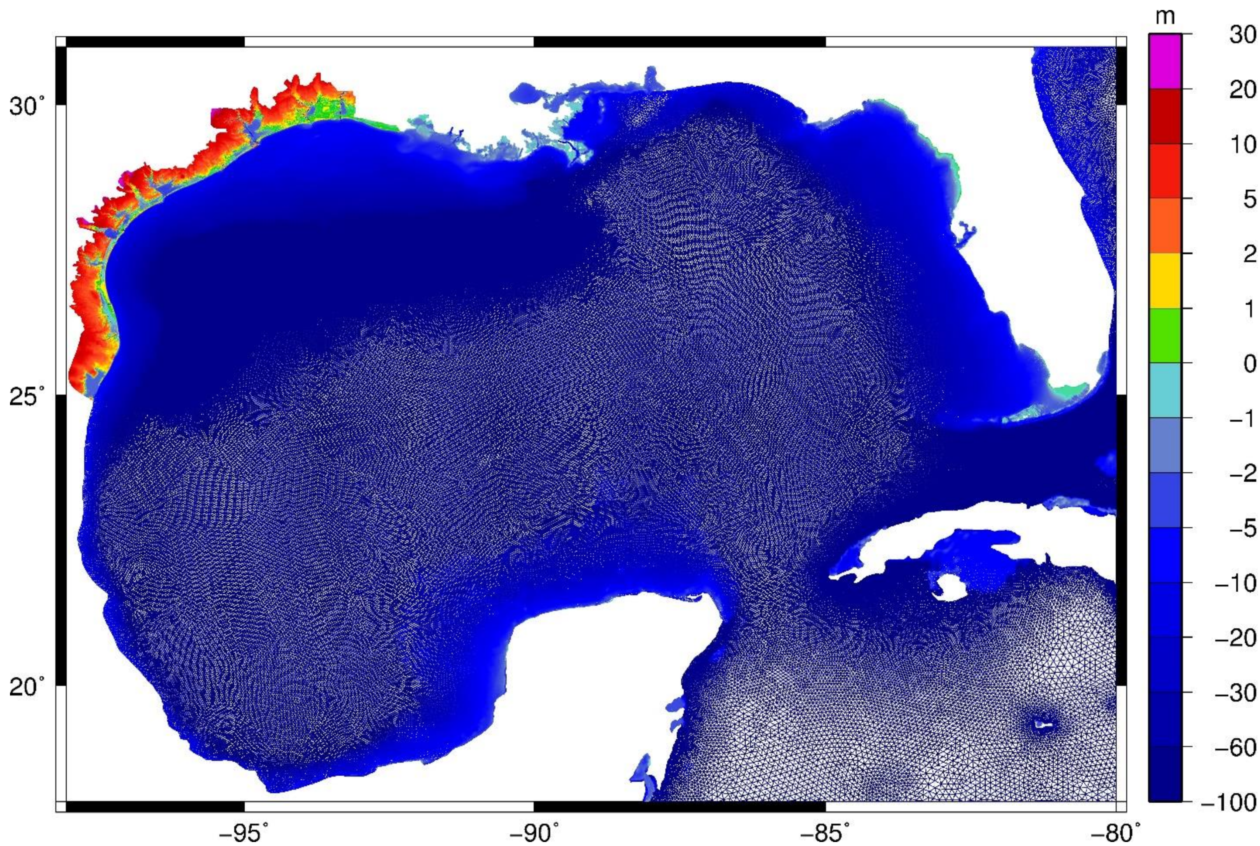

Figure 6-27: ADCIRC mesh topographic and bathymetric contours in meters showing the Gulf of Mexico and the Texas coast in the upper left corner

The existing bathymetric data in the computational mesh was not changed for this study, however, topographic data along the Texas coast was updated with the seamless high resolution, 3-m, lidar-based topographic DEM of the Texas coast for the present condition storm surge analysis. The topographic elevations were applied to the mesh using linear interpolation employed by the software program SMS 12.3.3 (Aquaveo, 2018) (Figure 6-28). All mesh elevations are referenced to the NAVD88 vertical datum.

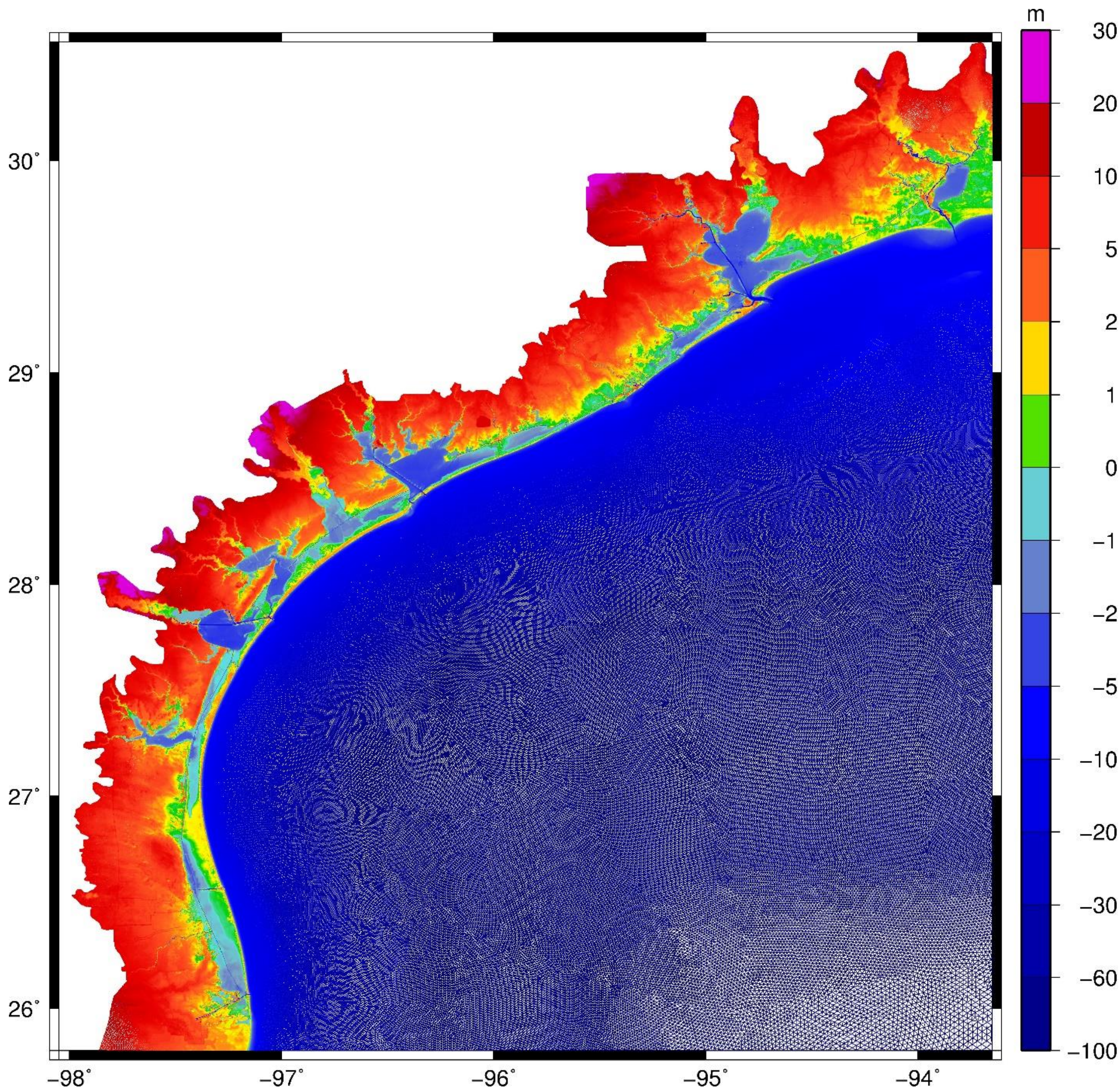

Figure 6-28: ADCIRC mesh topographic and bathymetric contours in meters along the Texas coast

In addition, SWAN+ADCIRC modeling requires an input of frictional roughness that is characterized by the land cover type over which wind blows, and wave and surge propagate. The speed at which the storm surge propagates is affected by land cover through bottom friction. Bottom friction is an important resistance mechanism that needs to be accurately quantified. The frictional roughness, represented by the Manning's *n* coefficients, was assigned to each land cover class derived from the Coastal Change Analysis Program (C-CAP) land cover data and NWI data (Figure 6-29). Wherever the NWI dataset showed no data, the C-CAP data were used. The Manning's *n* values associated with these land cover data were applied based on standard hydraulic literature and are shown in Table 6-8 and Table 6-9 and in Figure 6-30.

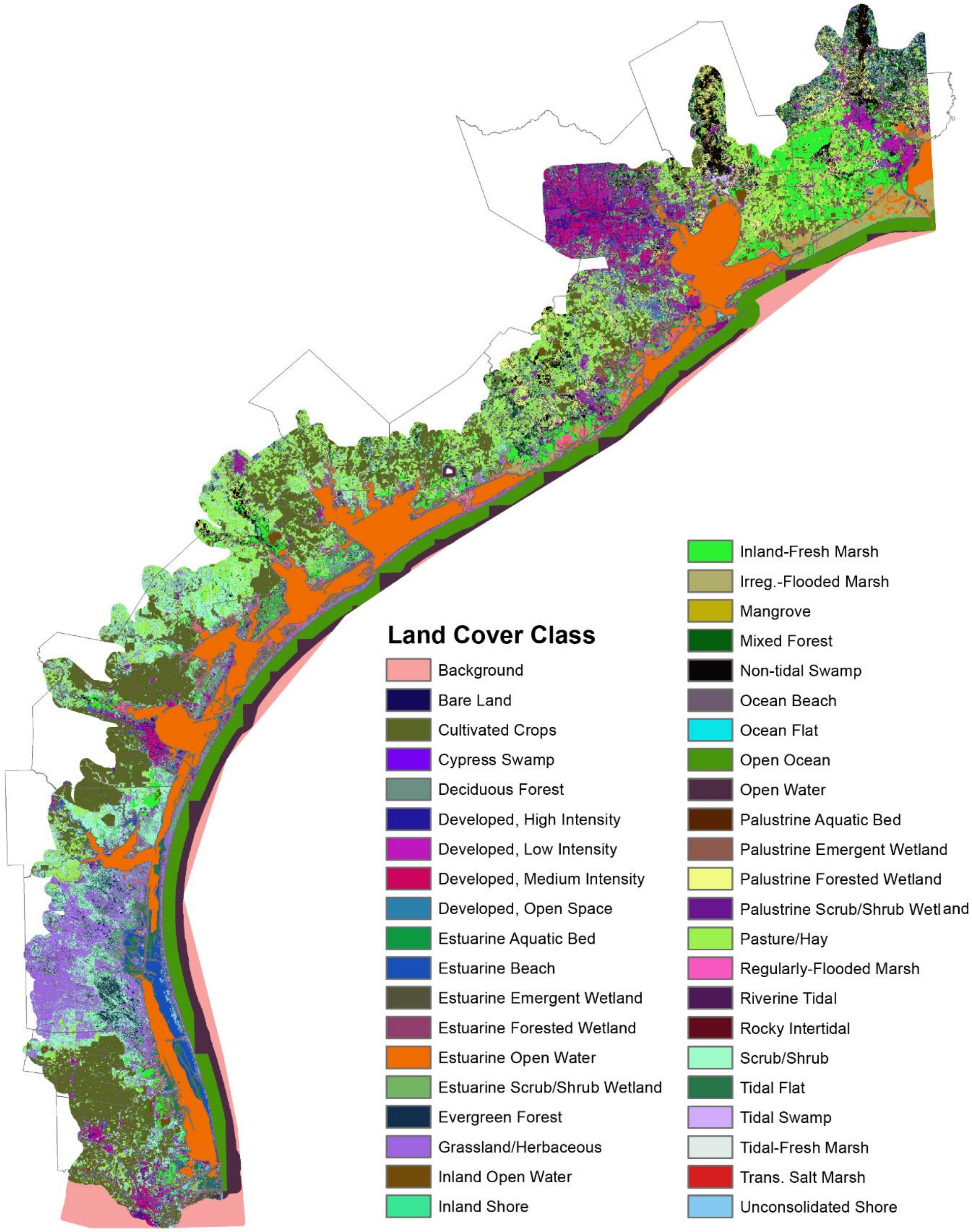

Figure 6-29: Present Condition land cover classes along the Texas coast used for storm surge modeling

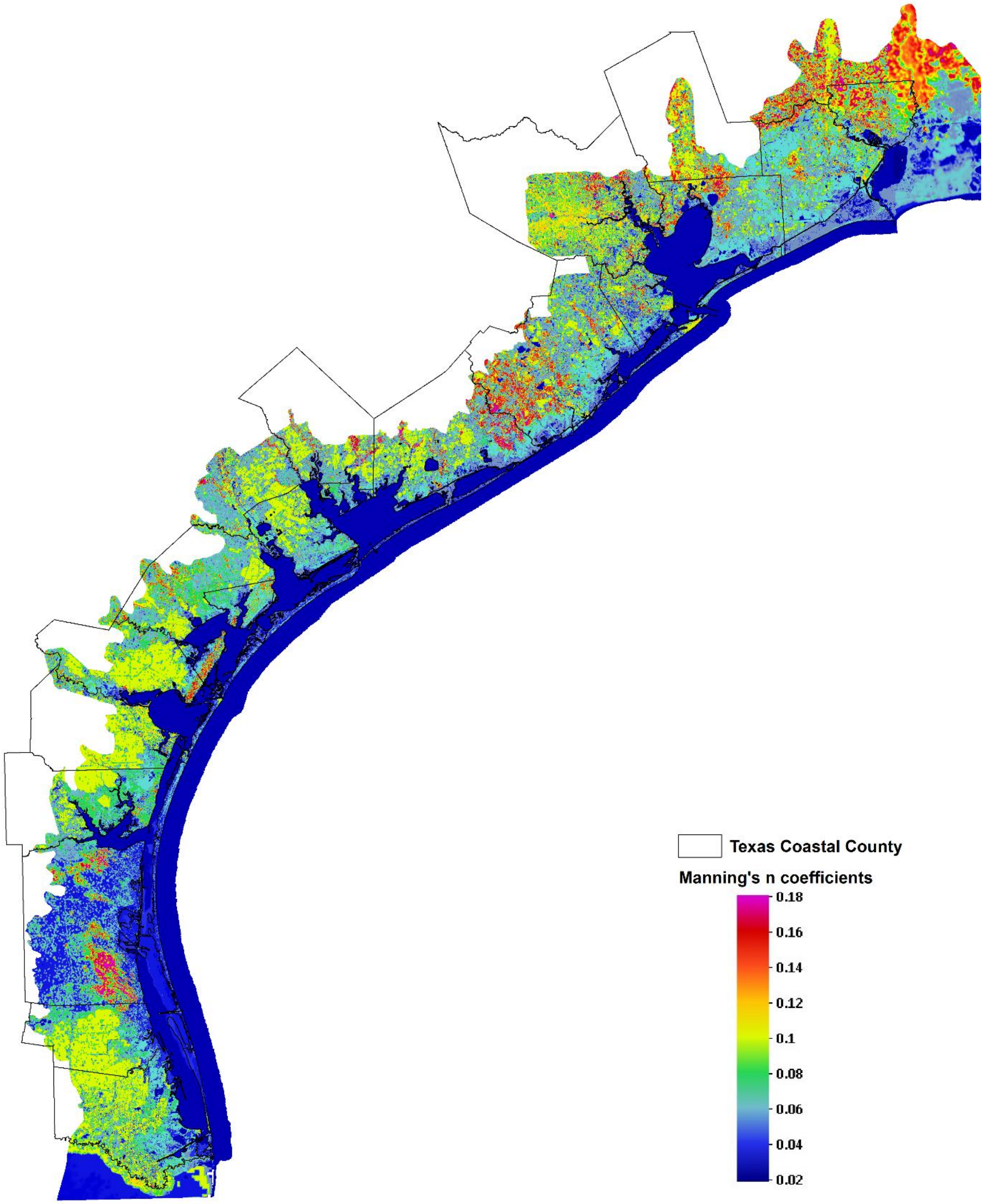

Figure 6-30: Present Condition ADCIRC nodal Manning's *n* coefficients along the Texas coast derived based on the land cover data in Figure 6-29

Table 6-8: Manning's *n* values for SLAMM land cover classes

SLAMM Class	Class Description	Manning's *n*
1	Developed Dry Land	0.120
2	Undeveloped Dry Land	0.070
3	Swamp	0.100
4	Cypress Swamp	0.100
5	Inland Fresh Marsh	0.070
6	Tidal Fresh Marsh	0.130
7	Transitional Marsh	0.065
8	Regularly Flooded Marsh	0.050
9	Mangrove	0.060
10	Estuarine Beach	0.035
11	Tidal Flat	0.040
12	Ocean Beach	0.030
13	Ocean Flat	0.040
14	Rocky Intertidal	0.060
15	Inland Open Water	0.025
16	Riverine Open Water	0.035
17	Estuarine Open Water	0.025
19	Open Ocean	0.025
20	Irregularly Flooded Marsh	0.050
22	Inland Shore	0.030
23	Tidal Swamp	0.100

Table 6-9: Manning's *n* values for C-CAP land cover classes

C-CAP Class	Class Description	Manning's *n*
2	Developed, High Intensity	0.12
3	Developed, Medium Intensity	0.1
4	Developed, Low Intensity	0.07
5	Developed, Open Space	0.035
6	Cultivated Crops	0.1
7	Pasture/Hay	0.05
8	Grassland/Herbaceous	0.035
9	Deciduous Forest	0.16
10	Evergreen Forest	0.18
11	Mixed Forest	0.17
12	Scrub/Shrub	0.08
13	Palustrine Forested Wetland	0.15
14	Palustrine Scrub/Shrub Wetland	0.075
15	Palustrine Emergent Wetland	0.07
16	Estuarine Forested Wetland	0.15
17	Estuarine Scrub/Shrub Wetland	0.07
18	Estuarine Emergent Wetland	0.05
19	Unconsolidated Shore	0.03
20	Bare Land	0.03
21	Open Water	0.025
22	Palustrine Aquatic Bed	0.035
23	Estuarine Aquatic Bed	0.03

To analyze the effects of future landscapes and sea level rise on storm surge, this study utilized the 2100 topographic surface predicted by the SLAMM model as representative of future elevations for input to the SWAN+ADCIRC model. The 2100 land cover conditions predicted by the SLAMM model were used to generate SWAN+ADCIRC friction parameters representative of future vegetation conditions. Where the SLAMM output did not extend far enough inland, the C-CAP data were used. If SLAMM output indicated undeveloped dry land, and C-CAP indicated forested land, the undeveloped dry land was replaced with C-CAP forest data. In addition, the 2100 land cover dataset developed by USGS (Sohl *et al*., 2014) was also used to generate the friction parameters wherever SLAMM output predicted undeveloped dry land, and the USGS predicted developed dry land in 2100.

The USGS land use/land cover (LULC) change projections uses the Forecasting Scenarios of Land-Use Change (FORE-SCE) modeling framework. This framework has 2 components: a non-spatial "demand" variable that provides the proportion of LULC change and a spatial component that distributes that change on the landscape. The model provides decadal land cover modeling output for multiple emissions scenarios based on the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (IPCC, 2006). This study used the A2 emissions scenario since it most closely matched the RCP8.5 emissions scenario from the IPCC AR5 used in this study's RSLR curve. The A2 scenario, similarly to RCP8.5, forecasts increasing population growth, economic expansion over environmental conservation, and high demand for food and energy resources that will lead to the expansion of the human footprint on the environment.

Manning's *n* values associated with these predicted land covers were interpolated to the ADCIRC nodal attribute file (fort.13) to model storm surge under 2100 conditions. These values are summarized in Table 6-8, Table 6-9, and Table 6-10. Similarly, the topographic elevation output from SLAMM was also interpolated to the ADCIRC mesh (fort.14) as representative of 2100 elevations to run the storm surge model for the 2100 landscape condition.

Table 6-10: Reassignment/Mapping of USGS 2100 land cover class to new class based on SLAMM or C-CAP land cover classes

USGS Class	Class Description	New Class Description (Land cover data source)
1	Water	Open Water (C-CAP)
2	Developed	Developed Dry Land (SLAMM)
4	Mechanically Disturbed Other Public Land	Undeveloped Dry Land (SLAMM)
5	Mechanically Disturbed Private Land	Undeveloped Dry Land (SLAMM)
6	Mining	Undeveloped Dry Land (SLAMM)
7	Barren	Bare Land (C-CAP)
8	Deciduous Forest	Deciduous Forest (C-CAP)
9	Evergreen Forest	Evergreen Forest (C-CAP)
10	Mixed Forest	Mixed Forest (C-CAP)
11	Grassland	Grassland (C-CAP)
12	Shrubland	Scrub/Shrub (C-CAP)
13	Agriculture	Cultivated Land (C-CAP)
14	Hay/Pasture	Pasture/Hay (C-CAP)
15	Herbaceous Wetland	Palustrine Emergent Wetland (C-CAP)
16	Woody Wetland	Palustrine Forested Wetland (C-CAP)

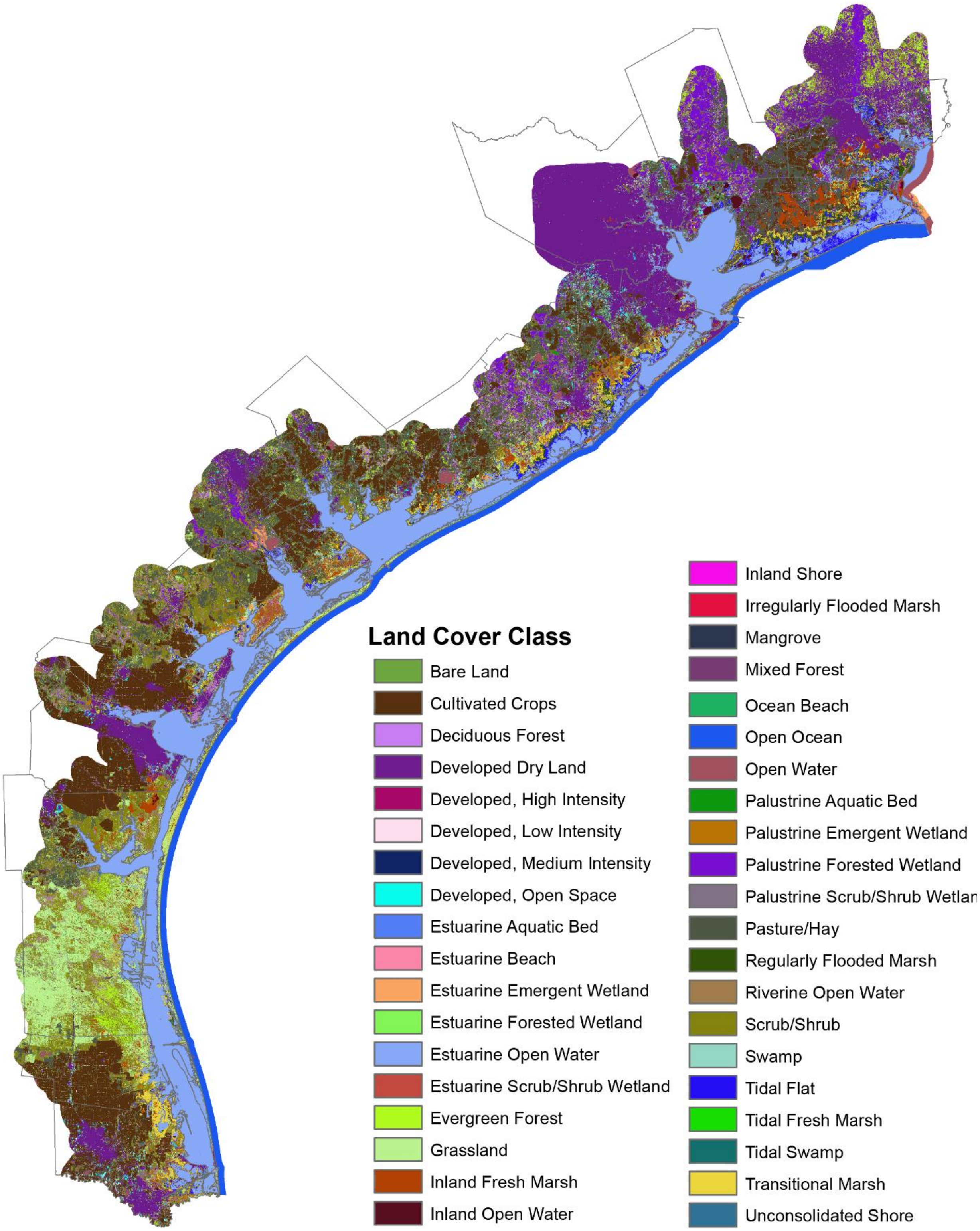

Figure 6-31: Future Condition land cover classes along the Texas coast used for the storm surge analysis

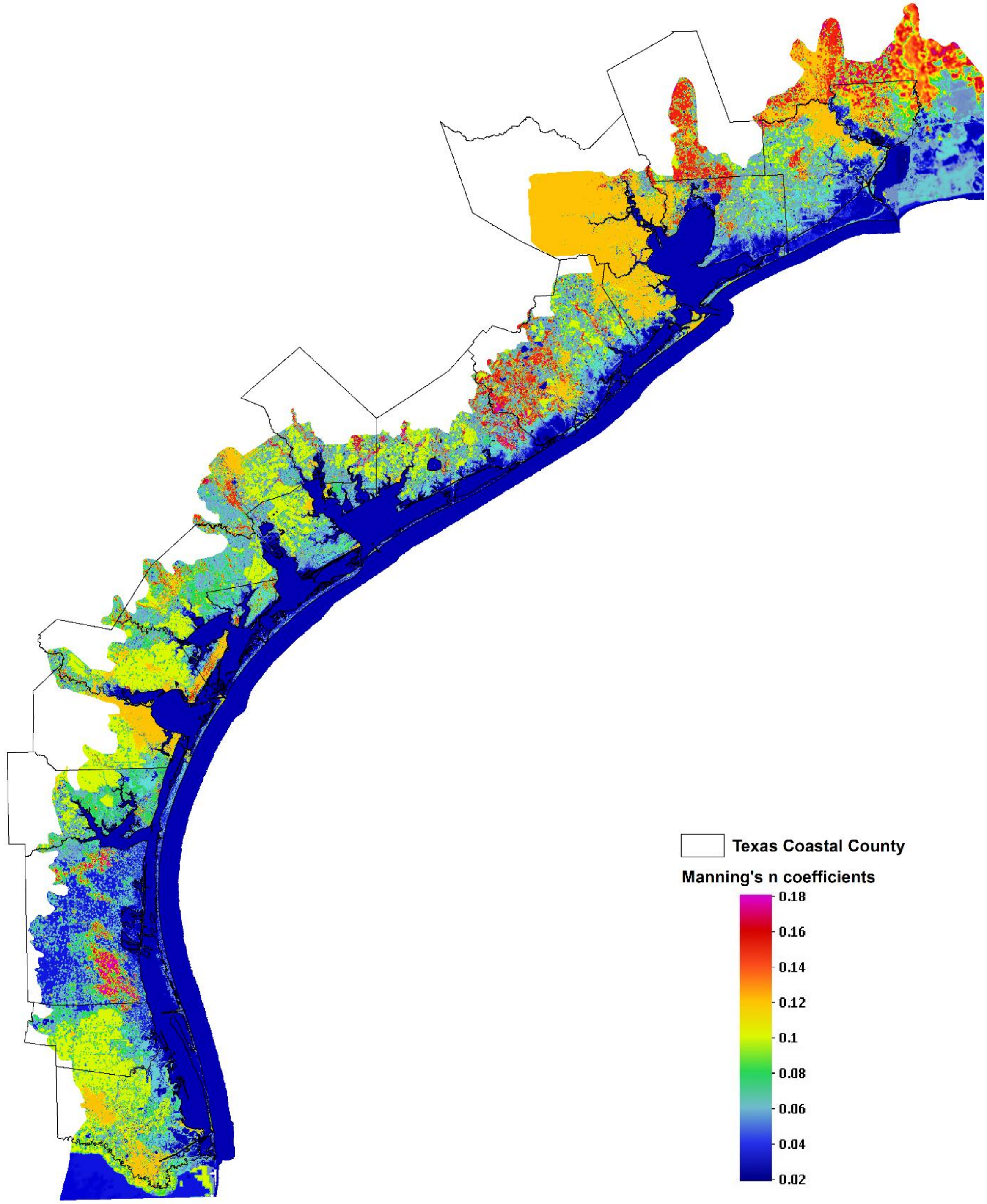

Figure 6-32: Future Condition (2100) ADCIRC nodal Manning's *n* coefficients along the Texas coast based on the land cover shown in Figure 6-31: Future Condition land cover classes along the Texas coast used for the storm surge analysis

In order to account for the vertical datum shift from local mean sea level (LMSL) to NAVD88 and the intra-annual mean sea surface variability caused by thermal expansion and other baroclinic effects of the Gulf of Mexico, initial water levels were increased at the beginning of the ADCIRC simulation. The datum conversion from NAVD88 to LMSL was calculated based on the three tide gauges – Galveston Pier 21 (0.209 m), Corpus Christi Bob Hall Pier (0.146 m) and Port Isabel (-0.012 m). Taking an average value for these datum offsets gave 0.1143 m. In order to account for the steric effects not captured by the model, a value of 0.119 m was added which was the same value used by other studies (Bunya *et al*., 2010; Dietrich *et al*., 2010). Since the bathymetry data was collected around 2008 timeframe, an average sea level rise rate of 0.0047 m/year was used for the coastal Texas region (USACE, 2018) which gave a total change of 0.047 m over a 10-year period from 2008 to 2018. So, adding all these three values (0.1143 m + 0.119 m + 0.047 m) gave the total geoid offset used for the present condition runs as 0.2804 m. This value was rounded to 1 foot (0.3048 m) and was used as the initial water surface elevation (WSE) for the ADCIRC model present condition simulations.

In order to incorporate sea level rise as a boundary condition in a storm surge model, either a eustatic method or boundary method is used (Bilskie *et al*., 2016). The boundary forcing method requires additional computational time than the eustatic method, but it was found that both methods give similar results (Bilskie *et al*., 2016), so this study has used the eustatic method to incorporate sea level rise in the ADCIRC model. In the eustatic method a given amount of sea level rise is applied by increasing the initial water level offset from the geoid. Therefore, sea level rise was accounted for in the ADCIRC model by increasing the initial water level 1 m from the present condition WSE (0.3038 m) which makes the initial WSE set to 1.3048 m for 2100 storm surge modeling.

Model Storm Scenarios

The historical storms that have struck the Texas coast do not sufficiently cover the multiple storm conditions that could affect all four regions. Therefore, this study utilized the hypothetical storms that were originally developed by the USACE as part of the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study (USACE, 2018). A set of 660 synthetic tropical storms were created in 82 master tracks for the Texas coast. For these tracks, four key storm parameters were altered – storm intensity, radius of maximum winds, forward speed of the storm and storm heading orientation (USACE, 2018).

Among those 660 synthetic storms, this study modeled six synthetic Category 2 storms with today's conditions and conditions in 2100 following sea level rise. Category 2 hurricanes were selected for this study because they have the potential of significant storm surge that can cause extensive inland flooding and devastating damage of residential and commercial property. Furthermore, all four coastal regions have been hit by at least one Category 2 or higher hurricane within the last 55 years, which approximates the average return period of severe hurricanes in these regions, except Region 1, which has an average return period of only 26 years (Keim *et al*., 2007; Roth, 2010). Therefore, Category 2 hurricanes are both devastating and have a frequency of occurrence so that many people have experienced them or can easily imagine themselves being impacted in their lifetime.

For this study, the selected six storms are classified as Category 2 just prior to landfall. For the selection of six storms, six city centers or areas of interest were identified along the coast – Beaumont/Sabine, Houston/Galveston, Freeport, Matagorda, Corpus Christi and South Padre. The storms were screened by their size, forward speed, and track orientation to the coast (also referred as 'storm heading'). These characteristics were chosen based on the fact that optimally, a large storm with "typical" speed and orientation is preferable. Additionally, storms that pass through the southeast of the identified city centers or areas of interest were only considered for the selection.

For all six locations a spreadsheet of landfall characteristics provided by USACE was used to give a comparative reference value of storm impact on an area with respect to the size of the storm and its distance to the storm's landfall, referred to here as the "hit location". The storm hit location was used to compare to a reference location for each of the regions. These reference locations were chosen to be the entrance channel of the adjacent major bay system. The distance of the hit location was then computed as a relative value: (distance between reference location and hit location)/ (Radius of Maximum Winds (RMW)). This gives a non-dimensional number that relates each storm's distance to the size of the storm. Storms were prioritized with distances between 1 and 2.5 times the RMW away from the reference location which will give the maximum value of surge for a "classical" storm track (i.e. not really considering tracks that may have less offshore surge, but more effects on the back bay).

Table 6-11 summarizes the storm characteristics for each of the selected storms and Figure 6-33 shows the storm tracks.

A total of 14 SWAN+ADCIRC model simulations were forced using meteorological wind and pressure fields for each of the six hurricane events. The six hurricane events were simulated on the present landscape, and again on the future 2100 landscape. In addition, two hurricane events were simulated on the future landscape "With Projects" scenario. The "With Projects" scenario was designed to assess the storm surge response to the simulated resiliency projects in Regions 1 and 3. More detail on the modeling of these resiliency projects is included on page 78. The maximum water surface elevation (MAXELE) and maximum water depth surface was derived for each of the storms and analyzed by region which resulted in 14 surfaces of both types.

Table 6-11: Storm characteristics of 6 selected storms for this study

Selected Storm	Landfall location	Central Pressure (mb)	RMW (miles)	Max. Wind Speed (mph)	Forward Speed (mph)
466	High Island	964	37	93	8
154	Follet's Island	940	37	108	12
146	Matagorda Peninsula	927	39	106	21
240	Matagorda Island	948	28	104	20
416	N. Padre Island	934	17	113	13
400	65 miles S. of U.S. Mexico Border	934	34	99	16

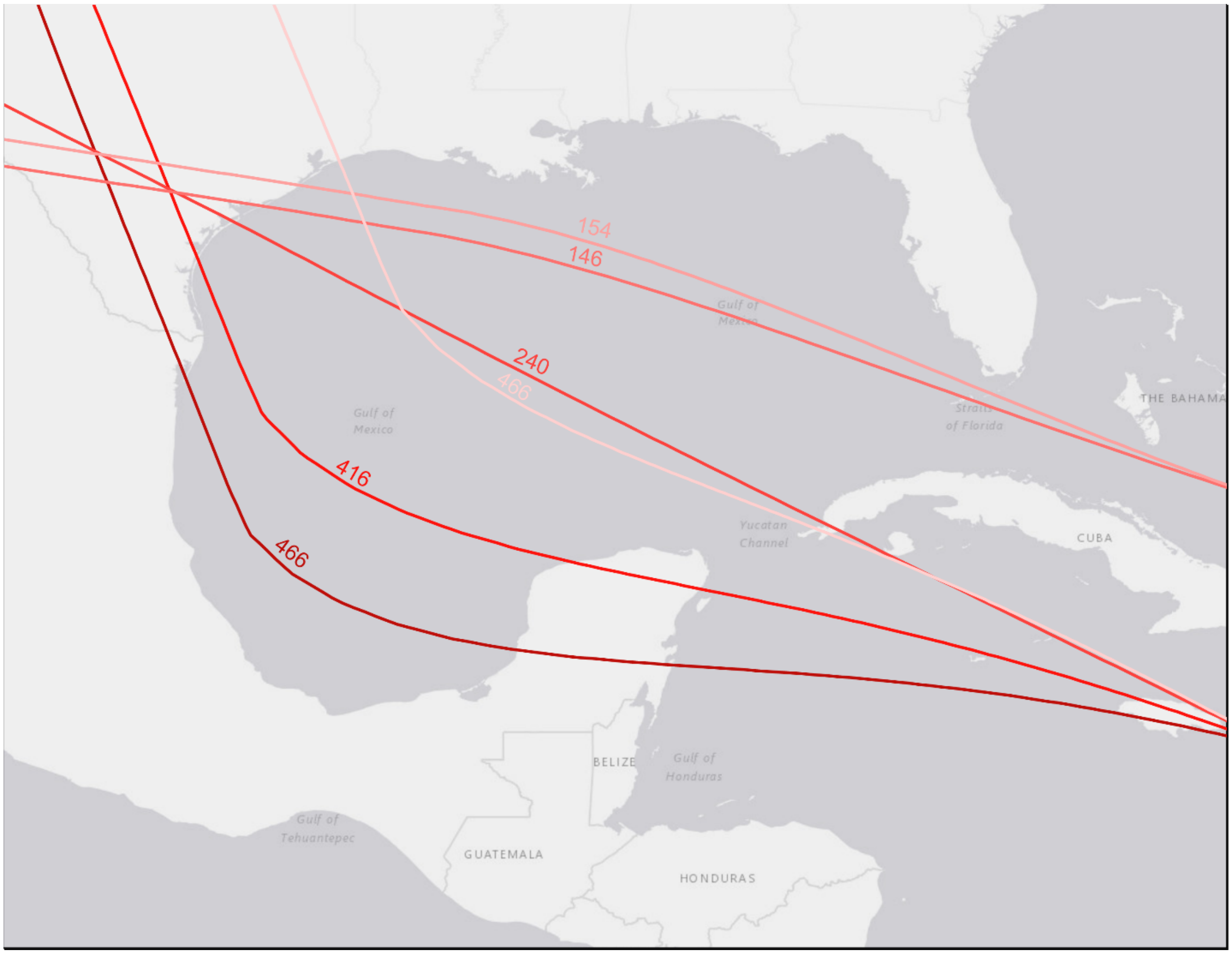

Figure 6-33: Tracks of 6 synthetic storms selected for this study

Modeling Resiliency Projects

This study also assessed how the implementation of hypothetical coastal restoration and habitat preservation projects could mitigate negative impacts of RSLR and future storm surge. Seven large-scale coastal restoration projects and two wetland creation projects were modeled with SLAMM. Six out of the nine projects were located in Region 1 and three were located in Region 3. To simulate a "Beneficial Use of Dredge Material (BUDM)" restoration project, the elevation of the input DEM within the project area was raised a unified amount every 25 years, by either 0.25 m or 0.5 m, enough to keep pace with RSLR in that area (Figure 6-34, Table 6-12). The added elevation was determined from the accretion/erosion rates and RLSR amount for each project area. The wetland creation projects were generated by first assigning an elevation for the initial condition DEM of the project area. This elevation was determined by calculating the average elevation of the low marsh (irregularly flooded) in nearby environments. The land cover input file was then changed to include the newly created marsh environment. Overall the amount of dredge material needed to build out all these projects would be about 23 million cubic yards every 25 years.

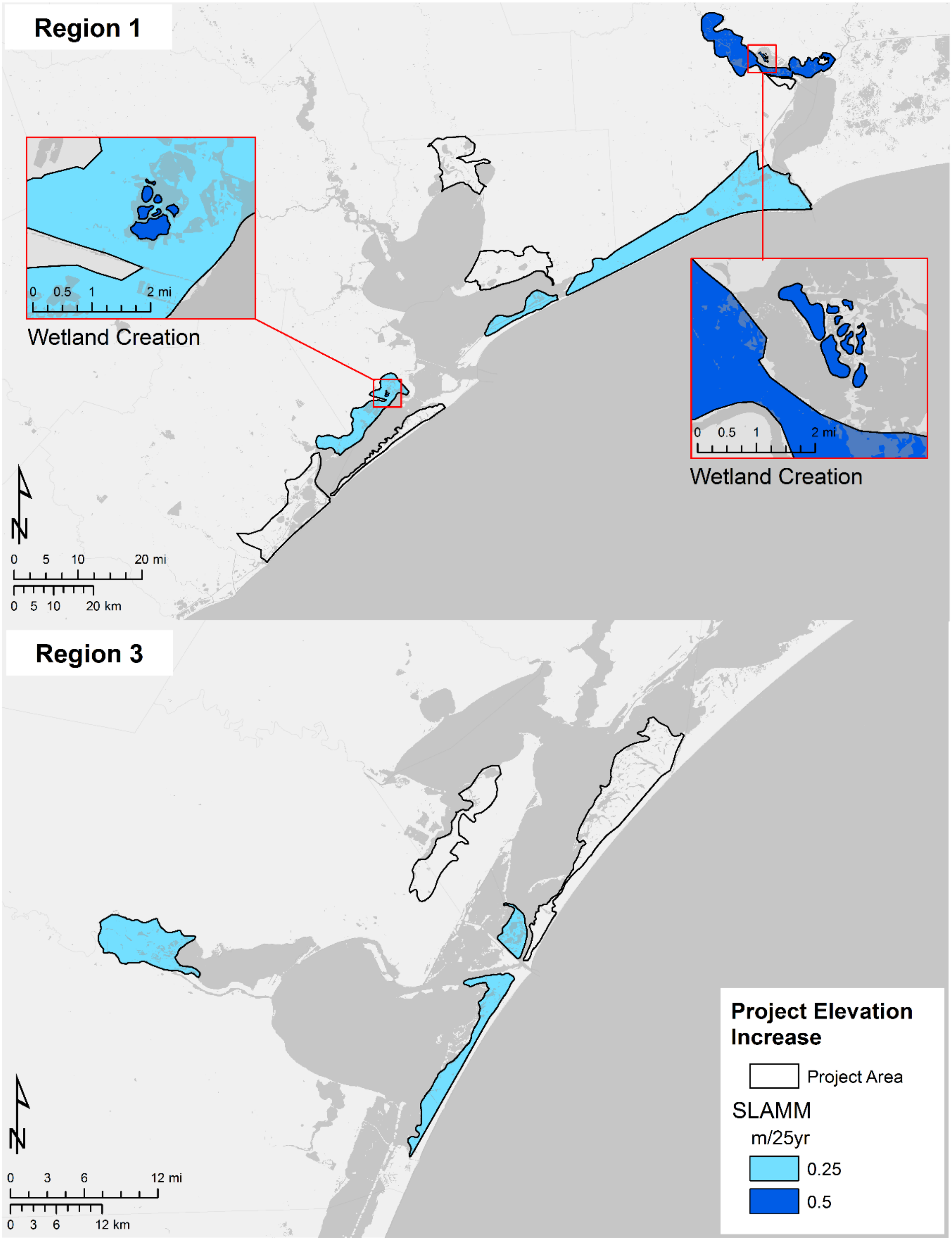

Figure 6-34: Beneficial Use of Dredge Material (BUDM) restoration project area selected in Region 1 (top) and Region 3 (bottom) and modeled in SLAMM. The elevation of the input DEM within the project area is raised by 0.25 m or 0.5 m every 25 years in SLAMM. Region 1 contains two "Wetland Creation" projects.

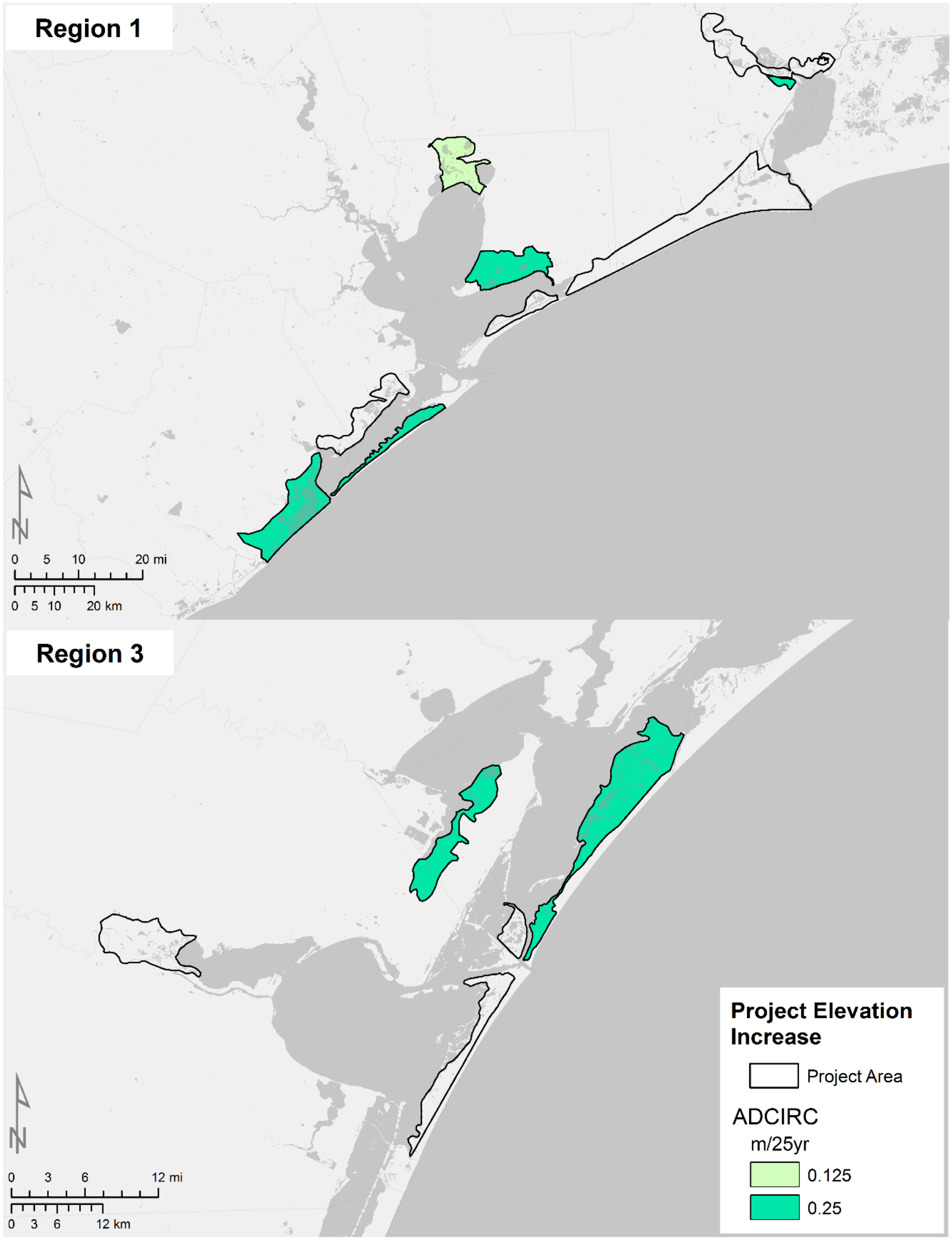

Figure 6-35: BUDM/habitat preservation project area selected in Region 1 (top) and Region 3 (bottom). The elevation of the input DEM within the project area is hypothetically raised by 0.125 m or 0.25 m every 25 years, resulting in an elevation increase of either 0.375 m or 0.75 m in the 2100 topographic surface input into SWAN+ADCIRC.

Table 6-12: Detail characteristics of resiliency projects implemented in this study

Region	Description	Project Type	Model Environment	SLAMM Added Elev. 25/yr (m)	ADCIRC Added Elev. (m)
1A	Beaumont/Neches River	BUDM/25 years	SLAMM/ results to ADCIRC	0.5	*NA*
1A	Chenier Plains	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
1A	Lower Neches/Bessie Heights Wetland Creation	Wetland Creation/ BUDM/25 years	SLAMM/ results to ADCIRC	0.5	*NA*
1B	Bolivar Peninsula Wetlands	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
1B	West Bay	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
1B	Pierce Marsh Wetland Creation	Wetland Creation/ BUDM/25 years	SLAMM/ results to ADCIRC	0.5	*NA*
3	Harbor Island	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
3	Mustang Island Backside Beaches/Wetlands	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
3	Nueces Delta Wetlands	BUDM/25 years	SLAMM/ results to ADCIRC	0.25	*NA*
1A	Port Neches/Groves	Habitat Preservation	ADCIRC	*NA*	0.75
1B	Moody NWR	Habitat Preservation	ADCIRC	*NA*	0.75
1B	Trinity River Delta	Habitat Preservation	ADCIRC	*NA*	0.375
1B	Galveston Island	Habitat Preservation	ADCIRC	*NA*	0.75
1B	Brazoria NWR	Habitat Preservation	ADCIRC	*NA*	0.75
3	San Jose Island Backside Beaches/Wetlands	Habitat Preservation	ADCIRC	*NA*	0.75
3	Port Bay	Habitat Preservation	ADCIRC	*NA*	0.75

Results from the SLAMM model in the nine resiliency project sites were then incorporated into the SWAN+ADCIRC model input files taking the same post-processing steps mentioned earlier for the future condition SWAN+ADCIRC input files preparation. The Manning's *n* values of the land cover within the project area where the SLAMM modeling was done was updated in the future condition Manning's *n* file. This updated Manning's *n* file was interpolated to the ADCIRC nodal attribute file (fort.13) to model storm surge under 2100 conditions with the resiliency projects. Similarly, the topographic surfaces predicted by the SLAMM model within the nine project sites were updated in the future condition ADCIRC mesh file prepared for the future condition storm surge modeling.

An additional seven project sites (Figure 6-35, Table 6-12) were only modeled for storm surge modeling in SWAN+ADCIRC. These sites were modeled to mimic habitat preservation projects and the land cover within these sites were considered maintained as initial condition in 2100. Therefore, the 2100 land cover input for these project areas were reverted back to their initial condition, and Manning's *n* values associated with the updated land cover was interpolated to the ADCIRC fort.13 file. The 2100 topographic surface within these project areas were elevated by the amount listed in Table 6-12 in the future condition ADCIRC mesh file. The 2100 future condition storm was modeled with all these coastal resiliency projects in place, both BUDM and habitat preservation project types. Storm 154 was selected for Region 1 and storm 416 was selected for Region 3.

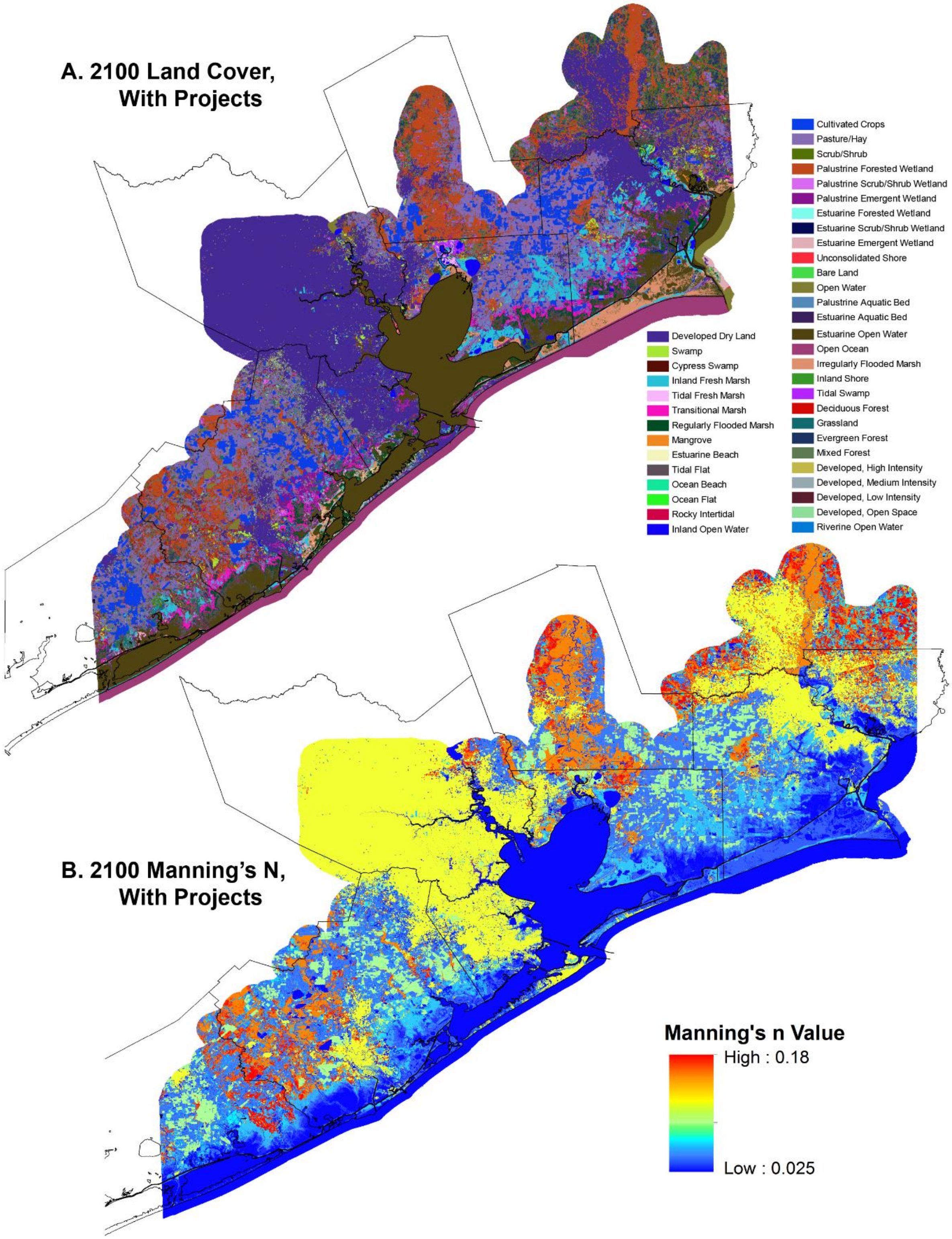

Figure 6-36: Map showing A) The 2100 land cover "With Projects" scenario in Region 1 with added C-CAP data and 2100 USGS model output; and B) The 2100 Manning's *n* values for the 2100 "With Projects" land cover classes used for input into the future condition ADCIRC model.

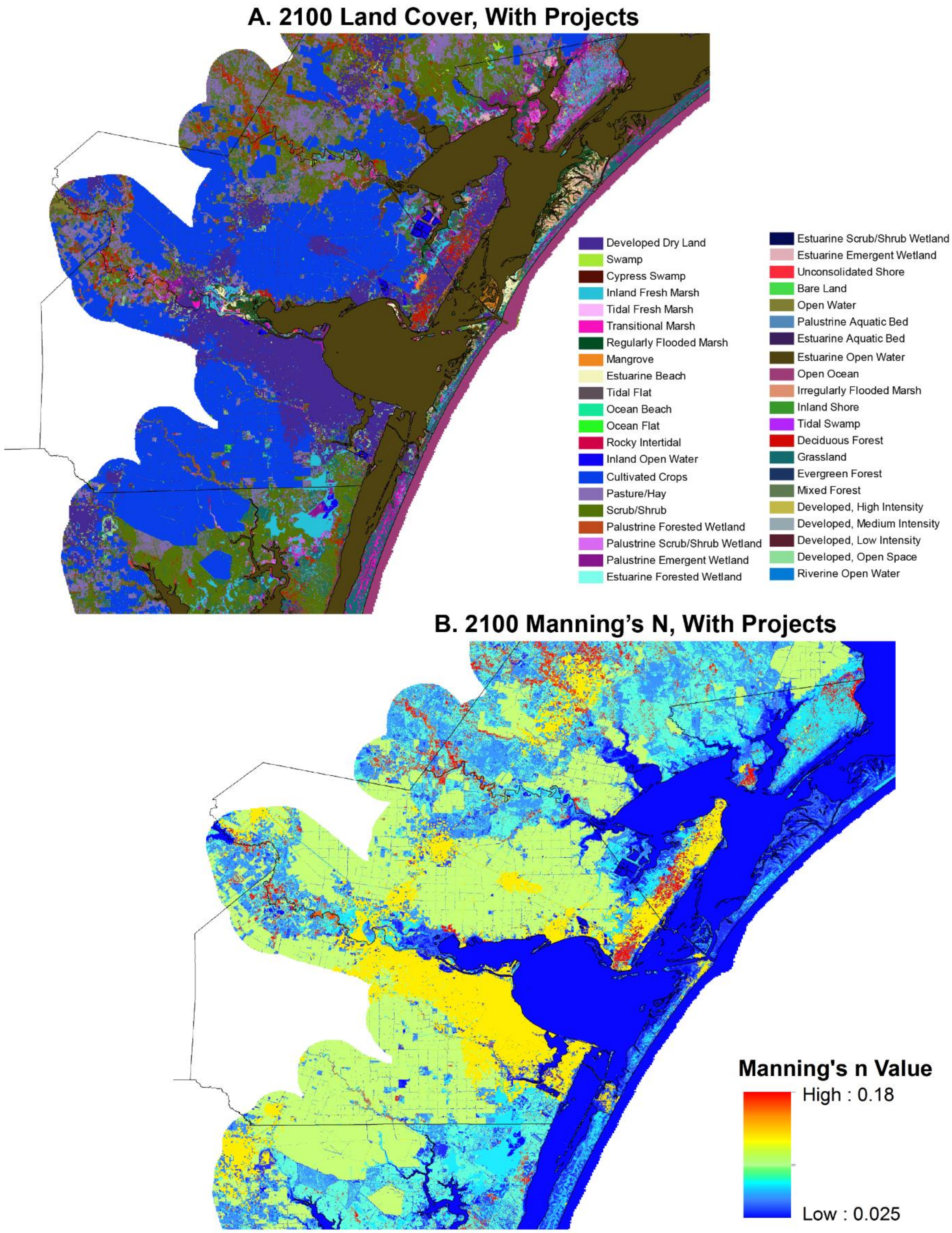

Figure 6-37: Map showing A) The 2100 land cover "With Projects" scenario in Region 3 with added C-CAP data and 2100 USGS model output; and B) The 2100 Manning's *n* values for the 2100 "With Projects" land cover classes used for input into the future condition ADCIRC model.

Model Calibration/Validation

<u>SLAMM</u>

SLAMM was calibrated by simulating a "time zero" step wherein the conceptual model is validated against data inputs. This simulation produces an output land-cover map produced from input tide ranges, salt elevation, elevation data, locations of dikes, and the original land-cover raster. No sea level rise, accretion, or erosion is imposed on this time zero run, so that land cover classifications output is based only on land elevations and the SLAMM conceptual model. To calibrate the model, elevation ranges for the habitat types were altered until the recommended threshold 5% discrepancy between simulated time zero and actual time zero land-cover was achieved. The elevation ranges for habitats are not exclusive and may overlap. Only slight changes were made to the SLAMM conceptual model. The lower boundary of the irregularly flooded marsh was changed from the default value of 0.5 half-tide units (HTU) to 0.25 HTU. The lower boundary of the regularly flooded marsh was adjusted from the default 0 HTU (which corresponds to mean tide level) to -0.95 HTU, which is slightly above mean lower low water.

Brackish and estuarine wetlands, when grouped together, were not able to be calibrated with the 5% limit due to SLAMM's overestimation of the transitional marsh environment where NWI indicates the land cover type is a fresh water wetland (Table 10). Previous modeling done by The Nature Conservancy in 2011 in this study area has indicated that the NWI tends to underestimate salinity, so these conversions were allowed to occur.

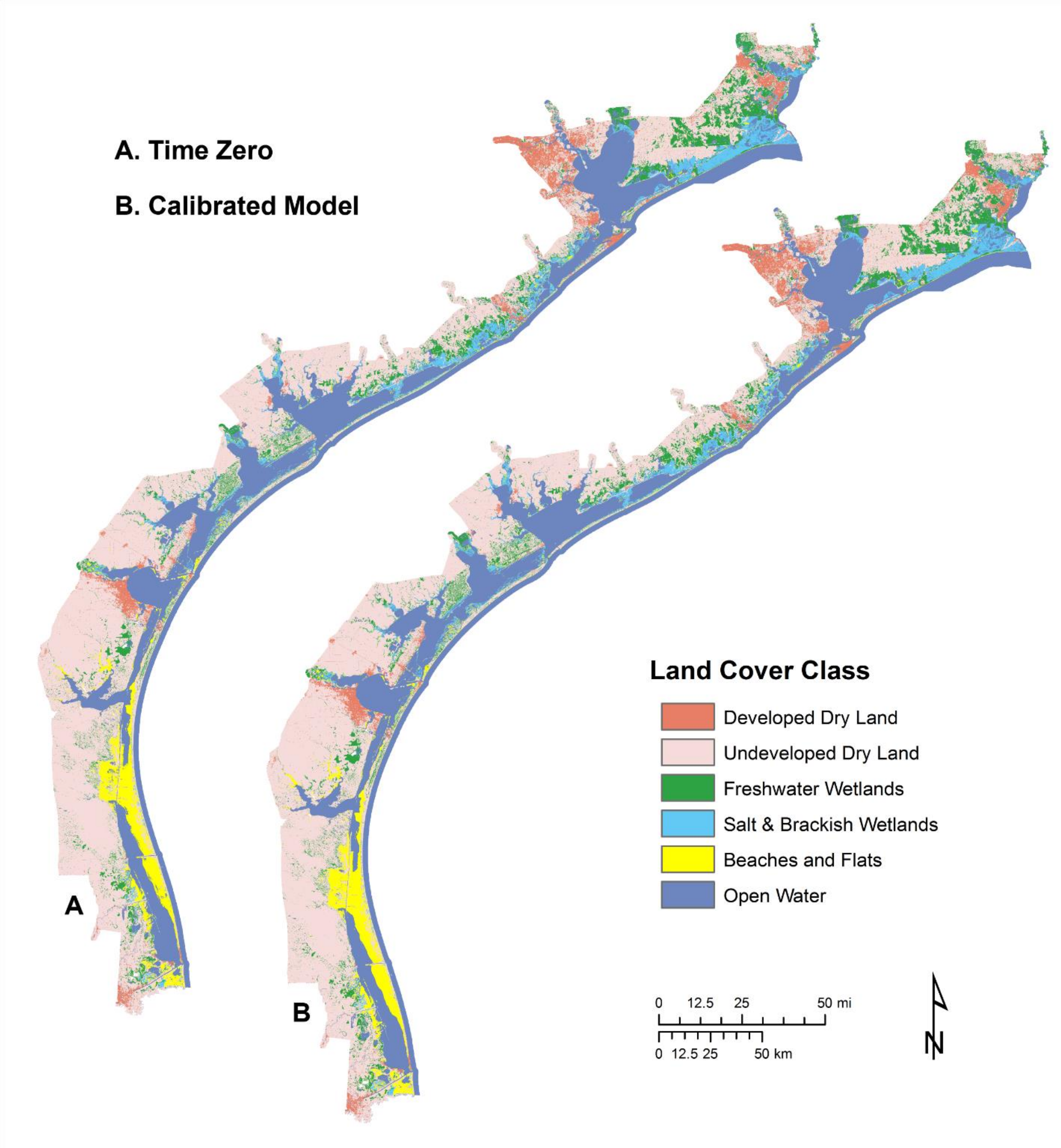

Figure 6-38: Map of Texas coast comparing SLAMM "time zero" to the 2007 calibrated model run

Table 6-13: Calculated area of each land cover class and percent difference between the "time zero" simulation and the 2007 calibrated simulation

Land cover class	Time Zero (sq. miles)	2007 Calibrated (sq. miles)	% Diff
Developed dry land	524.90	509.51	-2.98
Undeveloped dry land	5040.25	5024.82	-0.31
Freshwater wetlands, non-tidal	891.46	848.12	-4.98
Salt & brackish emergent wetlands, tidal	522.57	568.51	8.42
Beaches and flats	309.38	307.76	-0.52
Open water	3247.37	3273.89	0.81

SWAN+ADCIRC

The SWAN+ADCIRC model performance was first compared to and validated with tide gauge data collected during Hurricane Ike. This hindcast and validation process provided information about ADCIRC's ability to capture the surge's growth, peak, and recession during Hurricane Ike as well as information about the model's data driven parameterization of bottom friction in marsh. The time series of measured versus modeled water surface elevations are plotted at the existing tide gauges and temporary monitoring stations deployed by the USGS before Hurricane Ike (East *et al*., 2008). Figure 6-40 and Figure 6-41 show time series comparisons of the SWAN+ADCIRC model run forced with Hurricane Ike parameters, comparing the modeled water levels with the measured water levels at tide gauges on Pleasure Pier and Bob Hall Pier, and USGS temporary monitoring stations deployed at the northeast of landfall in Galveston and Jefferson county. USGS-SSS-TX-GAL-001 and USGS-SSS-TX-GAL-002 were located on the Gulf side and bay side of Bolivar Peninsula, whereas USGS-SSS-TX-JEF-001, USGS-SSS-TX-JEF-004 and USGS-SSS-TX-JEF-005 were located at McFaddin National Wildlife Refuge (Figure 6-39).

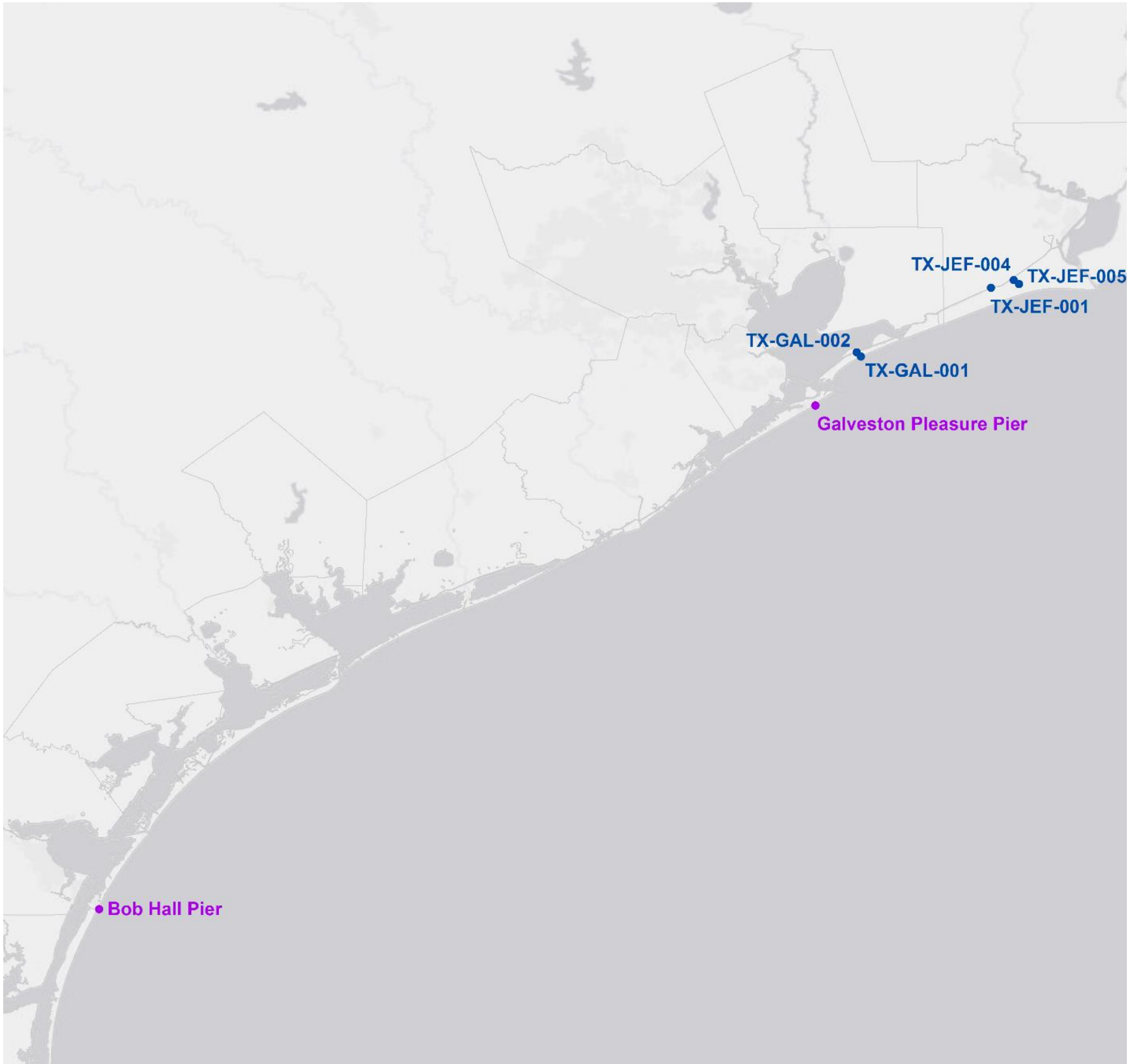

Figure 6-39: Locations of tide gauges and USGS temporary monitoring stations used for the SWAN+ADCIRC model validation

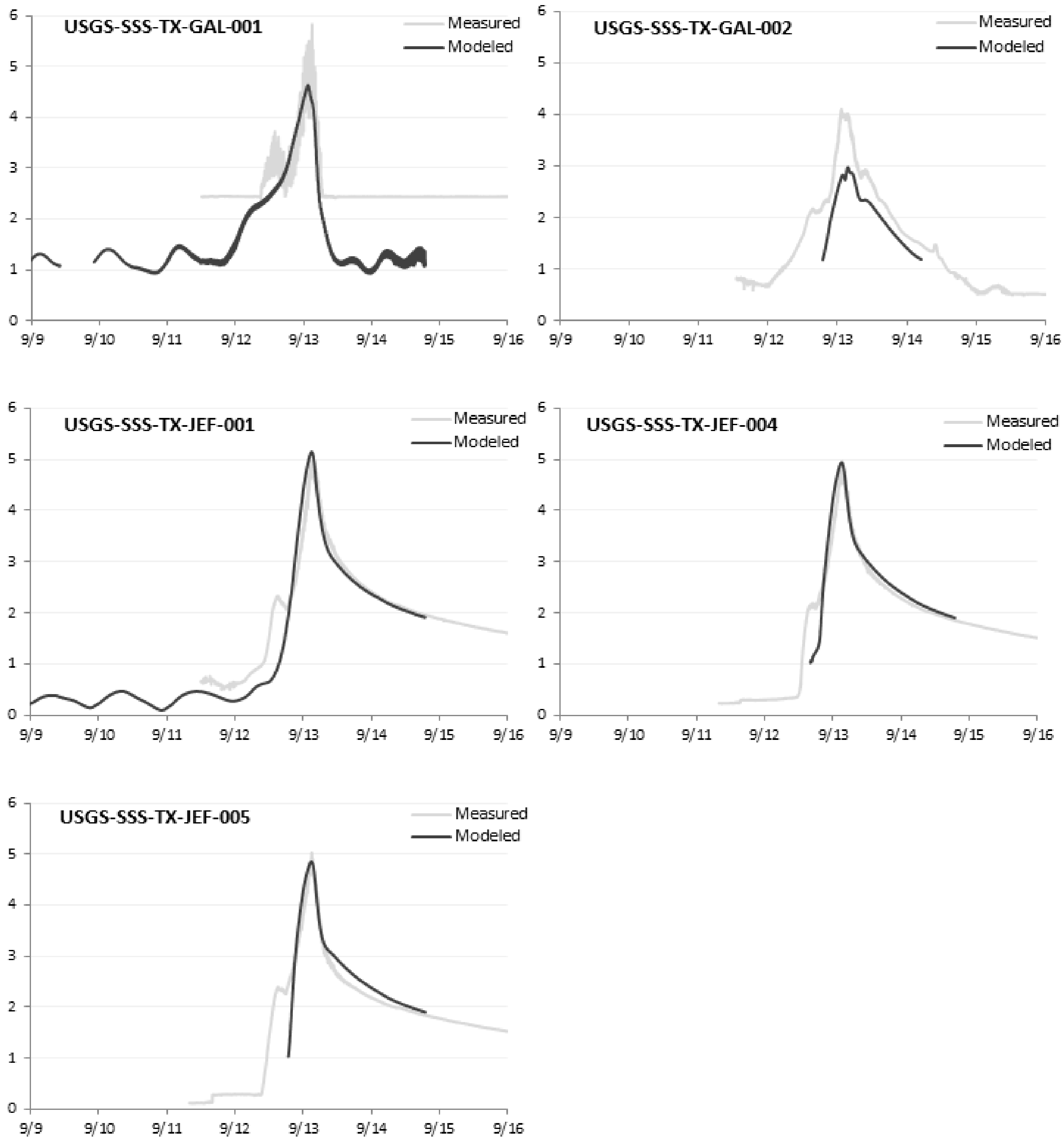

Figure 6-40: Time series plot of water surface elevations (in meters) at USGS temporary monitoring stations deployed during Hurricane Ike. The Y-axis in these plots is water surface elevation (m) and X-axis is day in September 2008.

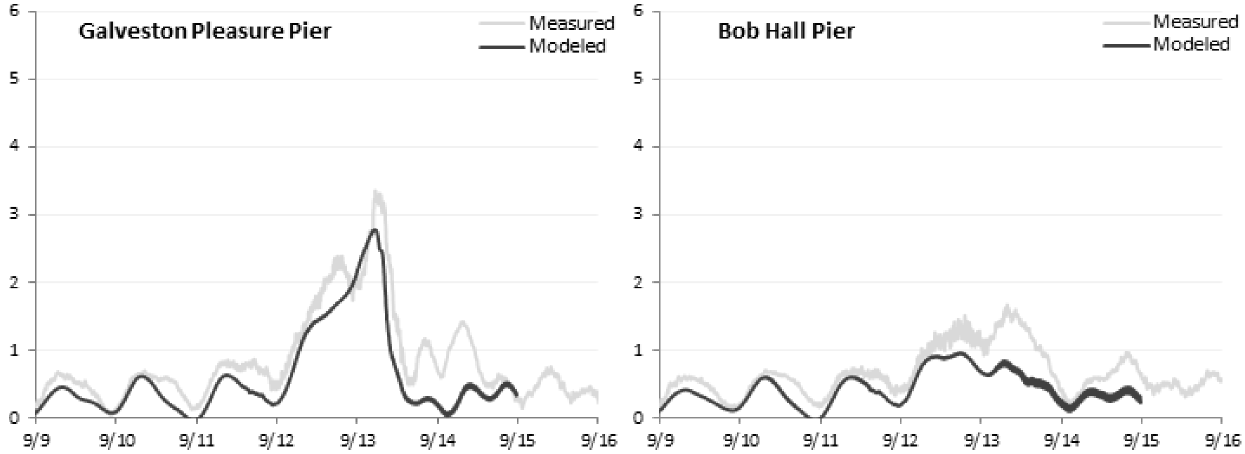

Figure 6-41: Time series plot of water surface elevations (in meters) at Galveston Pleasure Pier and Bob Hall Pier tide gauges. The Y-axis in these plots is water surface elevation (m) and X-axis is day in September 2008.

The present condition SWAN+ADCIRC model performance for this study was also compared and validated with 2D maps of the MAXELE provided by the USACE model runs (for the Coastal Texas Study) for each storm. USACE has performed the storm surge simulation using the Coastal Storm Modeling System (CSTORM-MS) that uses the coupled ADCIRC and Steady-State Spectral WAVE (STWAVE) models for dynamic interactions between the simulated surge and wave results (USACE, 2018). Similarly, the ADCIRC mesh used for the Coastal Texas Study is also different than the one used in this study. The USACE mesh was developed from a combination of previously developed and validated ADCIRC meshes (USACE, 2018).

The MAXELE was qualitatively validated by comparing the two output files. A visual validation is performed by comparing the extent of the inundation and the maximum water surface elevations in both the Gulf of Mexico and Landfall domains. Figure 6-42 shows an example of the visual validation for Storm 466. All other storms are included in the Appendix.

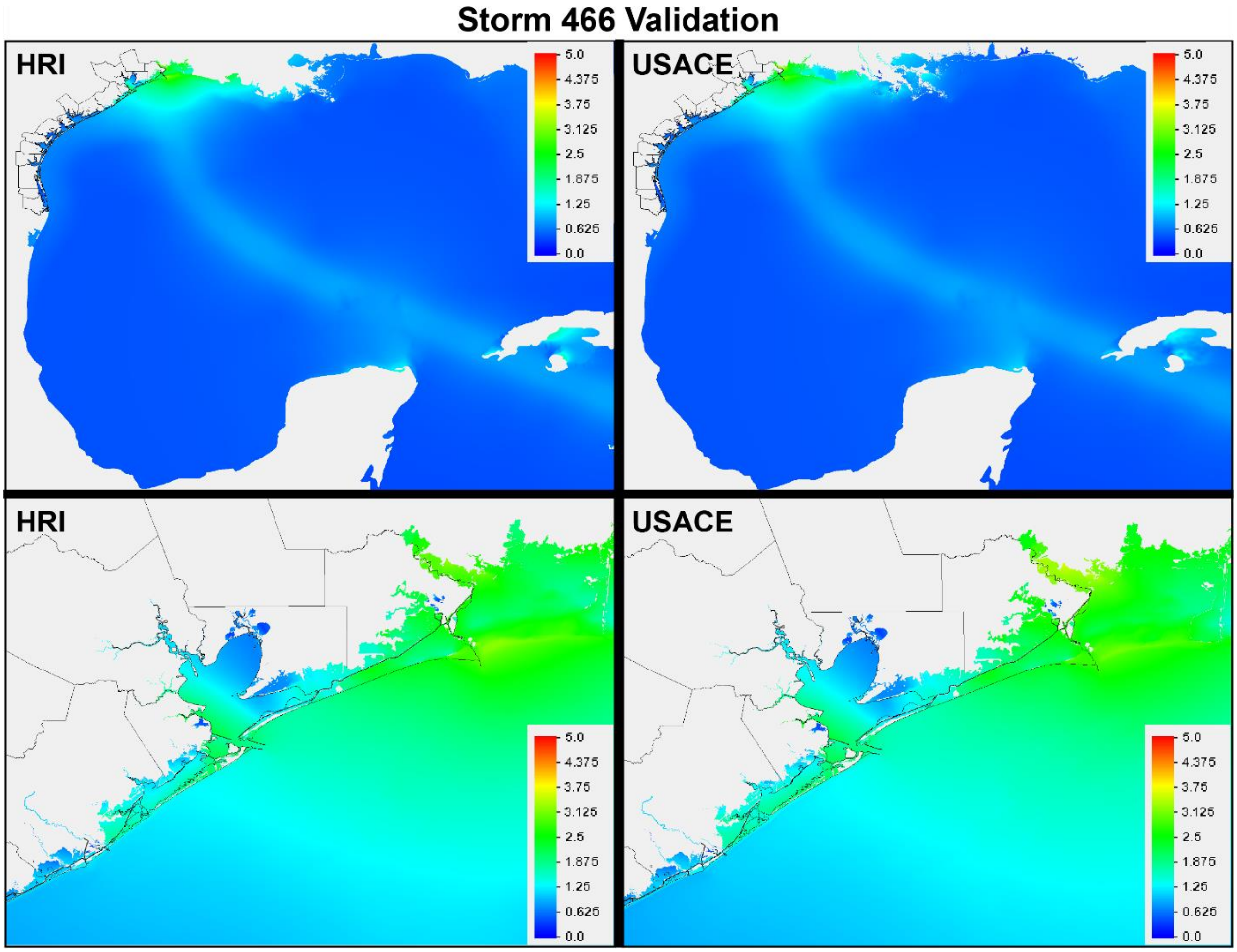

Figure 6-42: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 466. The maps on the left are MAXELE files with HRI simulated SWAN+ADCIRC run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

II. RESULTS

Sea Level Rise Modeling

The following subsections describe the results from the sea level rise modeling part of the study. First, the Texas coast as a whole is broadly examined, comparing the 2100 land cover output to the initial condition in the form of maps, graphs, and tables. The Texas coast is also compared to the separate regions in Figure 6-43 and Figure 6-44. Subsequently, each of the four regions are discussed and analyzed in a more detailed approach, providing information on the vulnerability each region faces as the rising sea level is projected to alter the landscape into the future.

SLAMM includes 21 different land cover classes which are condensed into 6 classes for this analysis. Table 6-14 shows what classes are aggregated for this study.

Table 6-14: Aggregation of SLAMM output land cover classes to new classes for change analysis

SLAMM Codes	SLAMM Description	New Code	New Description
1	Developed Dry Land	1	Developed Dry Land
2	Undeveloped Dry Land	2	Undeveloped Dry Land
3, 4, 5	Non-tidal Swamp, Cypress Swamp, Inland-Fresh Marsh	3	Freshwater, non-tidal
6, 7, 8, 9, 20, 23	Tidal-Fresh Marsh, Trans. Salt Marsh, Regularly-Flooded Marsh, Mangrove, Irreg.-Flooded Marsh, Tidal Swamp	4	Saltwater and Brackish tidal marshes
12, 22, 10, 11, 13, 14	Ocean Beach, Inland Shore, Estuarine Beach, Tidal Flat, Rocky Intertidal, Ocean flat	5	Beaches and flats
15, 16, 17,19	Inland Open Water, Riverine Tidal, Estuarine Open Water, Tidal Creek, Open Ocean	6	Open water

Coastwide

Significant effects of sea level rise are predicted to impact the Texas coast, vastly changing the landscape by 2100. Figure 6-43 shows the present landscape of the Texas coast and the model output of the future landscape in 2100, while Figure 6-44 shows the areal changes in square miles by land cover type. Figure 6-45 and Figure 6-46 show maps of individual losses and gains of freshwater and saltwater marsh and open water along the coast. With 1 meter of sea level rise on top of varying subsidence/uplift rates along the coast by 2100, there is a dramatic decrease in the amount of inland-fresh marshes and swamps in each region. Slightly less than half of their initial area is predicted to remain by the year 2100, a combined 52% loss (Table 6-15). The model predicts these habitats will transition to transitional scrub-shrub wetlands, regularly flooded marsh or tidal flats. Almost all of the saltwater and brackish marshes seen today along the Texas coast are expected to be impacted by sea level rise by both loss through inundation and gain by upward migration. Their initial area is 553 square miles, and by 2100 only 33 square miles of their initial area remains. The lost low marsh area is converted to either tidal flat or open water. However, contingent upon the migration space being open, the salt and brackish marshes will migrate landwards, contributing to a net gain of 27% by 2100.

Table 6-15: Areal and percent difference in each land cover type between Present Condition (2007) and Future Condition (2100) along the Texas coast

Land cover class	2007 (sq. miles)	2100 (sq. miles)	% Diff
Developed dry land	523.86	460.52	-12.09
Undeveloped dry land	5032.44	4587.64	-8.84
Freshwater wetlands, non-tidal	853.58	408.82	-52.11
Salt & brackish emergent wetlands, tidal	553.00	701.30	26.82
Beaches and flats	495.86	312.05	-37.07
Open water	3247.87	4236.71	30.45

In addition to impacts on the natural environment, a significant amount of developed land is predicted to be inundated by 2100. A total of 77 square miles of developed land along the coast is projected to be impacted by RSLR. Most of these inundated developed areas consist of low-lying coastal communities and critical infrastructure such as water treatment and power plants. These vulnerable areas will be highlighted in subsequent sections.

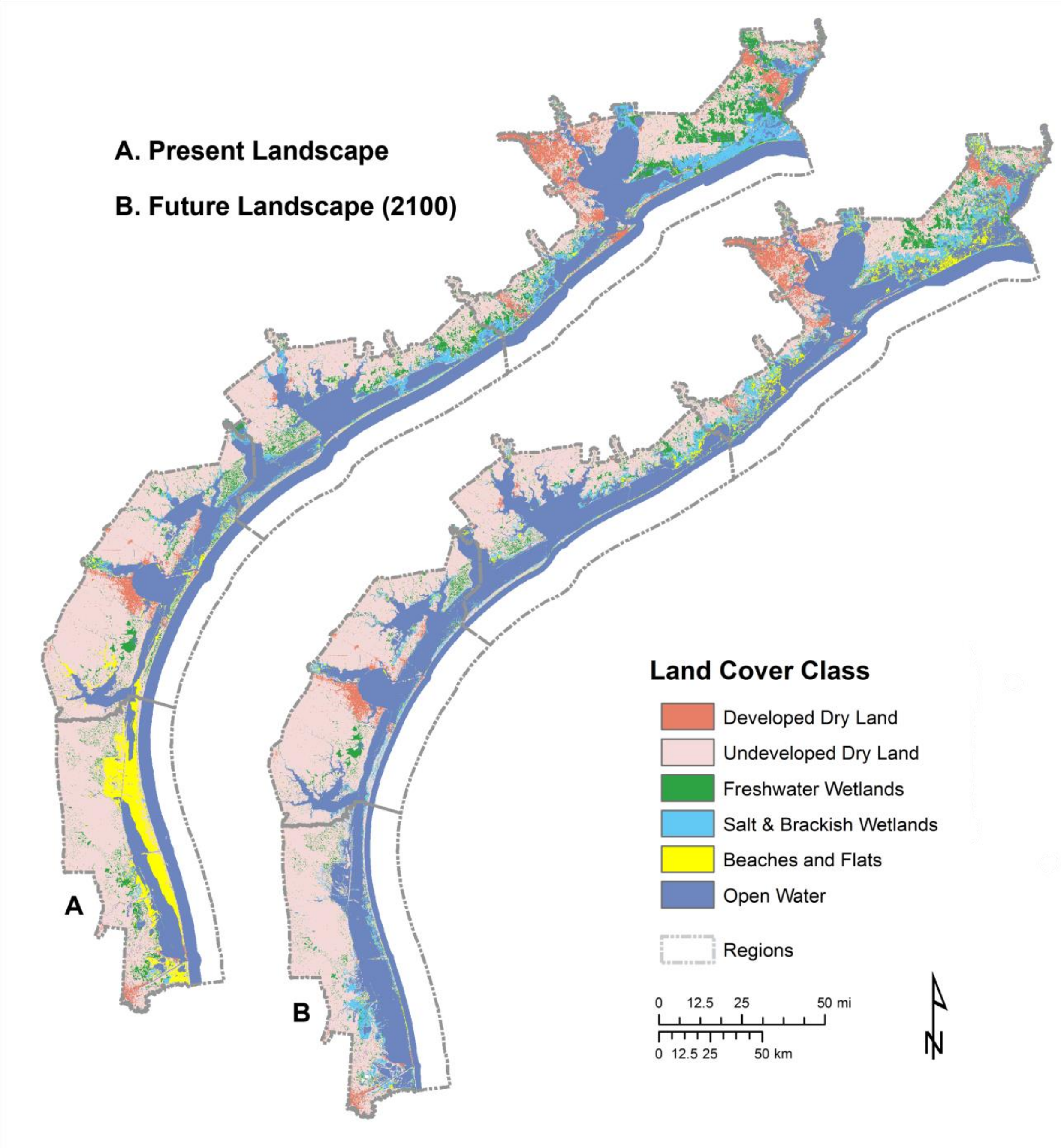

Figure 6-43: Present landscape vs. future landscape along the Texas coast. (A) Present Condition (2007) land cover data used by SLAMM. (B) Future Condition (2100) land cover output from SLAMM

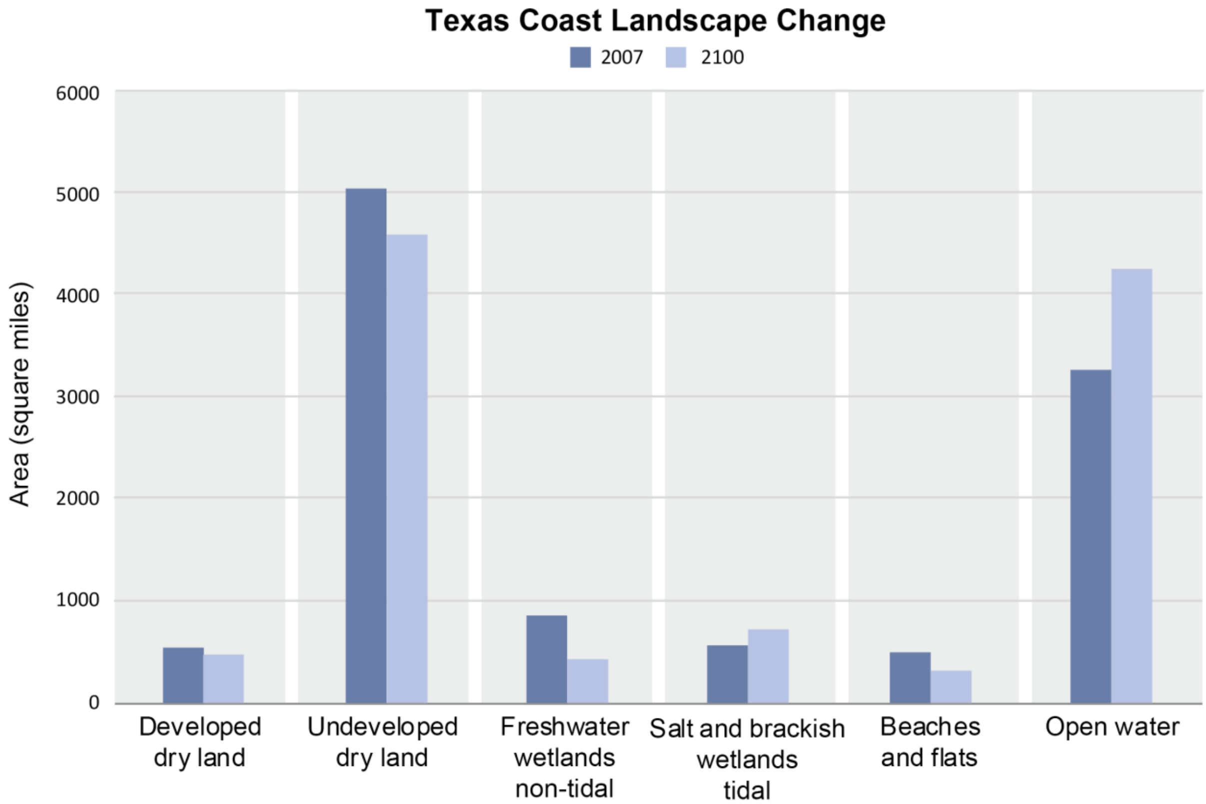

Figure 6-44: Areal changes (in square miles) of individual land cover types between Present Condition and Future Condition along the Texas coast

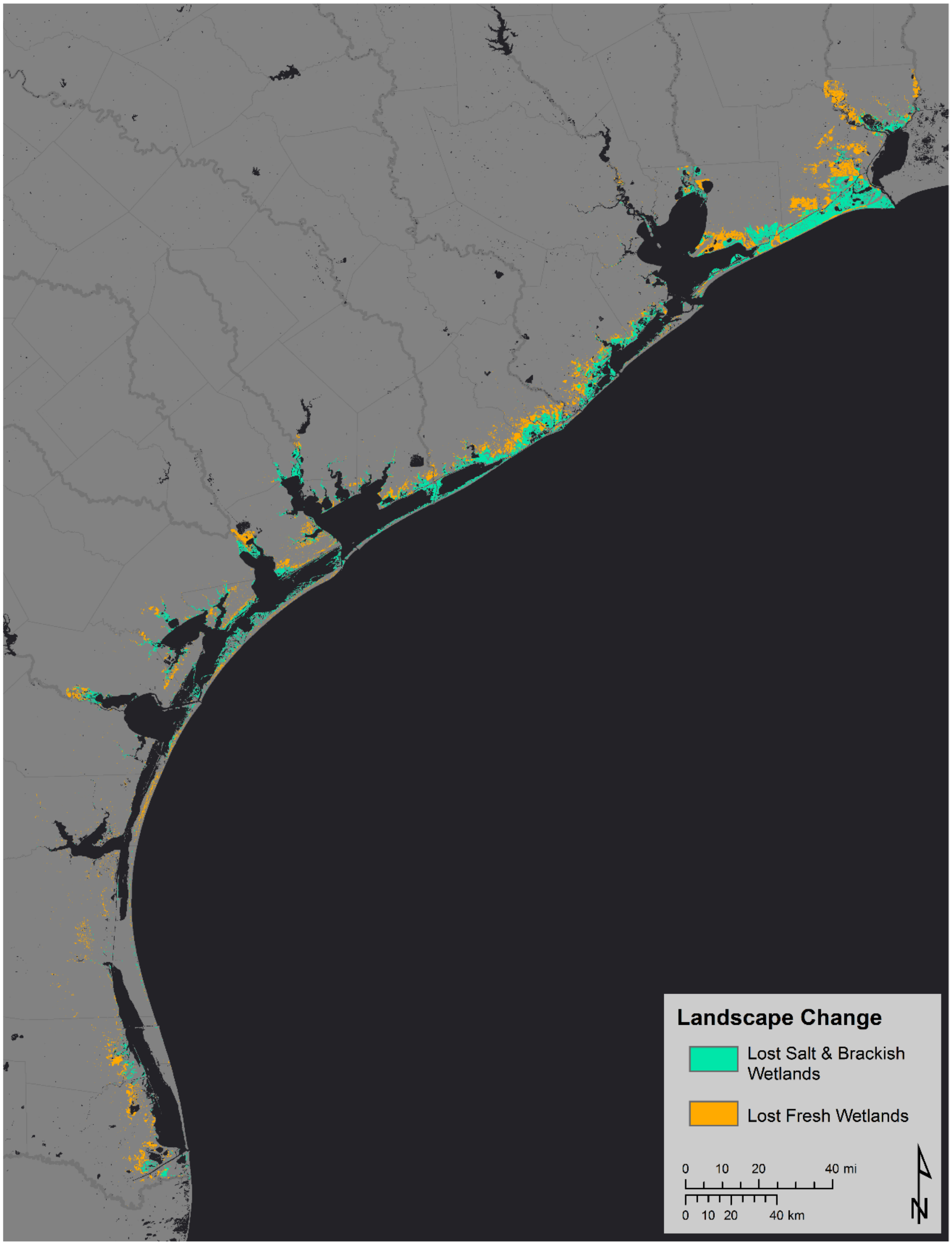

Figure 6-45: Map showing the extent of fresh wetlands and salt and brackish wetlands along the Texas coast predicted to be lost due to RSLR by the year 2100.

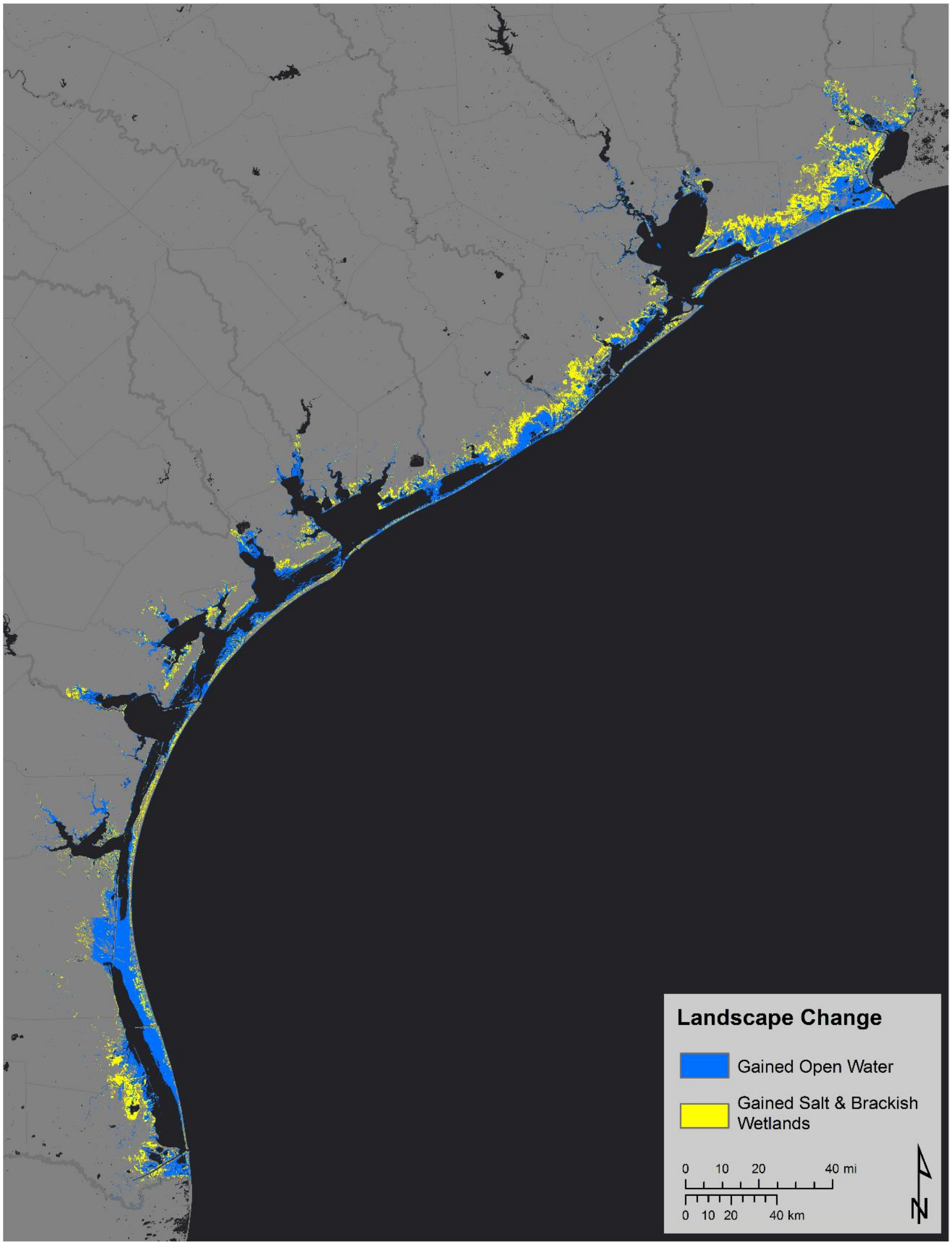

Figure 6-46: Map showing the extent of gained open water and salt and brackish wetlands by the year 2100.

The area of open water is expected to increase 30% by the year 2100. This expansion of open water and loss of essential coastal habitats has the potential to increase the vulnerability of the coast to future hazards such as storm surge and nuisance flooding. Figure 6-47 shows the relative vulnerability to land loss along the coast, where land is defined as any land cover type excluding open water and intertidal flats that are regularly submerged. This is calculated by first dividing the coast into quarter-quarter-quarter-quadrangles (Q4), created by dividing each standard USGS 7.5-minute quadrangle in the coastal zone by 4 to yield quarter quads (Q2) then dividing each Q2 by 4 to yield Q3's and again by 4 to yield Q4's. Each Q4 represents approximately 645 acres, or one square mile. To find the amount of land lost by 2100 in each Q4, the area of land in the initial input land cover dataset is compared against the 2100 SLAMM land cover output using Geographic Information System (GIS) operations to quantify where and how much of present-day land has turned to open water over time. On average, the Texas coast is predicted to lose an average of 85 acres of land to open water within each colored Q4 in Figure 6-47. The map shows more vulnerable trends occurring on the backside of barrier islands and river deltas where low-lying coastal habitats reside. The most vulnerable habitats to become open water are low-lying salt and brackish marshes.

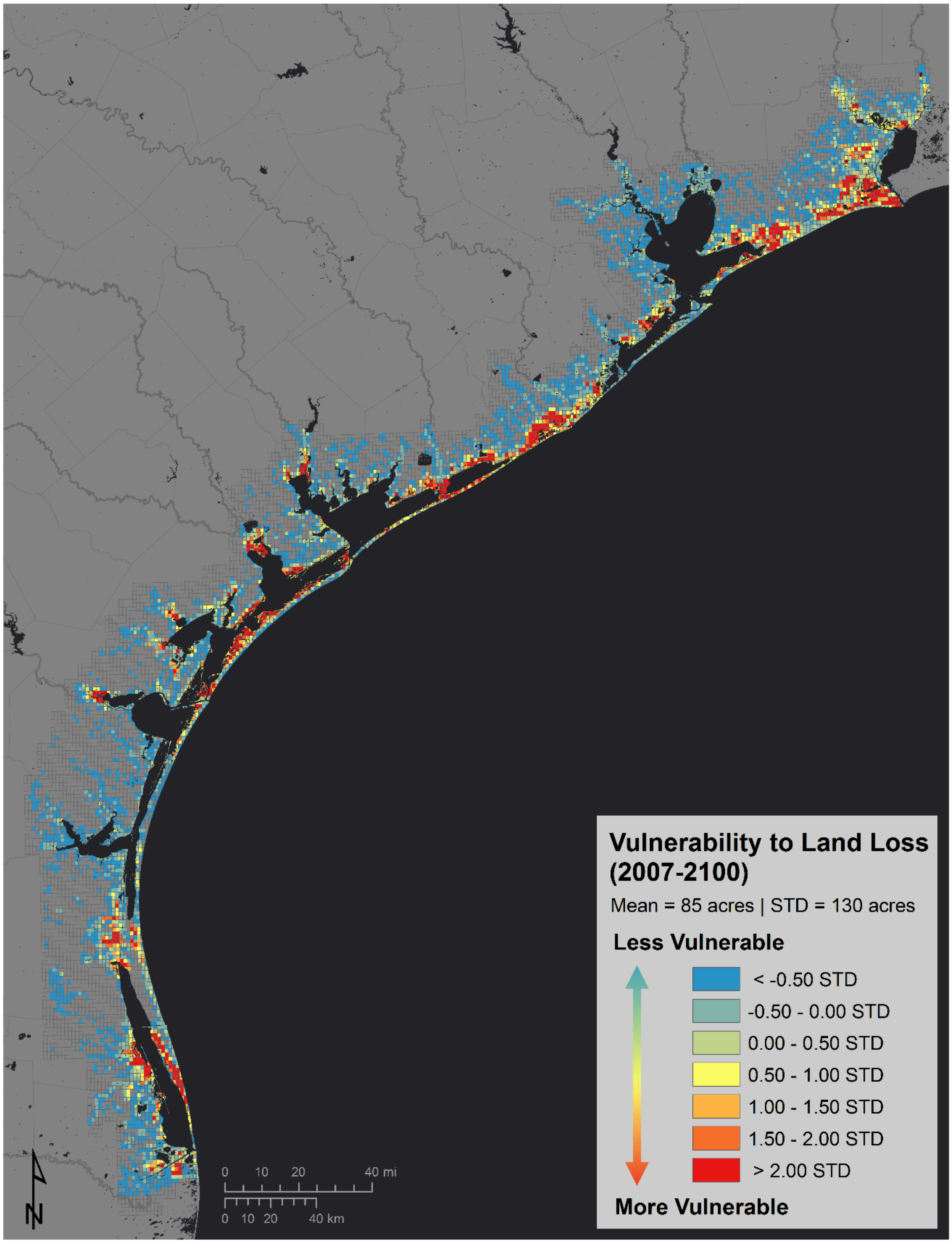

Figure 6-47: Map showing relative vulnerability to land loss, where land loss signifies any type of land (excluding intertidal flats) that has converted to open water by the year 2100. The map is symbolized by standard deviations (STD) from the mean.

Texas Coast vs. Regions

Each region along the Texas coast has unique characteristics that cause the landscape to change differently than the average trend of the coast. Figure 6-48 and Table 6-16 compare the percent change of each land cover class between the Texas coast and each region. With Region 1 being the most developed region along the coast, a greater percent loss of both developed and undeveloped dry land is predicted to occur by 2100. All regions are predicted to sustain a loss of freshwater wetlands. Region 2 is the only region that is predicted to endure a net loss of salt and brackish wetlands. Regions 3 and 4 are predicted to withstand greater gain in salt and brackish wetlands than the coastwide average, Region 4 especially. The lower rates of RSLR and erosion in these two regions, compared to the upper coast, allow the low marsh environments to keep pace with sea level rise as upland habitats become tidally influenced. The Texas coast is predicted to see an overall loss in beaches and tidal flats, except for the upper coast which sees a net gain in tidal flat habitats as saltwater marshes are eroded. Regions 1 and 2 contain a larger area of salt and brackish wetland habitats than the lower coast, and the lower coast contains a larger area of tidal flats than the upper coast. The large area of tidal flat habitats in region 4 that exist today are predicted to drown by 2100 which contributes to the largest percent gain of open water for any of the regions.

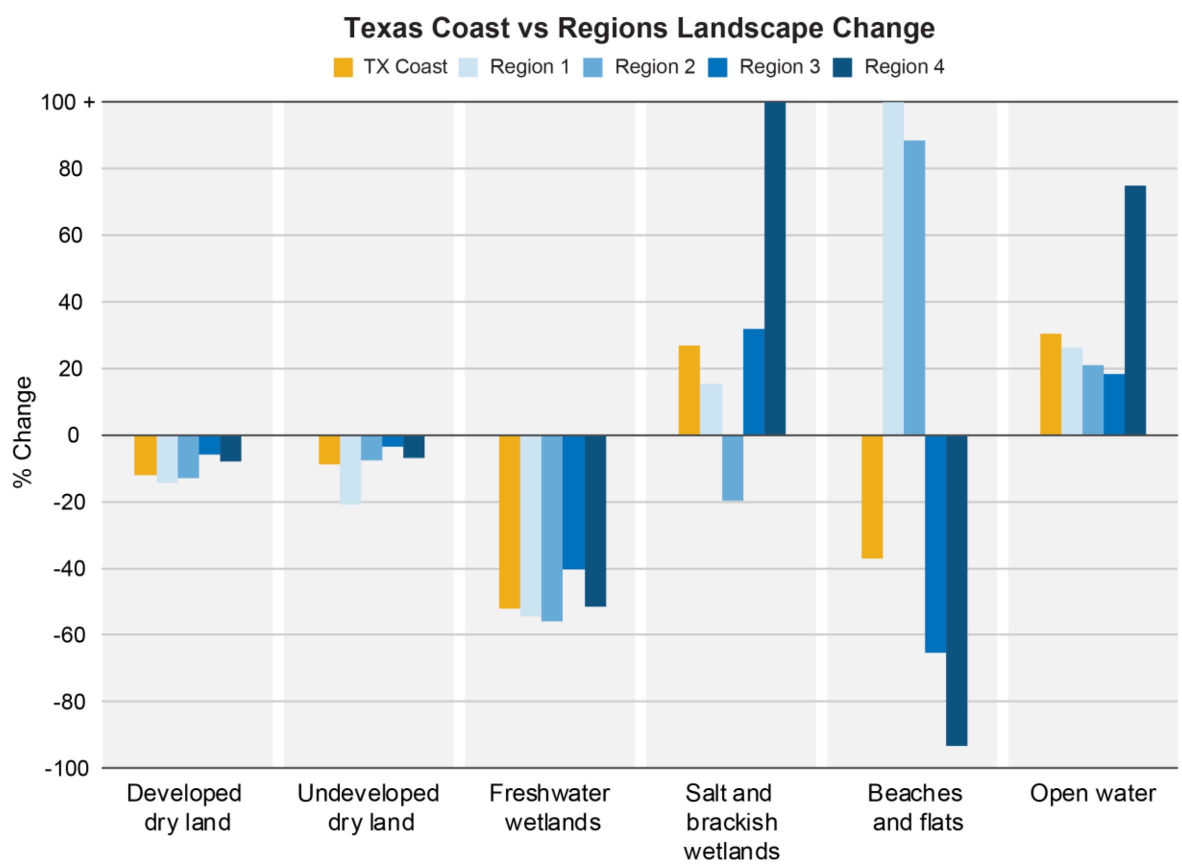

Figure 6-48. Graph showing the percent change of various land cover types from 2007 to 2100 for each region compared to the total change on the entire Texas coast.

Table 6-16: The percent change of various land cover types from 2007 to 2100 for each region compared to the total percent change on the entire Texas coast.

Land Cover Class	% Change				
	TX Coast	**Region 1**	**Region 2**	**Region 3**	**Region 4**
Developed dry land	-12.09	-14.42	-12.84	-5.79	-7.78
Undeveloped dry land	-8.84	-20.94	-7.50	-3.46	-6.58
Freshwater wetlands, non-tidal	-52.11	-54.50	-56.00	-40.40	-51.52
Salt & brackish wetlands, tidal	26.82	15.25	-19.70	31.76	415.07
Beaches & flats	-37.07	534.82	88.55	-65.27	-93.25
Open water	30.45	26.16	20.90	18.34	74.78

Regions

Region 1

Significant effects of sea level rise are predicted to impact Region 1, vastly changing the landscape by 2100. Figure 6-49 shows the present landscape of Region 1 and the model output of the future landscape in 2100, and Figure 6-50 shows change in each land cover class. Figure 6-51 and Figure 6-52 are maps of individual loss and gains of freshwater and saltwater marsh in Region 1. With one meter of sea level rise on top of varying subsidence/uplift rates within this region by 2100, there is a dramatic decrease in the amount of inland-fresh marshes and swamps. Slightly less than half of their initial area is predicted to remain by the year 2100, a combined 55% loss (Table 6-17). The model predicts these habitats will transition to transitional scrub-shrub wetlands, regularly flooded marsh or tidal flats. Most of the saltwater and brackish marshes in Region 1 are expected to be impacted by sea level rise. Their initial area is 312 square miles, and by 2100 only 23 square miles of their initial area remains. The lost low marsh area is converted to either tidal flat or open water. However, contingent upon the migration space being open, the salt and brackish marshes will migrate landwards, contributing to a net gain of 15% by 2100. Region 1 is predicted to see a substantial increase in tidal flat habitats, from 33 square miles to 209 square miles by 2100. This gain is attributed to the expansive area of salt and brackish marshes that are eroded into flats.

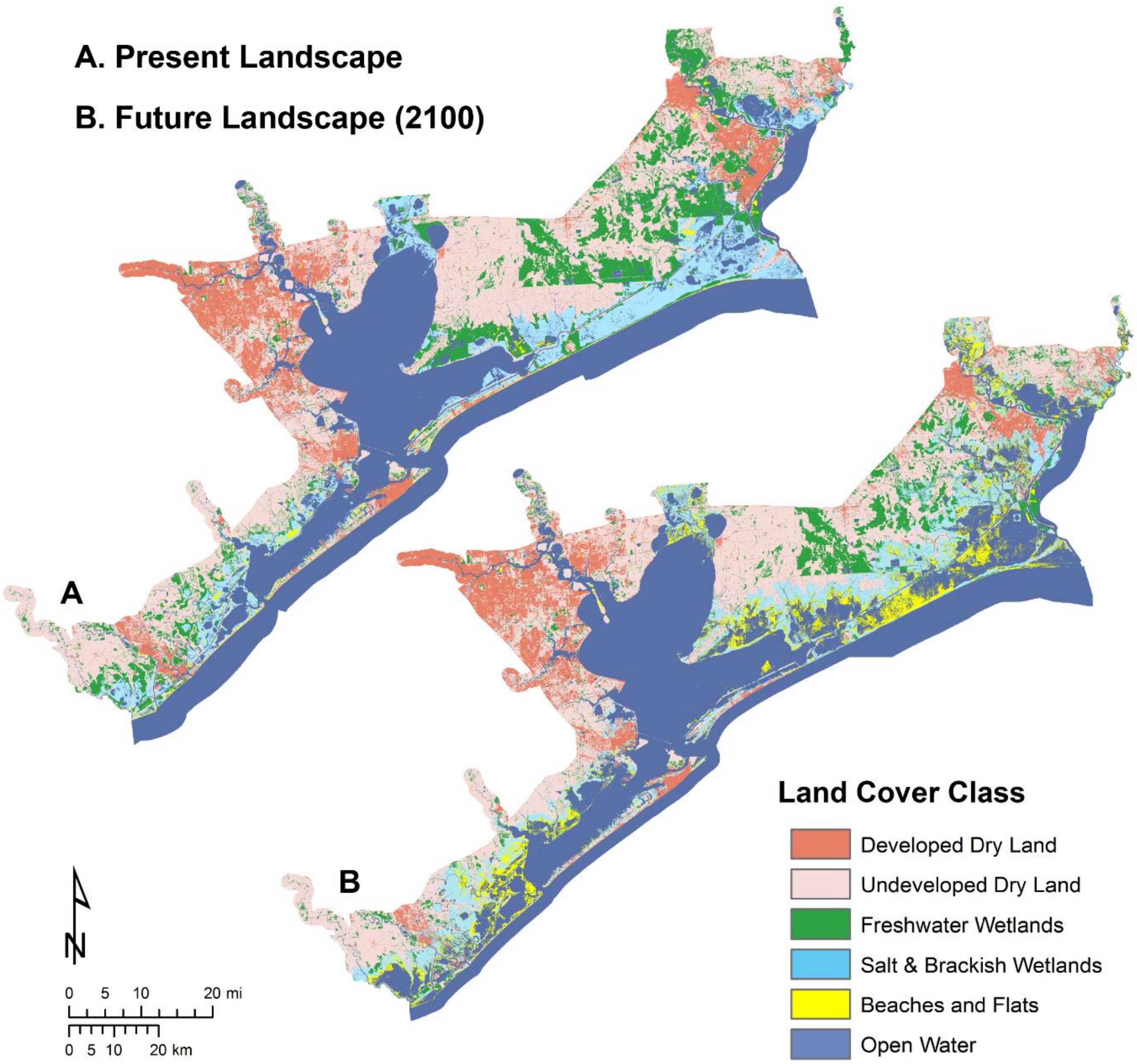

Figure 6-49: Map comparing the land cover distribution in Region 1 on A) the present landscape (2007) and B) the future landscape (2100).

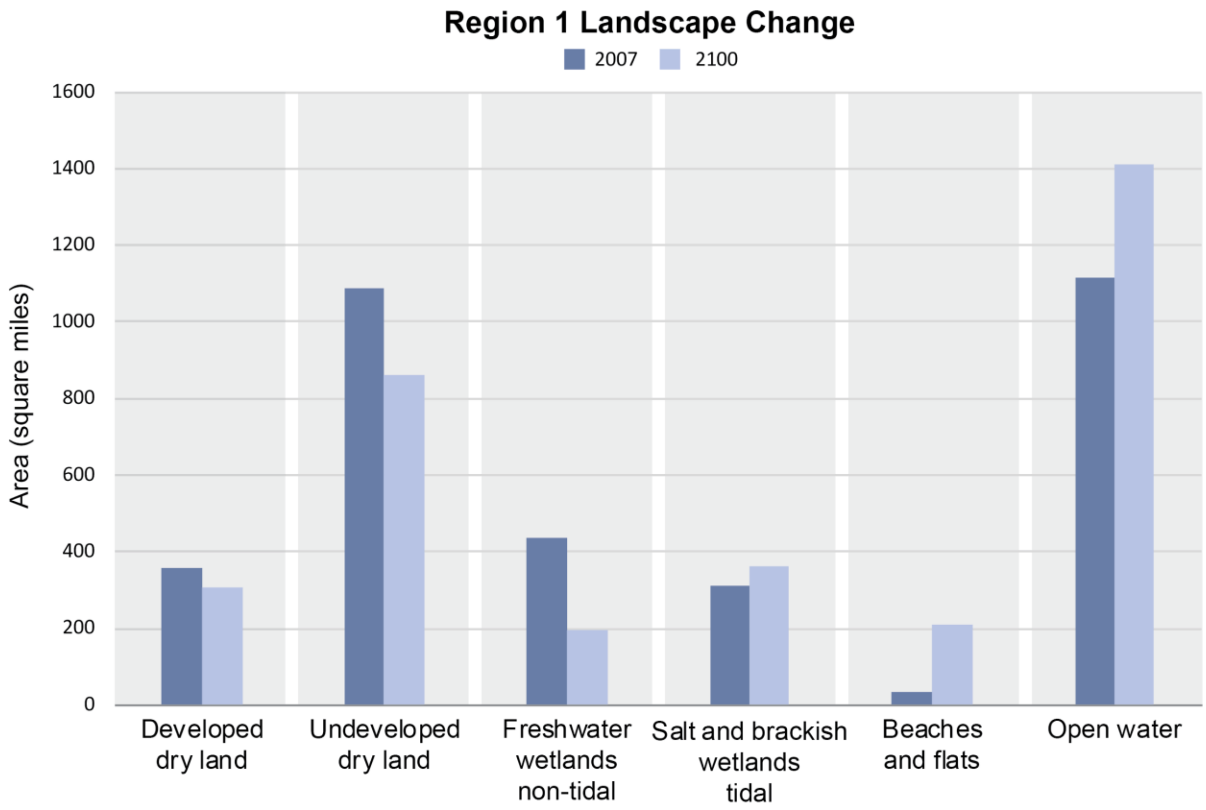

Figure 6-50: Graph comparing the land cover distribution in Region 1 on A) the present landscape (2007) and B) the future landscape (2100).

Table 6-17: The percent difference between land cover types in Region 1 in 2007 and 2100.

Land cover class	2007 (sq. miles)	2100 (sq. miles)	% Diff
Developed dry land	359.23	307.42	-14.42
Undeveloped dry land	1088.71	860.78	-20.94
Freshwater wetlands, non-tidal	433.71	197.34	-54.50
Salt & brackish emergent wetlands, tidal	312.06	359.65	15.25
Beaches and flats	32.99	209.43	534.82
Open water	1117.46	1409.79	26.16

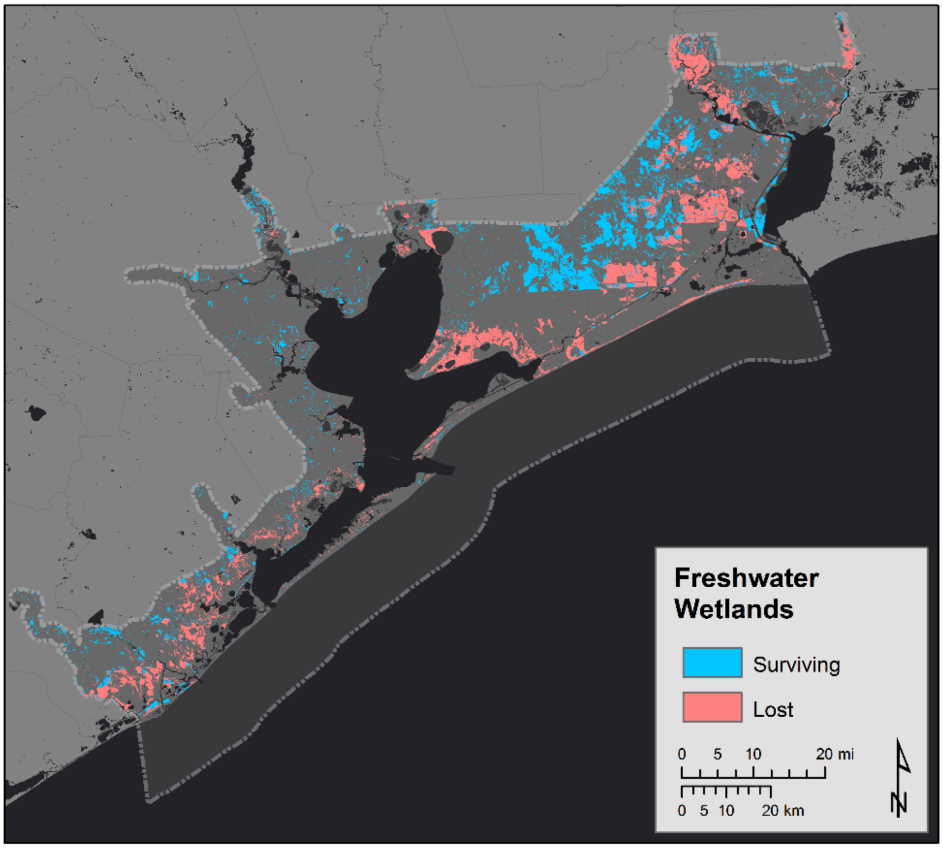

Figure 6-51: Map showing where freshwater wetlands that exist on the present landscape are modeled to either survive or be converted to another land cover type or open water by the year 2100.

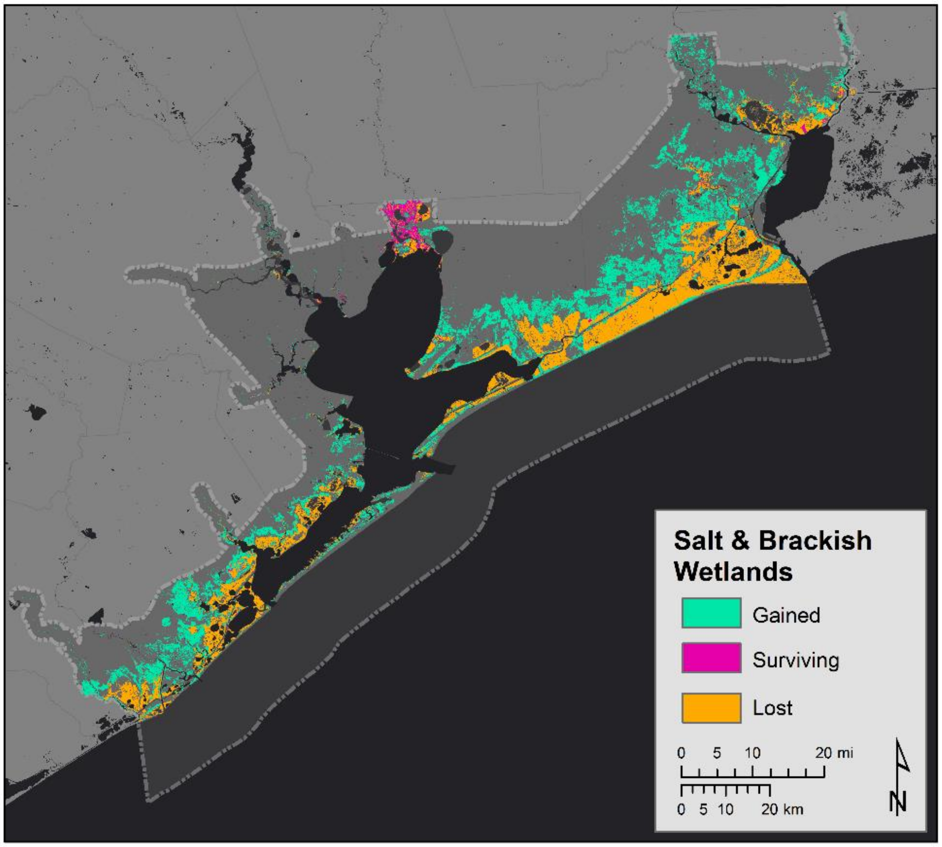

Figure 6-52: Map showing where salt and brackish wetlands that exist on the present landscape are modeled to either gain area, survive as is, or be converted to another land cover type or open water by the year 2100.

The area of open water is expected to increase 26% by the year 2100. This expansion of open water and loss of essential coastal habitats has the potential to increase the vulnerability of this region to future hazards such as storm surge and nuisance flooding. Figure 6-53 shows the relative vulnerability within this region. The map shows where land is converted to open water by 2100. Within each Q4, an average of 85 acres of land is lost to open water in Region 1. The areas most susceptible to land loss coincide with the areas experiencing the highest rates of subsidence. The marshes in these vulnerable areas are not vertically accreting at a pace fast enough to keep up with the rate of RSLR and are thus predicted to become submerged by 2100.

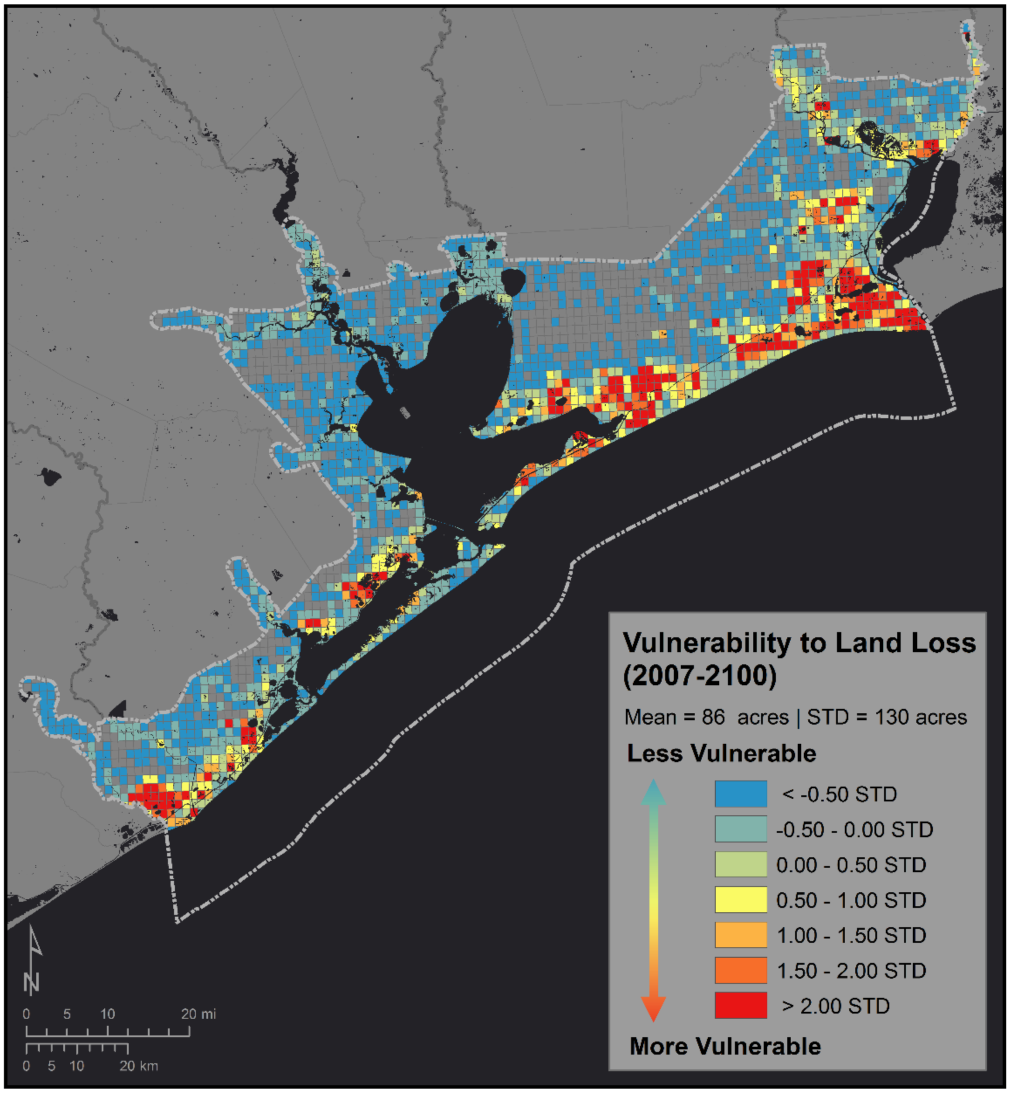

Figure 6-53: Map showing relative vulnerability to land loss in Region 1 where land loss means any type of land (excluding intertidal flats) that has converted to open water by the year 2100.

Low-lying coastal topography is highly susceptible to flooding and can become tidally influenced as sea level rises. The SLAMM model has the capability to either protect or unprotect all dry land (developed and undeveloped). Areas unprotected are allowed to convert to other habitat types in the simulations, allowing the wetlands to migrate inland. This study does not protect dry lands; therefore, they are subject to inundation and erosion processes. In addition to impacts on the natural environment, results show a significant amount of developed and undeveloped dry land in Region 1 is subject to inundation by 2100. A total of 60 square miles of developed land in Region 1 is projected to be impacted by sea level rise. Most of these inundated developed areas consist of low-lying coastal communities and critical infrastructure. Figure 6-54 shows a close up of the Neches River Delta where the landscape is predicted to change substantially by 2100. Most of the salt & brackish mashes within the Lower Neches Wildlife Management Area are expected to drown or erode to tidal flat habitats. Additionally, developed dry land in Port Neches and Port Arthur is capable of becoming inundated.

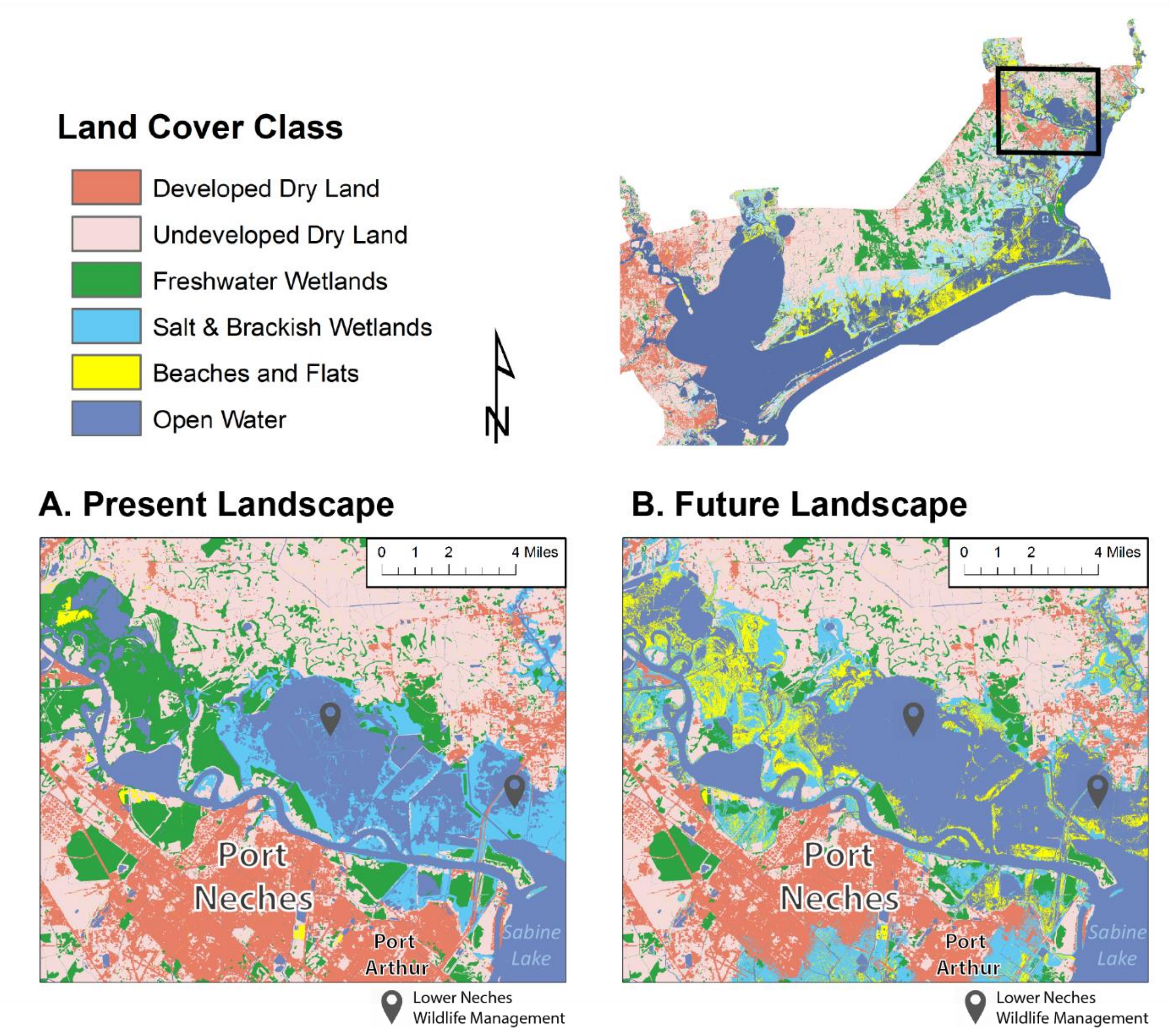

Figure 6-54: A close up of the Neches River Delta on the upper Texas coast in Region 1 where the landscape is predicted to change substantially by 2100. Large areas of freshwater wetlands are projected to become salt marshes or flats.

Figure 6-55 shows a close-up map of the landscape around West Bay. By 2100, the salt and brackish wetlands that fringe West Bay are predicted to erode to tidal flats. A substantial area of wetlands around Greens Lake are expected to drown and become open water. The developed and undeveloped dry land on the backside of Galveston Island is also vulnerable to being inundated by 2100.

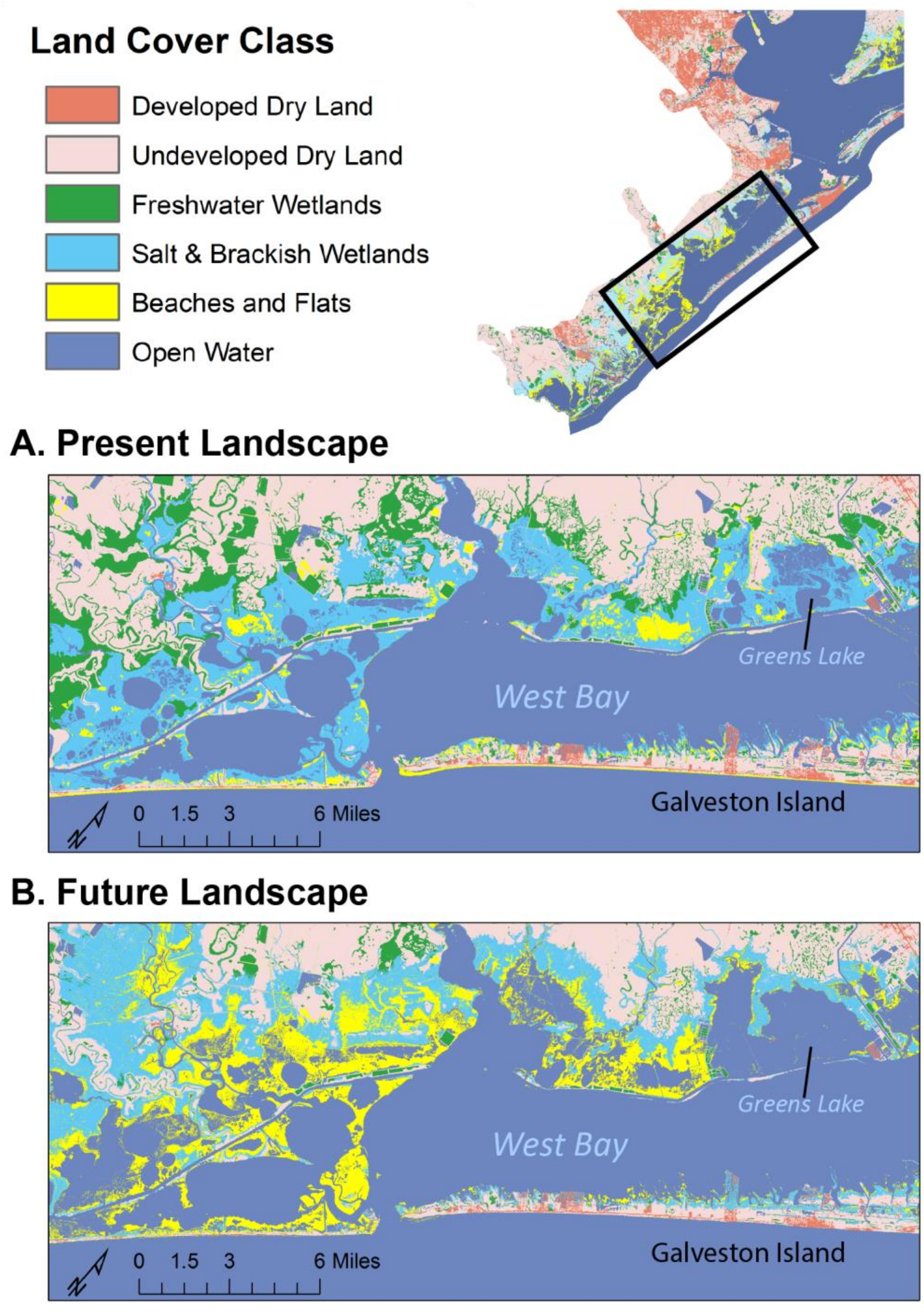

Figure 6-55: A close up map of the landscape around West Bay in Region 1. By 2100, the salt and brackish wetlands that fringe West Bay are predicted to erode to tidal flats.

Region 2

Significant effects of sea level rise are predicted to impact Region 2, vastly changing the landscape by 2100. Figure 6-56, Figure 6-57 and Table 6-18 show the present landscape of Region 2 and the model output of the future landscape in 2100. Figure 6-58 and Figure 6-59 show maps of individual loss and gains of freshwater and saltwater marsh habitats within Region 2. With 1.6 m of RSLR within this region by 2100, there is a dramatic decrease in the amount of inland-fresh marshes and swamps. Slightly less than half of their initial area is predicted to remain by the year 2100, a combined 56% loss (Table 6-18). The model predicts these habitats will transition to transitional scrub-shrub wetlands, regularly flooded marsh or tidal flats. Almost all of the saltwater and brackish marshes in Region 2 are expected to be impacted by sea level rise. The initial area today is 145 square miles, and by 2100 only 5 square miles of their initial area remains. The lost low marsh area is converted to either tidal flat or open water. The high RSLR rate along with relatively high erosion rates, cause most of the low marsh habitats in this region to drown and become open water. Contingent upon the migration space being open, the salt and brackish marshes will migrate landwards, gaining 111 sq. miles, however still resulting in a net loss of 20%. Region 2 is predicted to see a substantial increase in tidal flat habitats of 89%. This gain is mostly seen north east of East Matagorda Bay where salt and brackish wetlands are converted to tidal flats.

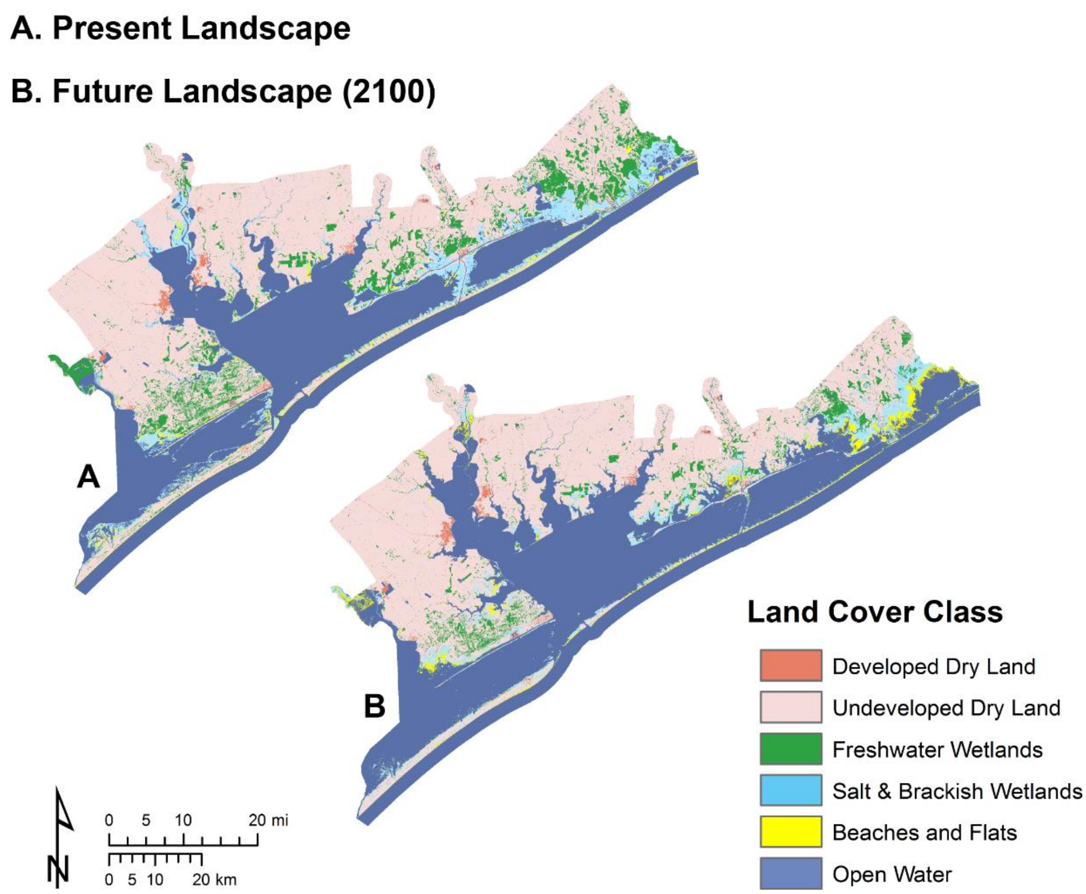

Figure 6-56: Maps comparing the land cover distribution in Region 2 on A) the present landscape (2007) and B) the future landscape (2100).

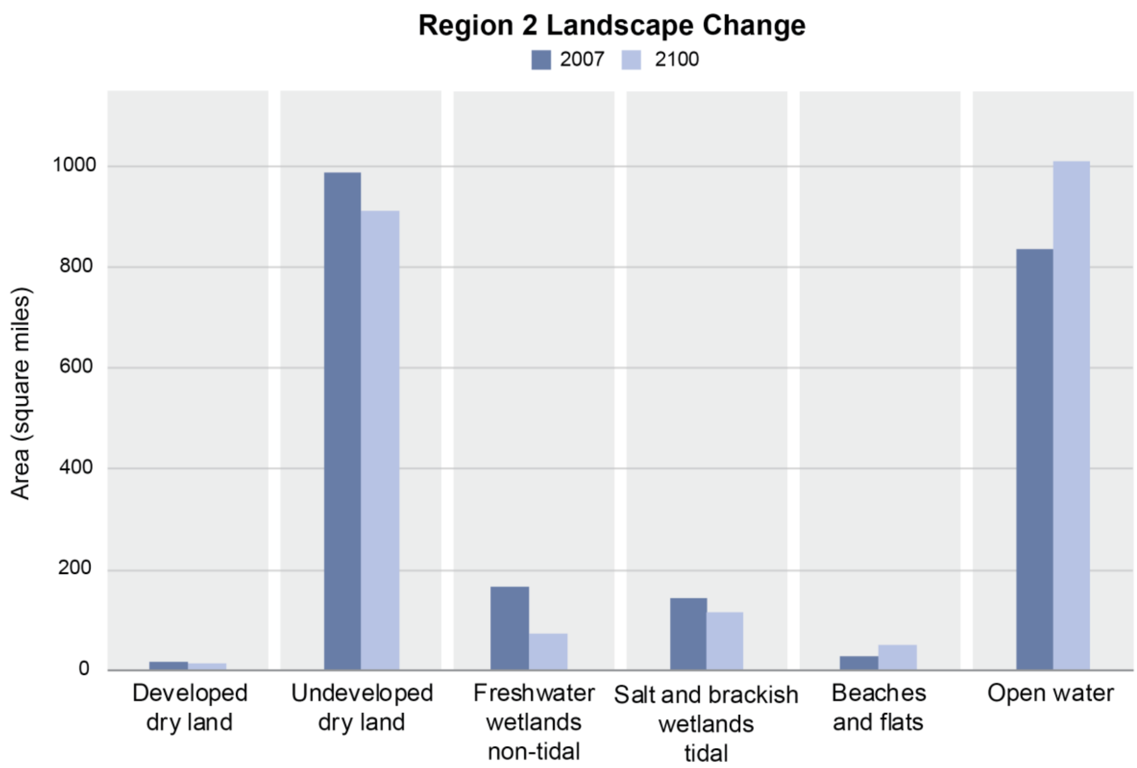

Figure 6-57: Graph comparing the land cover distribution in Region 2 on A) the present landscape (2007) and B) the future landscape (2100).

Table 6-18: The percent difference between land cover types in Region 2 in 2007 and 2100.

Land cover class	2007 (sq. miles)	2100 (sq. miles)	% Diff
Developed dry land	17.34	15.11	-12.84
Undeveloped dry land	985.62	911.74	-7.50
Freshwater wetlands, non-tidal	166.42	73.23	-56.00
Salt & brackish emergent wetlands, tidal	144.95	116.39	-19.70
Beaches and flats	29.28	52.65	88.55
Open water	834.96	1009.51	20.90

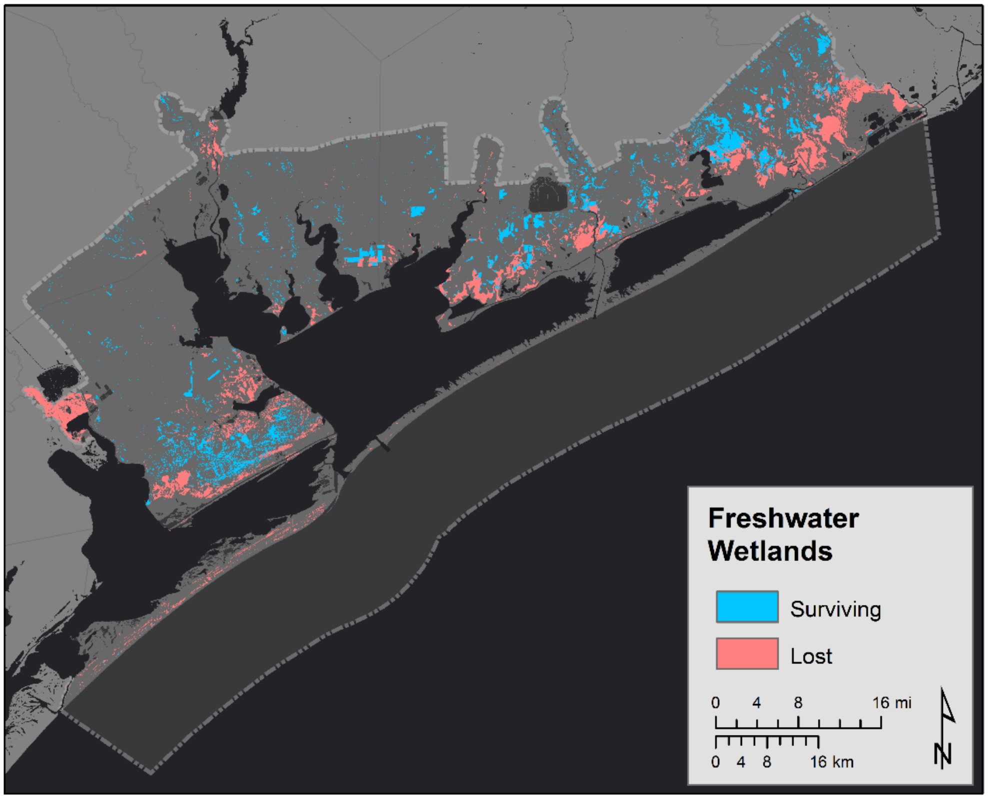

Figure 6-58: Map showing where freshwater wetlands that exist on the present landscape are modeled to either survive or be converted to another land cover type or open water by the year 2100.

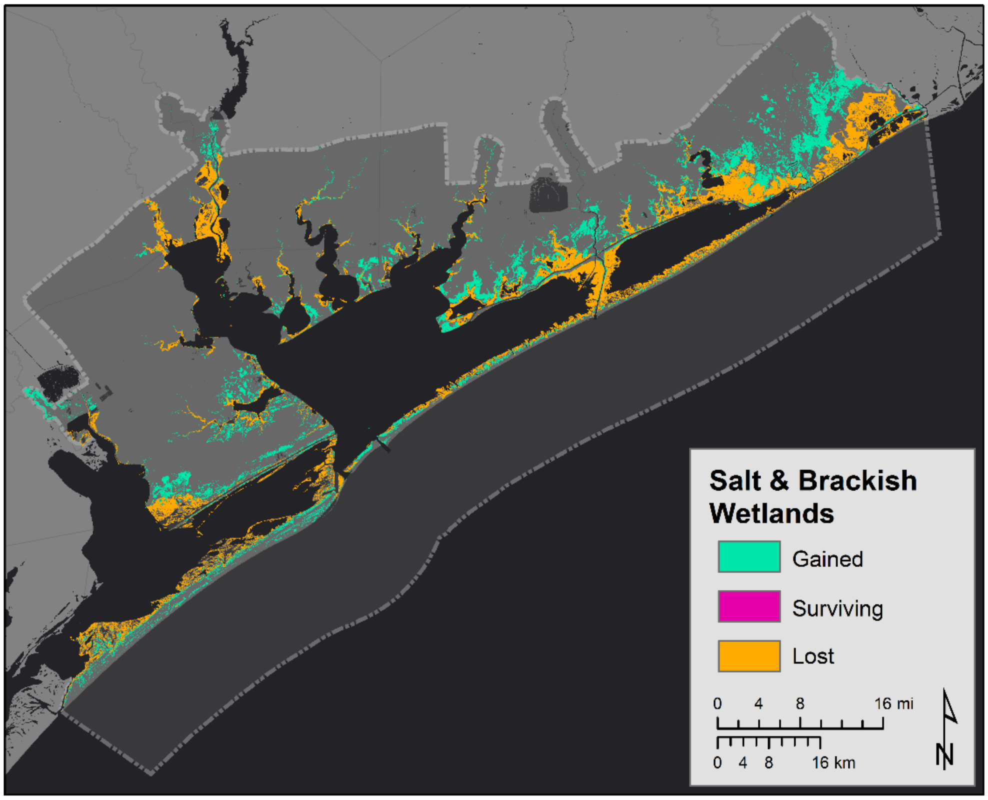

Figure 6-59: Map showing where salt and brackish wetlands that exist on the present landscape are modeled to either gain area, survive as is, or be converted to another land cover type or open water by the year 2100.

The area of open water in Region 2 is expected to increase 21% by the year 2100. This expansion of open water and loss of essential coastal habitats has the potential to increase the vulnerability of this region to future hazards such as storm surge and nuisance flooding. Figure 6-60 shows the relative vulnerability within this region. The map shows where land is converted to open water by 2100. Within each Q4, an average of 103 acres of land is lost to open water in Region 2. The most vulnerable areas are the salt and brackish water wetlands fringing the bays, indicating they are not accreting fast enough to keep pace with RSLR.

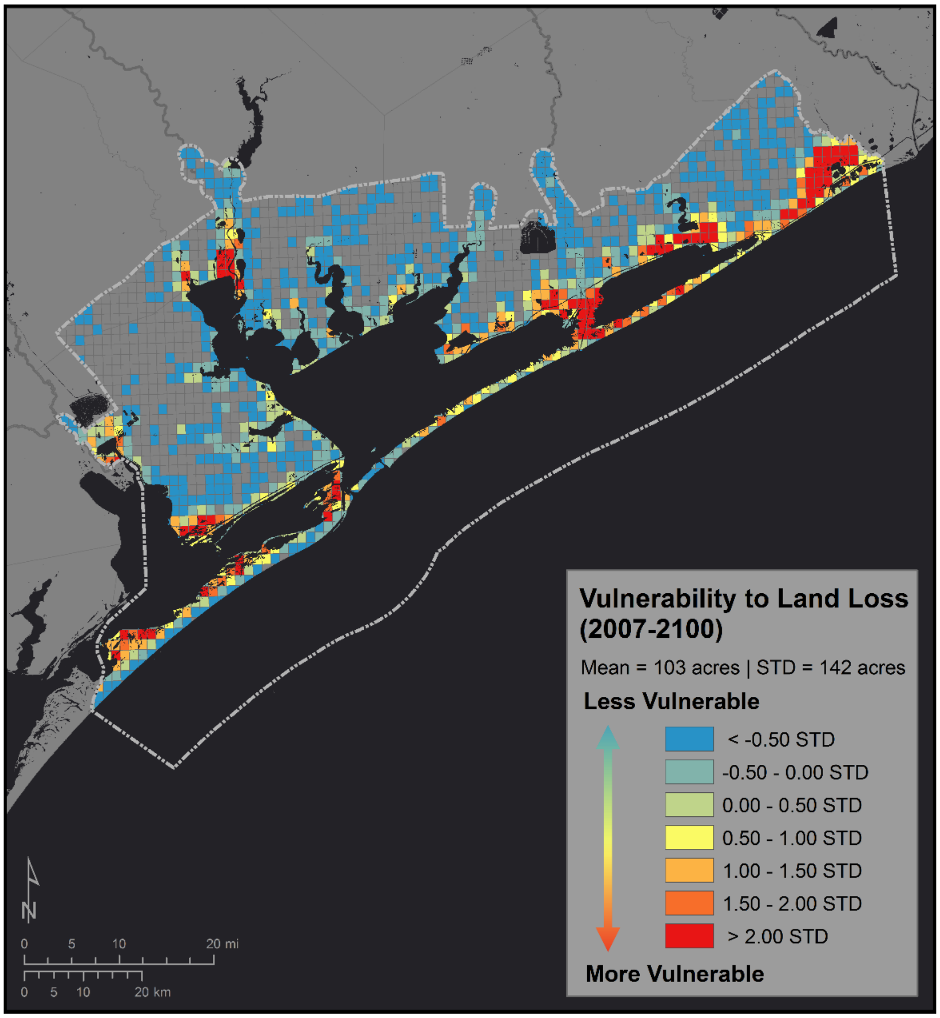

Figure 6-60: Map showing relative vulnerability to land loss in Region 2 where land loss means any type of land (excluding intertidal flats) that has converted to open water by the year 2100.

Figure 6-61 shows a close up of East Matagorda Bay where the surrounding landscape is predicted to change substantially by 2100. Almost all of the salt & brackish mashes on the backside of Matagorda Peninsula and Matagorda Island are expected to drown. The marshes along the Colorado River Entrance are also projected to disappear. The Big Boggy National Wildlife Refuge and the Mad Island Wildlife Management Area face similar fates.

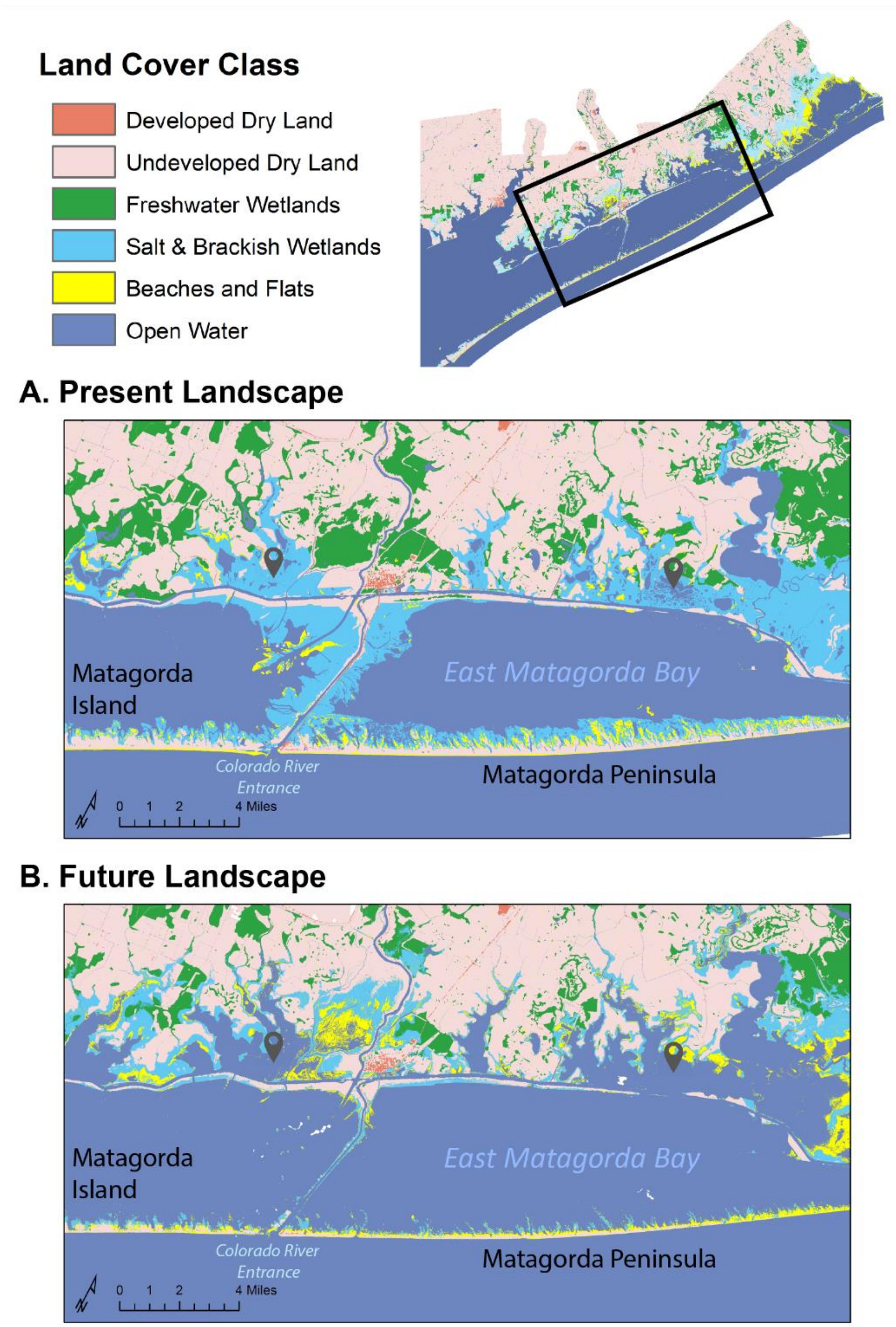

Figure 6-61: A close up of East Matagorda Bay in Region 2 where the surrounding landscape is predicted to change substantially by 2100. Almost all of the salt & brackish mashes on the backside of Matagorda Peninsula and Matagorda Island are expected to be lost to open water. The left location icon in the map is the Mad Island WMA, and the right location icon is the Big Boggy NWR.

Region 3

Significant effects of sea level rise are predicted to impact Region 3, vastly changing the landscape by 2100. Figure 6-62 and Figure 6-63 and Table 16 show the present landscape of Region 3 and the model output of the future landscape in 2100. Figure 6-64 and Figure 6-65 show maps of individual loss and gains of freshwater and saltwater marsh habitats within Region 3. With variable RSLR between 1.45-1.60 m within this region by 2100, there is a dramatic decrease in the amount of inland-fresh marshes and swamps. Slightly more than half of their initial area is predicted to remain by the year 2100, a combined 40% loss (Table 6-19). The model predicts these habitats will transition to transitional scrub-shrub wetlands, regularly flooded marsh or tidal flats. Almost all of the saltwater and brackish marshes in Region 3 are expected to be impacted by sea level rise. The initial area today is 70 square miles, and by 2100 only 2 square miles of their initial area remains. The lost low marsh area is converted to either tidal flat or open water. However, contingent upon the migration space being open, the salt and brackish marshes will migrate landwards, contributing to a net gain of 32% by 2100. Region 3 is predicted to see a significant decrease in tidal flat habitats of 65%. This loss is mostly seen in the arms of Baffin Bay and on the backside of the barrier islands.

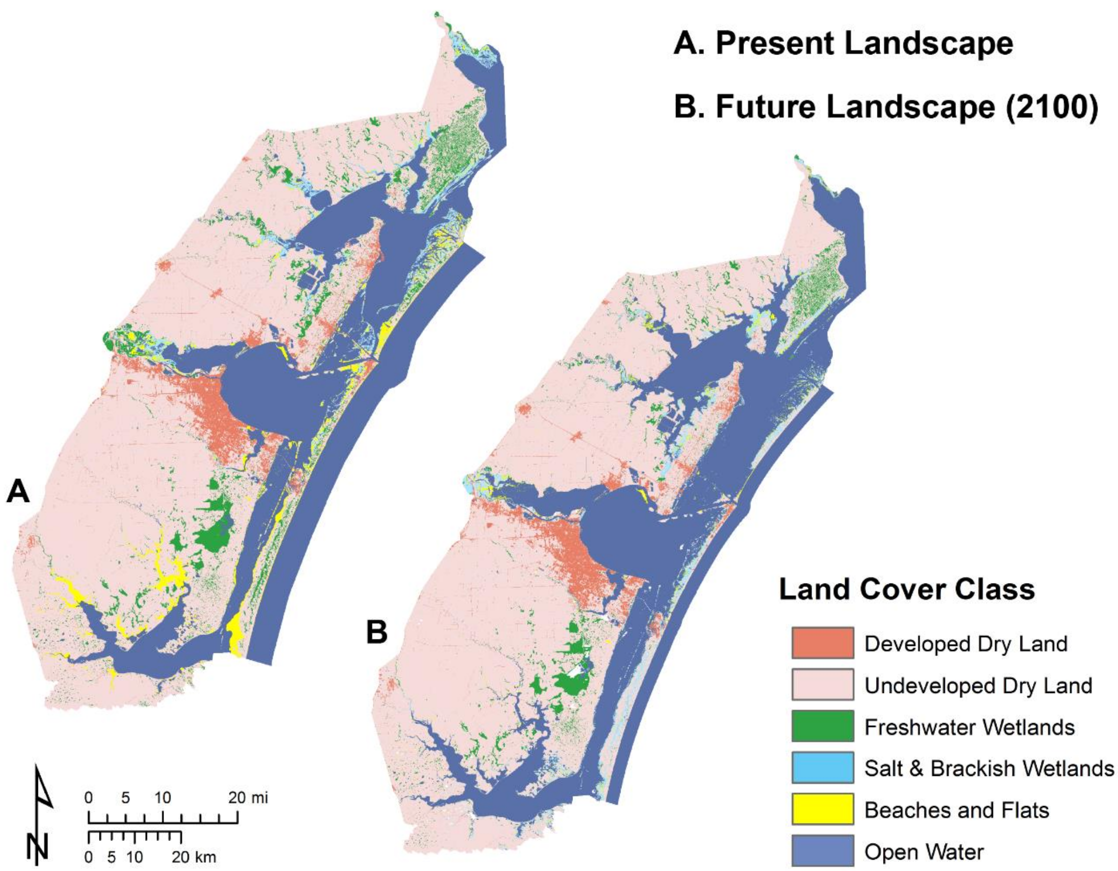

Figure 6-62: Map comparing the land cover distribution in Region 3 on A) the present landscape (2007) and B) the future landscape (2100).

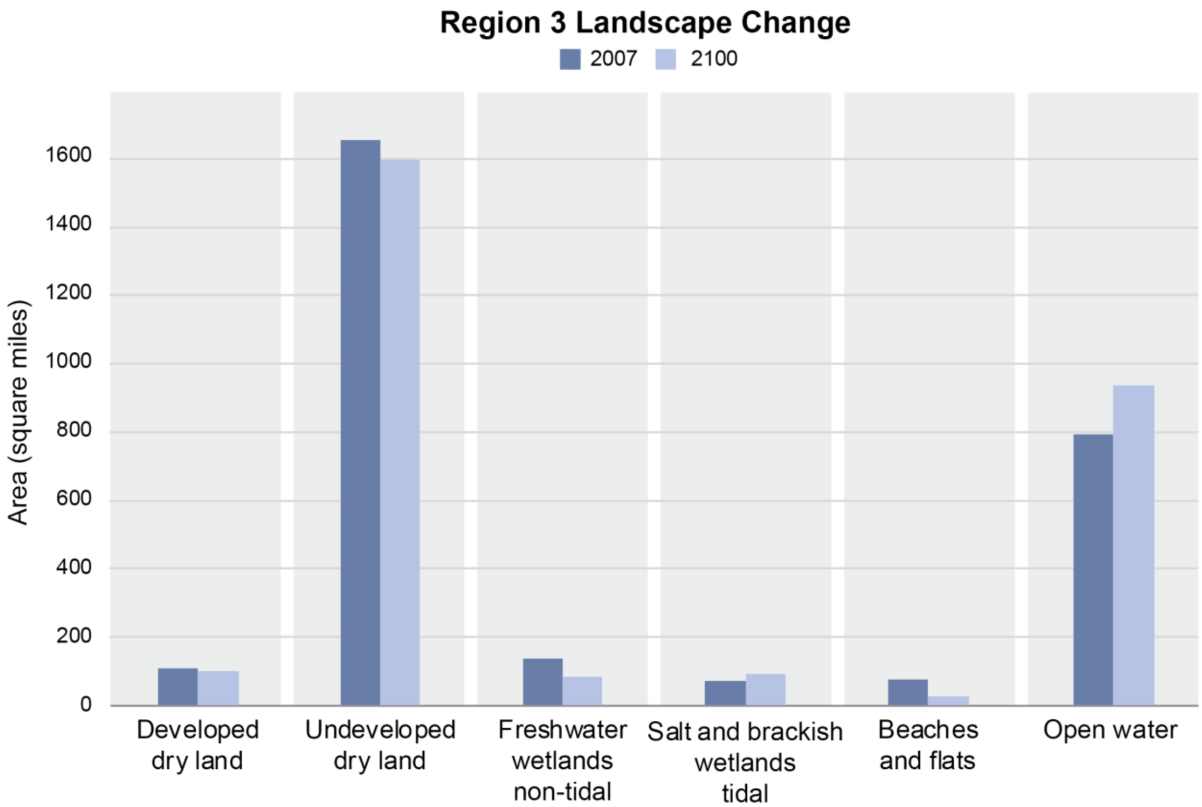

Figure 6-63: Graph comparing the land cover distribution in Region 3 on A) the present landscape (2007) and B) the future landscape (2100).

Table 6-19: The percent difference between land cover types in Region 1 in 2007 and 2100.

Land cover class	2007 (sq. miles)	2100 (sq. miles)	% Diff
Developed dry land	107.89	101.64	-5.79
Undeveloped dry land	1653.04	1595.89	-3.46
Freshwater wetlands, non-tidal	138.21	82.38	-40.40
Salt & brackish emergent wetlands, tidal	70.23	92.53	31.76
Beaches and flats	73.99	25.70	-65.27
Open water	791.66	936.88	18.34

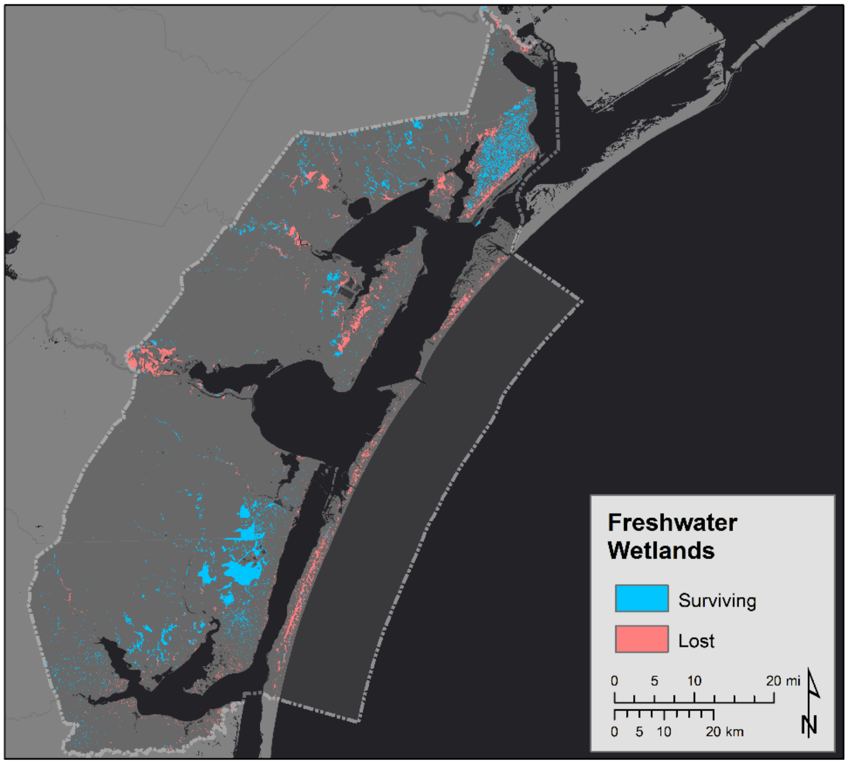

Figure 6-64: Map showing where freshwater wetlands that exist on the present landscape are modeled to either survive or be converted to another land cover type or open water by the year 2100.

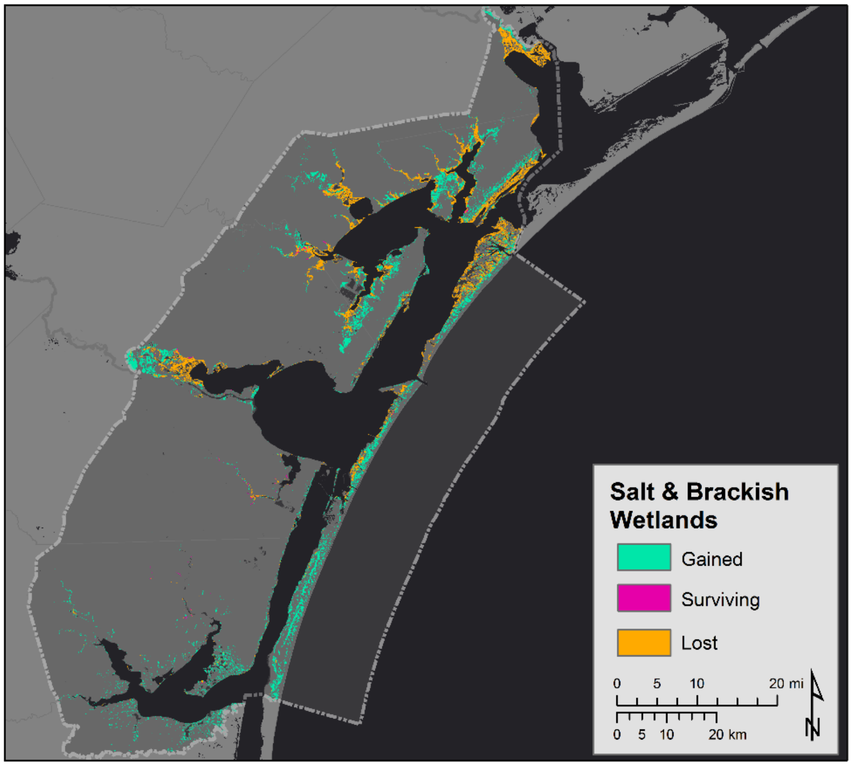

Figure 6-65: Map showing where salt and brackish wetlands that exist on the present landscape are modeled to either gain area, survive as is, or be converted to another land cover type or open water by the year 2100.

The area of open water in Region 3 is expected to increase 19% by the year 2100. This expansion of open water and loss of essential coastal habitats has the potential to increase the vulnerability of this region to future hazards such as storm surge and nuisance flooding. Figure 6-66 shows the relative vulnerability within this region. The map shows where land is converted to open water by 2100. Within each Q4, an average of 101 acres of land is lost to open water in Region 3. The areas most susceptible to land loss are the marshes on the backside of the barrier islands, especially San Jose Island, and around the bay head deltas. Like the other regions, this indicates RSLR is outpacing the vertical accretion rate of the salt and brackish water wetlands.

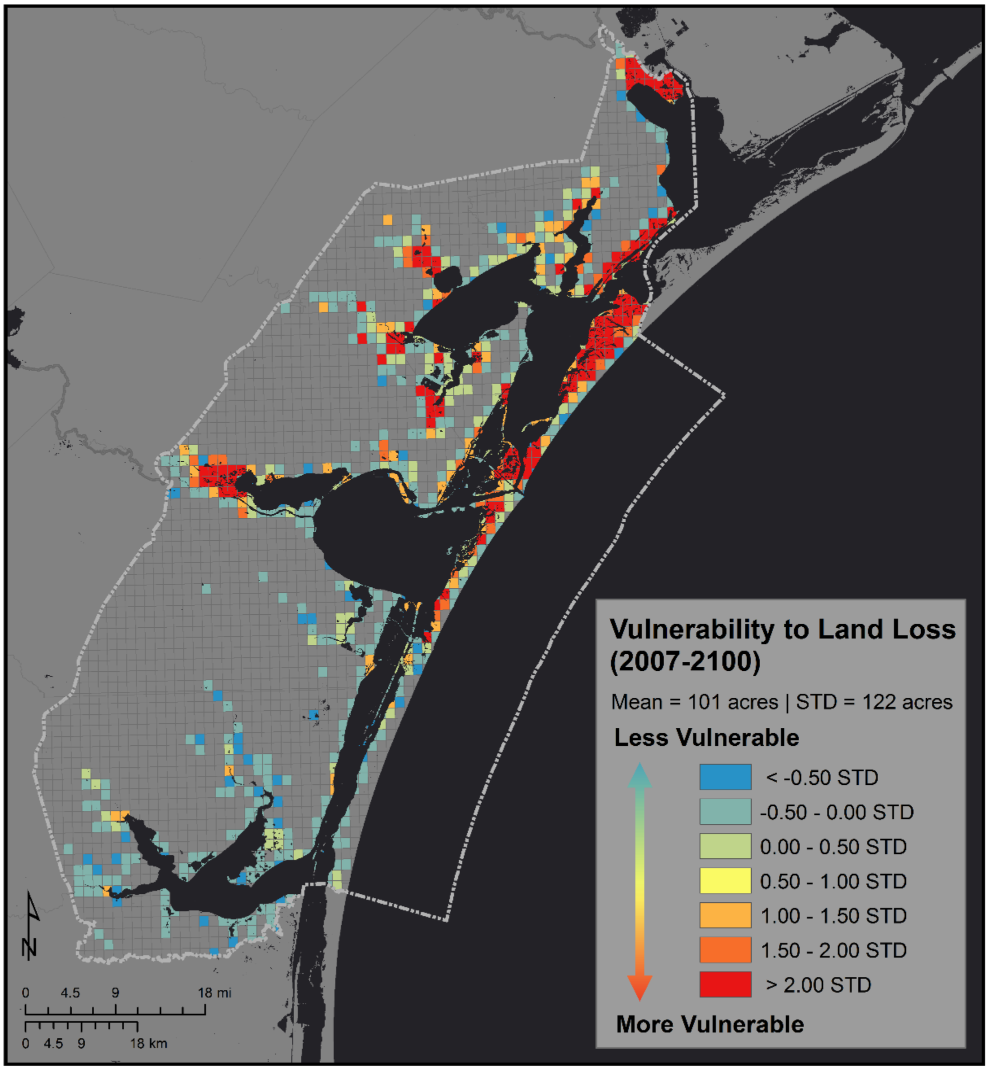

Figure 6-66: Map showing relative vulnerability to land loss in Region 3 where land loss means any type of land (excluding intertidal flats) that has converted to open water by the year 2100.

Figure 6-67 shows a close up of the wetlands around Cedar Bayou on the backside of San Jose and Matagorda Islands. The important nursery ground and storm surge buffer is at critical risk of inundation from RSLR.

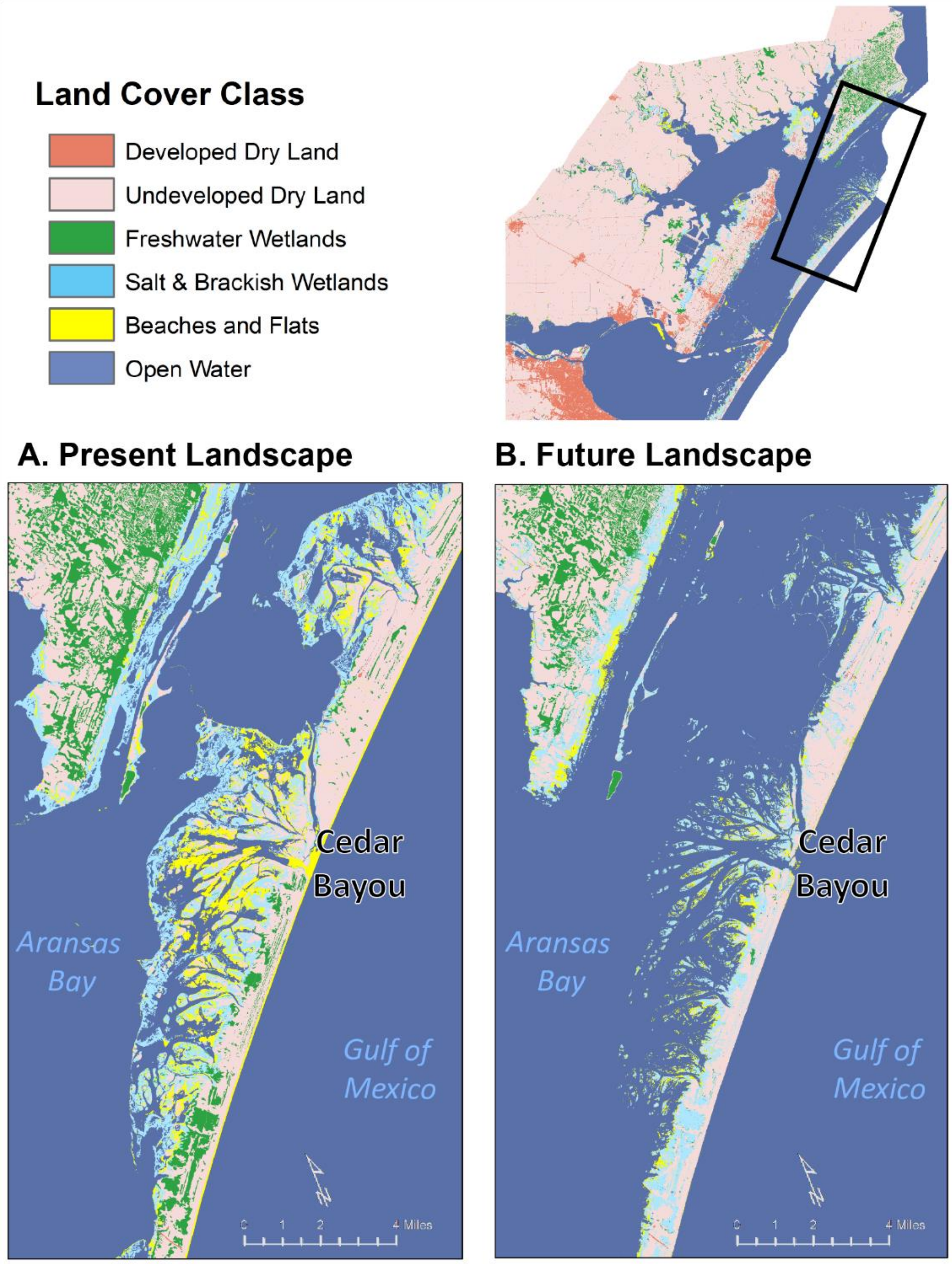

Figure 6-67: A close up of the wetlands around Cedar Bayou on the backside of San Jose and Matagorda Islands showing a substantial loss of wetlands by the year 2100.

Region 4

Significant effects of sea level rise are predicted to impact Region 4, vastly changing the landscape by 2100. Figure 6-68, Figure 6-69 and Table 6-20 show the present landscape of Region 4 and the model output of the future landscape in 2100. Figure 6-70 and Figure 6-71 show maps of individual loss and gains of freshwater and saltwater marsh habitats within Region 4. With variable RSLR between 1.37-1.43 m within this region by 2100, there is a dramatic decrease in the amount of inland-fresh marshes and swamps. Slightly less than half of their initial area is predicted to remain by the year 2100, a combined 52% loss (Table 6-20). The model predicts these habitats will transition to transitional scrub-shrub wetlands, regularly flooded marsh or tidal flats. Almost all of the saltwater and brackish marshes in Region 4 are expected to be impacted by sea level rise. The initial area today is 26 square miles, and by 2100 only 3 square miles of their initial area remains. The lost low marsh area is converted to either tidal flat or open water. However, contingent upon the migration space being open, the salt and brackish marshes will migrate landwards at the expense of freshwater habitats, gaining 130 sq. miles by 2100. Region 4 is predicted to see almost a complete loss in tidal flat habitats of 93%.

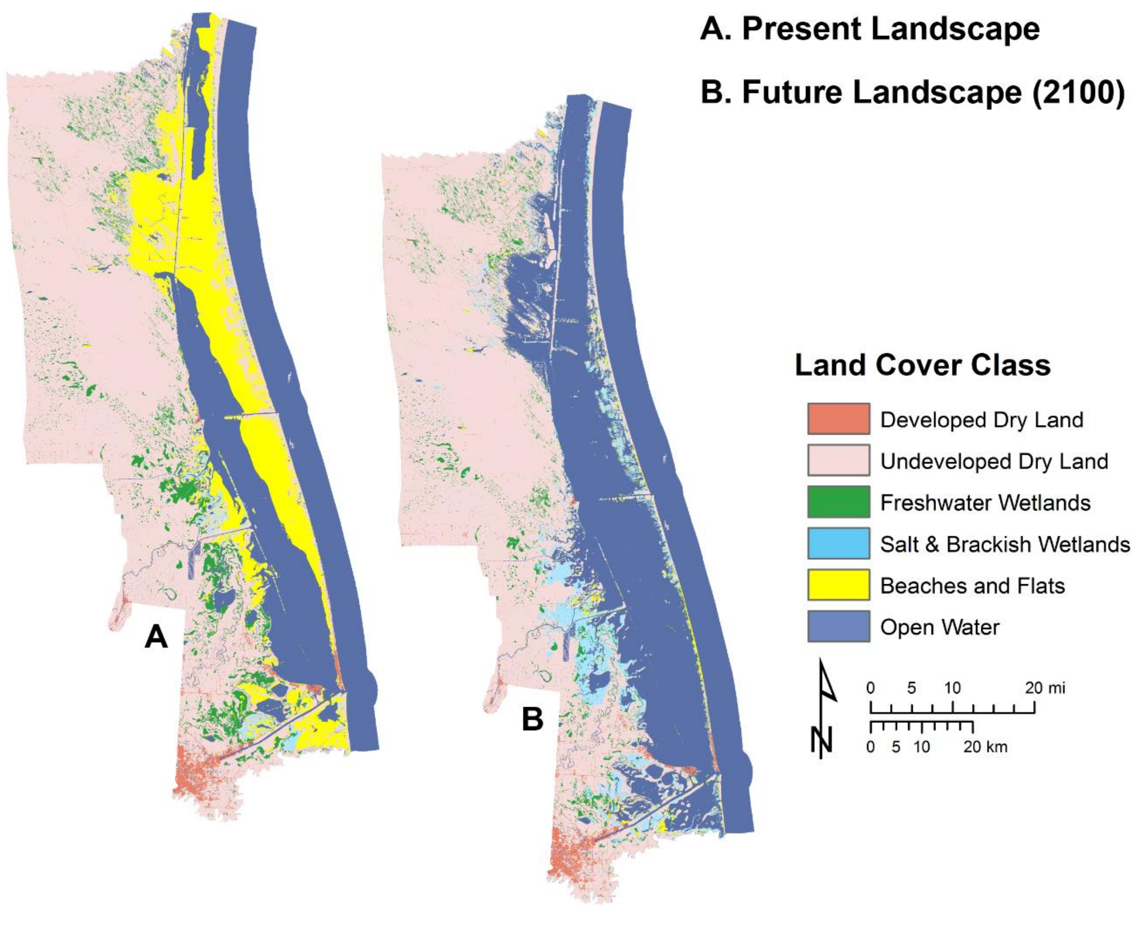

Figure 6-68: Map comparing the land cover distribution in Region 4 on A) the present landscape (2007) and B) the future landscape (2100).

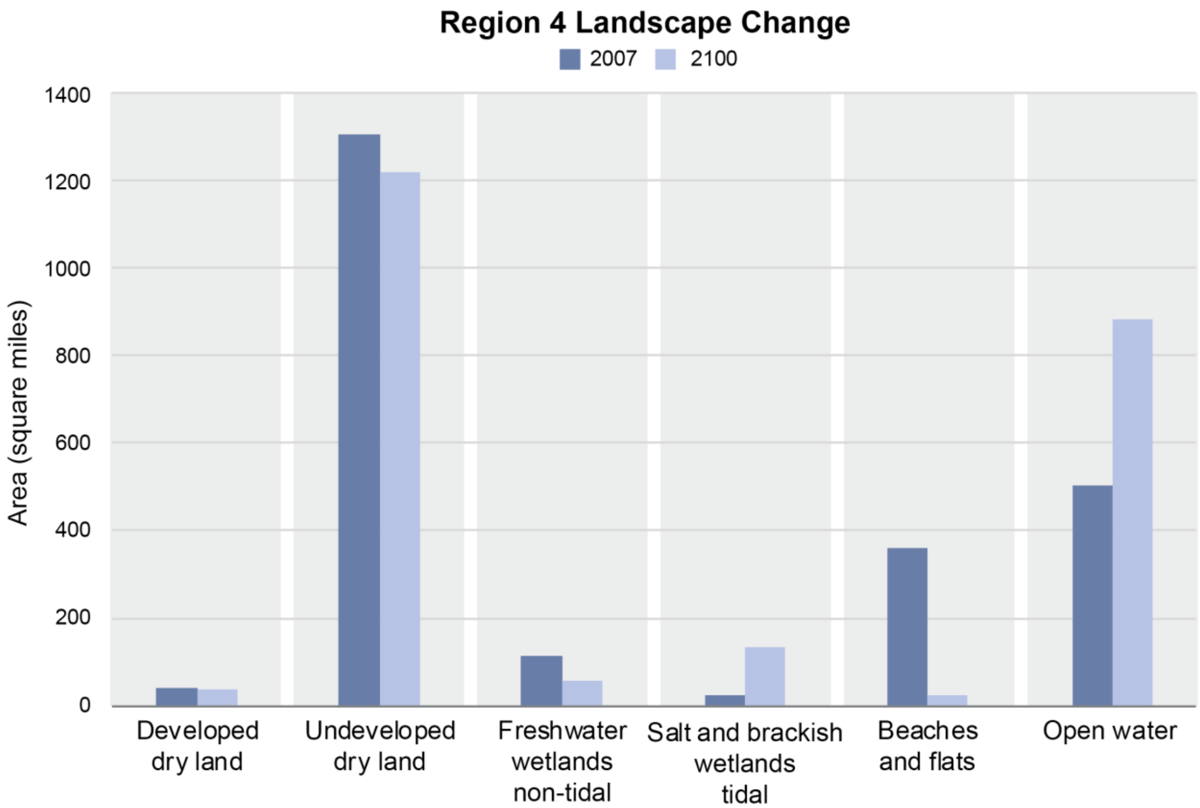

Figure 6-69: Graph comparing the land cover distribution in Region 4 on A) the present landscape (2007) and B) the future landscape (2100).

Table 6-20: The percent difference between land cover types in Region 1 in 2007 and 2100.

Land cover class	2007 (sq. miles)	2100 (sq. miles)	% Diff
Developed dry land	39.41	36.35	-7.78
Undeveloped dry land	1305.08	1219.24	-6.58
Freshwater wetlands, non-tidal	115.23	55.87	-51.52
Salt & brackish emergent wetlands, tidal	25.77	132.72	415.07
Beaches and flats	359.61	24.28	-93.25
Open water	503.79	880.52	74.78

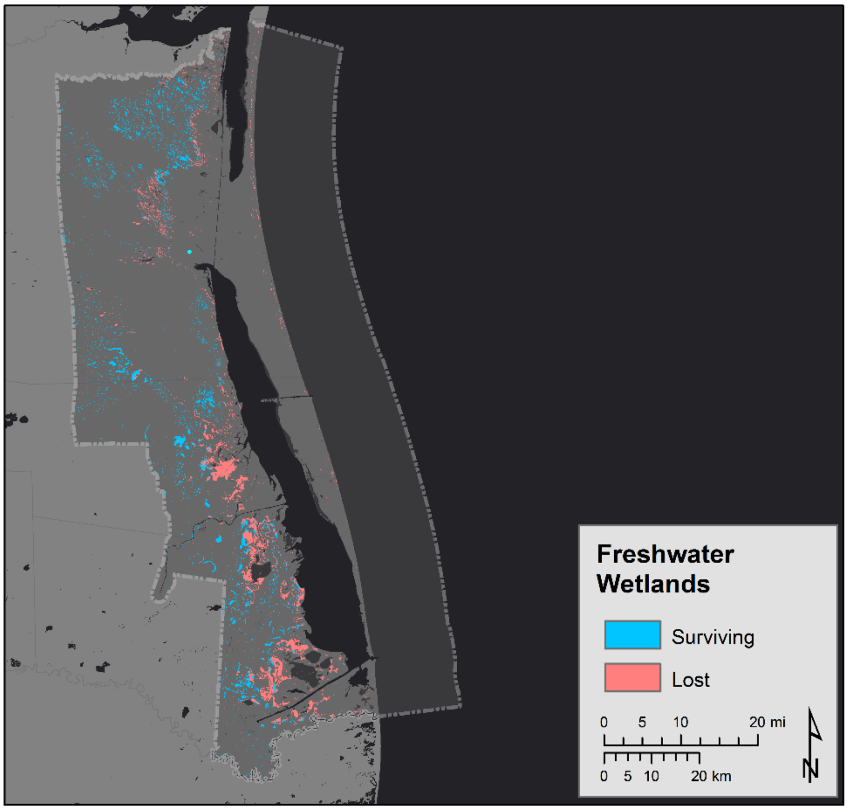

Figure 6-70: Map showing where freshwater wetlands that exist on the present landscape are modeled to either survive or be converted to another land cover type or open water by the year 2100.

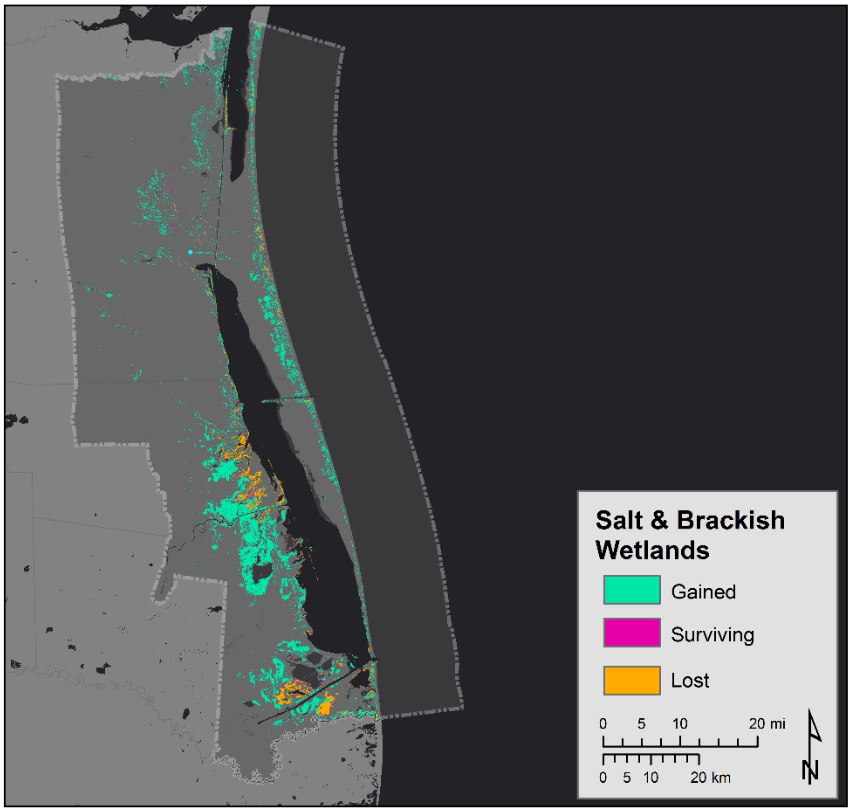

Figure 6-71: Map showing where salt and brackish wetlands that exist on the present landscape are modeled to either gain area, survive as is, or be converted to another land cover type or open water by the year 2100.

The area of open water is expected to increase significantly, 75% by the year 2100. This expansion of open water and loss of essential coastal habitats has the potential to increase the vulnerability of this region to future hazards such as storm surge and nuisance flooding. Figure 6-72 shows the relative vulnerability within this region. The map shows where land is converted to open water by 2100. Within each Q4, an average of 95 acres of land is lost to open water in Region 4. The backside of South Padre Island and the Laguna Atascosa National Wildlife Refuge are both highly susceptible to land loss driven by RSLR. The loss of the barrier island and the habitats in the refuge could greatly impact the communities and wildlife in the region.

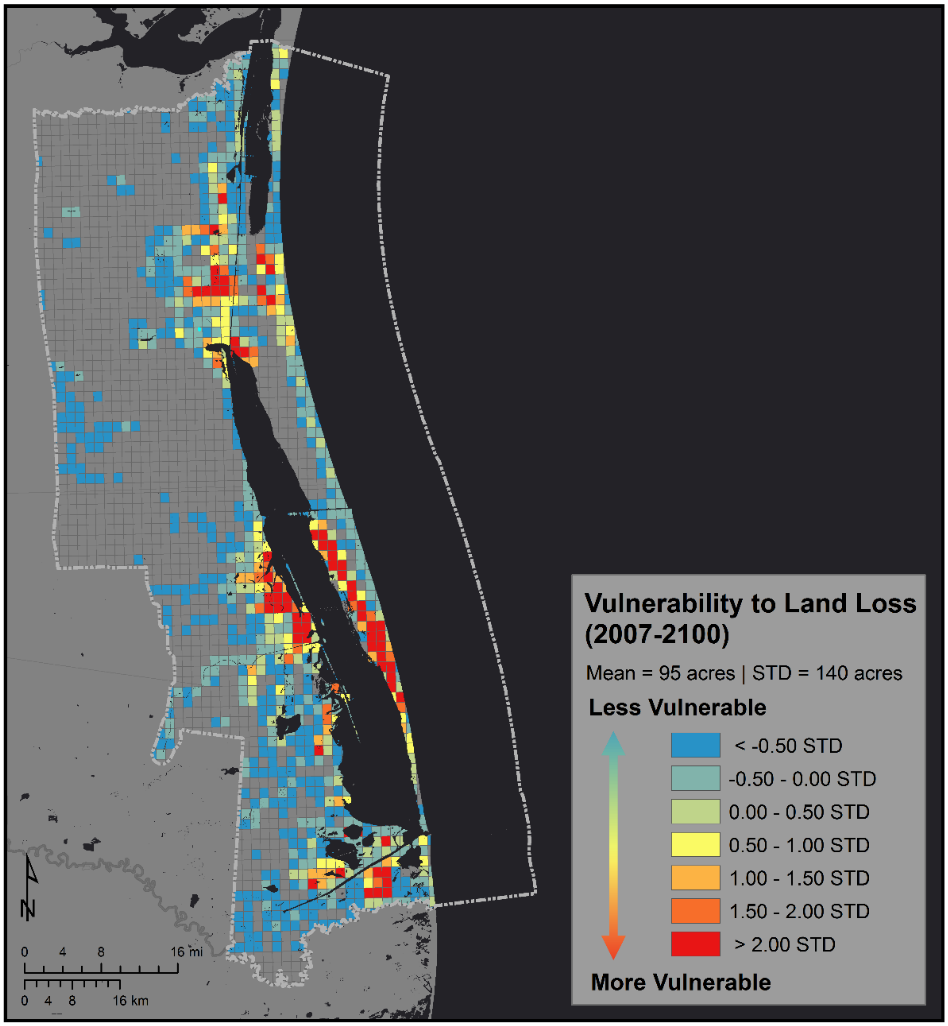

Figure 6-72: Map showing relative vulnerability to land loss in Region 4 where land loss means any type of land (excluding intertidal flats) that has converted to open water by the year 2100.

Figure 6-73 shows a close up of the southern end of Region 4 where the landscape is predicted to change substantially by 2100. Almost all of the beach and tidal flat habitats on the backside of South Padre Island, and around Bahia Grande and South Bay are expected to drown, and the fresh marshes will become tidally influenced. The developed dry land on the backside of South Padre Island is also capable of becoming inundated by the rising seas.

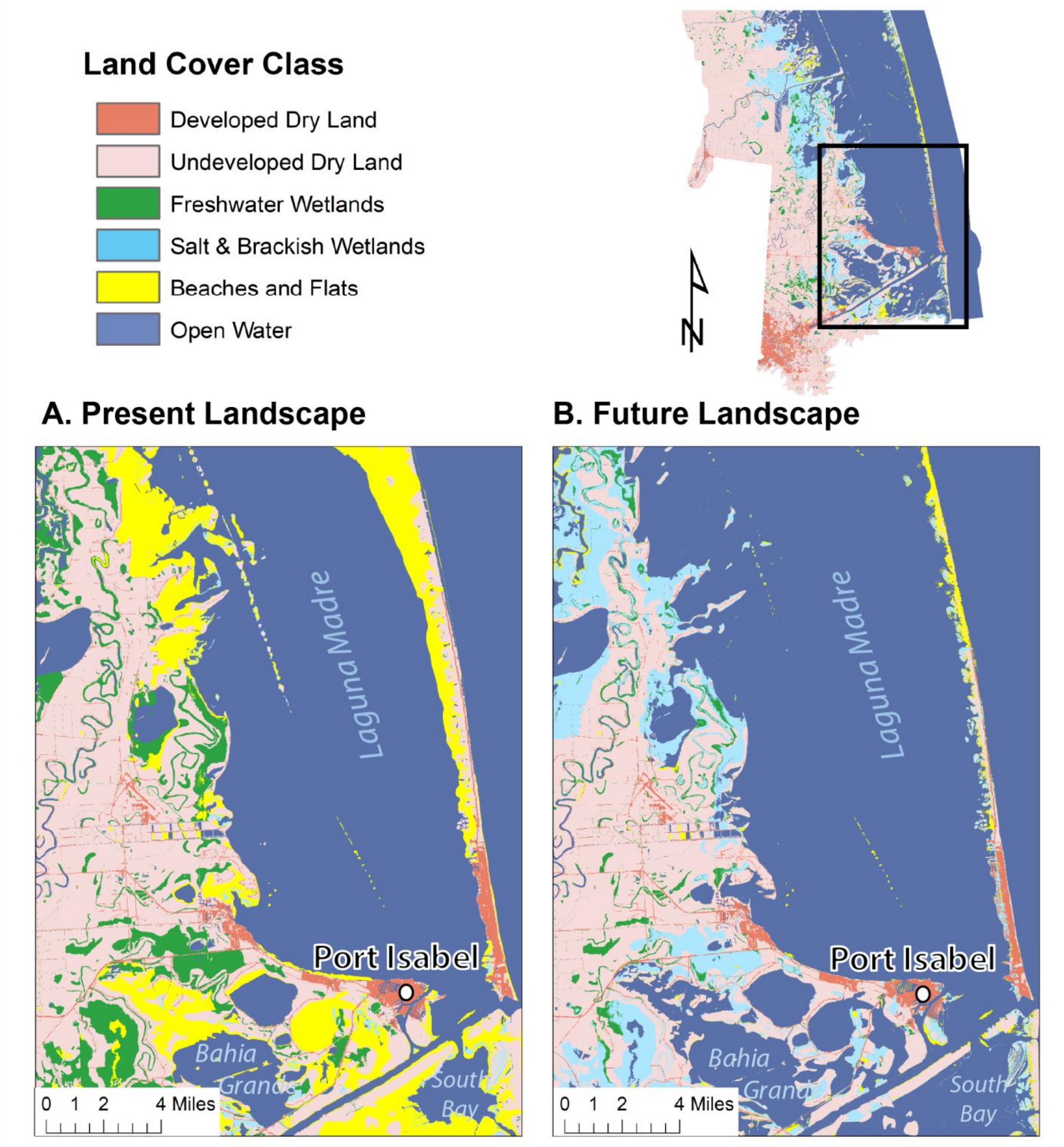

Figure 6-73: A close up of the southern end of Region 4 where the landscape is predicted to change substantially by 2100. Almost all of the tidal flat habitats on the backside of South Padre Island, and around Bahia Grande and South Bay are expected to be lost.

Storm Surge Modeling

The simulated maximum surge depth and maximum inundation extent due to six synthetic storms for the present landscape and future landscape are shown in the following subsections. The maximum surge depth was calculated by subtracting the ground elevation value from the MAXELE value. The MAXELE, also known as maximum envelope of water (MEOW), is the maximum storm surge elevation computed at any point during the hurricane and provides information about the maximum inundation patterns. Whereas, the maximum inundation extent maps show the increased extent of maximum surge in the future landscape in comparison to the present landscape. In order to quantify the amount of flooding due to storm surge, the total inundated land area in each region where the storm has made landfall was computed.

The higher storm surge impact was observed on the right side (east) of the storm track in both the current and future landscape which was due to the counterclockwise direction of the circulating winds during the hurricane as well as the stronger winds passing on the right side (east) of the storm track. A maximum storm surge elevation of 5-6 m was seen due to Storm 154 (Figure 6-80) and Storm 146 (Figure 6-82) under the present landscape. However, the maximum storm surge elevation of 4-5 m is generally seen in all other storms.

Under future conditions, the locations of maximum storm surge elevation followed similar trends as seen in the present conditions. There was almost a meter increase in maximum storm surge offshore that was exactly equal to the sea level rise value used to model future condition. It could be due to relatively deep water and low bottom friction offshore. The increase in surge throughout the region was generally on the order of 1-3 m as seen in the maximum inundation extent maps. The linear response of sea level rise on storm surge would have shown the surge increase equal to the sea level rise increment. However, the storm surge flooding under sea level rise in the future landscape along the nearshore and complex coastlines was nonlinear. A significant variation in storm surge elevation between the present and future condition was observed for all six storm simulations. Similarly, the increase in surge inland was higher by a factor of 1.5 m and more in many locations which showed a non-linear increase above the 1 m seen along the open coast. There were some locations where the increment was less than 1 m and that could be due to the additional sea level rise allowing water to go farther inland and exposing new areas to inundation which decreased water levels on the newly exposed flooded area.

It was also found that the higher sea level enabled an early arrival of the peak surge in the future condition than in the present condition and also increased the time of inundation along the barrier islands and inland regions. The surge driven inland took longer to go back to the Gulf of Mexico due to the increased sea level, significantly increasing the timing of inundation in the future condition.

<u>Region 1</u>

There were two storms that made landfall in Region 1 – Storm 466 and Storm 154. Storm 466 made landfall near High Island with a maximum wind speed of 93 mph and an RMW of 37 miles. Storm 466 was the slowest moving storm among the six storms with a forward speed of 8 mph. Storm 154 made landfall at the northern end of Follet's Island with a maximum wind speed of 108 mph and an RMW of 37 miles. Storm 154 had a forward speed of 12 mph.

Storm 466

The large wind field of Storm 466 produced the strong shore parallel current that drove a forerunner surge, which increased water levels at the coast and bays well before the landfall (Figure 6-74A). A significant increase in water levels in inland channels was also observed due to the forerunner surge in the present condition. Under the future condition, the water level was significantly higher, penetrating considerably farther inland. The barrier island was already completely inundated with 2 to 3 m of water and there was significant inland penetration of the forerunner surge across the region 12 hours before the landfall in future condition (Figure 6-74B).

During landfall, there was an increase in surge height in the area already being inundated due to the forerunner surge (Figure 6-75A). Sustained winds of 93 miles per hour during landfall impacted bays and inland lakes that were already filled with extra water due to the forerunner surge. This caused a large buildup of water that was pushed into Chambers and Jefferson County resulting in more inland penetration of surge in the present landscape. Under the future condition, a much larger impact of storm surge was observed in not only these two counties but also in Orange County. The surge depth was more than 4 m in some areas in Jefferson and Orange County in the case of 2100 scenario.

As the wind subsided after the landfall, the water was driven against the coast back towards the Gulf of Mexico (Figure 6-76A). However, the surge driven inland and into the coastal wetlands took longer to go back to the Gulf of Mexico due to the bottom friction. Under the future condition, the increase of sea level made it more difficult for the surge to go back to the Gulf of Mexico. Therefore, more than 3 m of water was still seen in some upland areas 12 hours after the landfall (Figure 6-76B).

To quantify the additional flooding due to the enhanced storm surge, the total area of inundated land in Region 1 was calculated for both the present and the future condition (Figure 6-78). Almost 290 sq. mile of land was lost due to RSLR and was converted to open water in Region 1. The total inundation exclusively due to storm surge from Storm 466 within Region 1 increased from 626 sq. mile in the present landscape to 1250 sq. mile in the future landscape, a change of almost 100%.

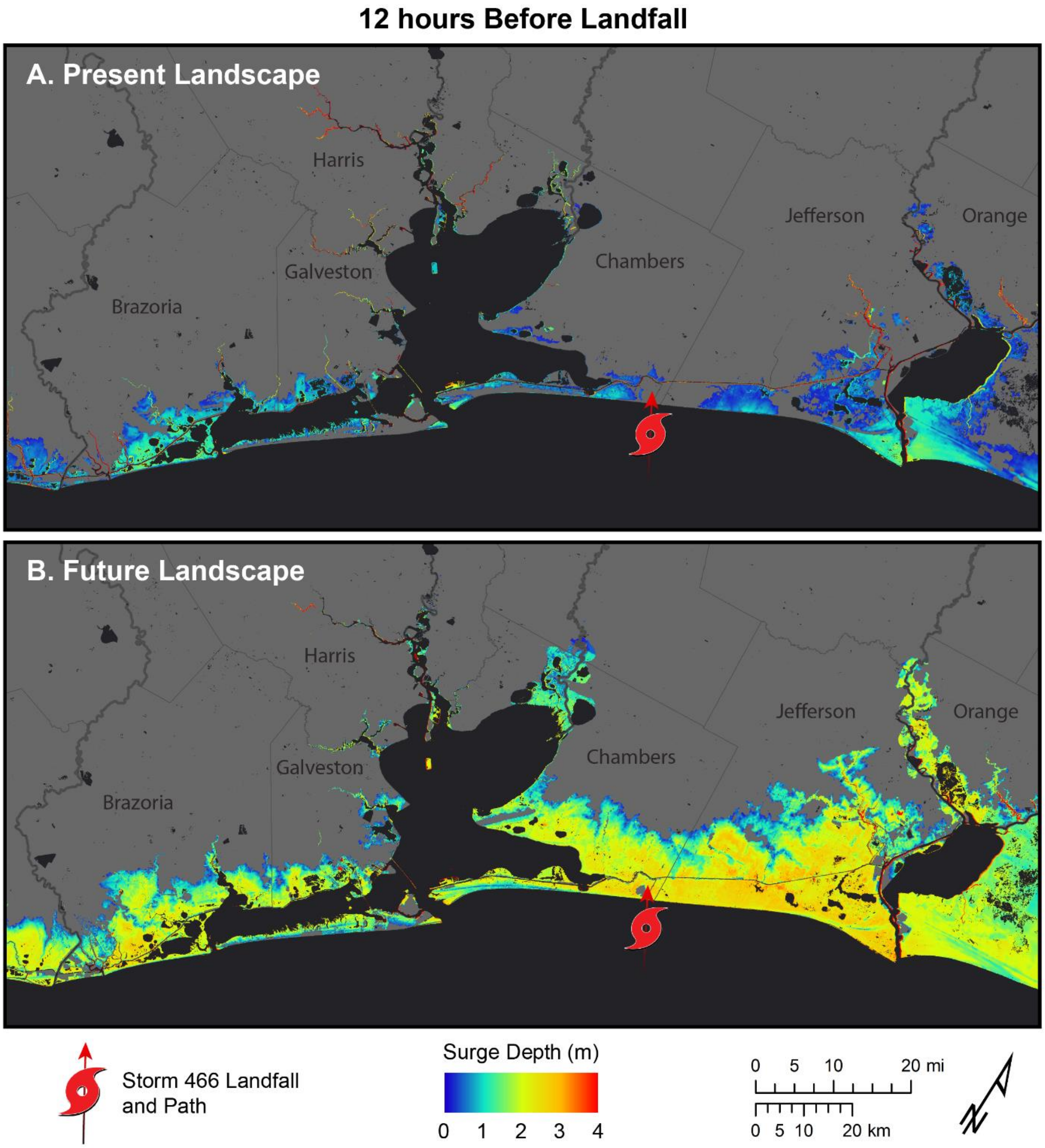

Figure 6-74: Water depth 12 hours before storm 466 made landfall on A) Present landscape and on B) Future landscape

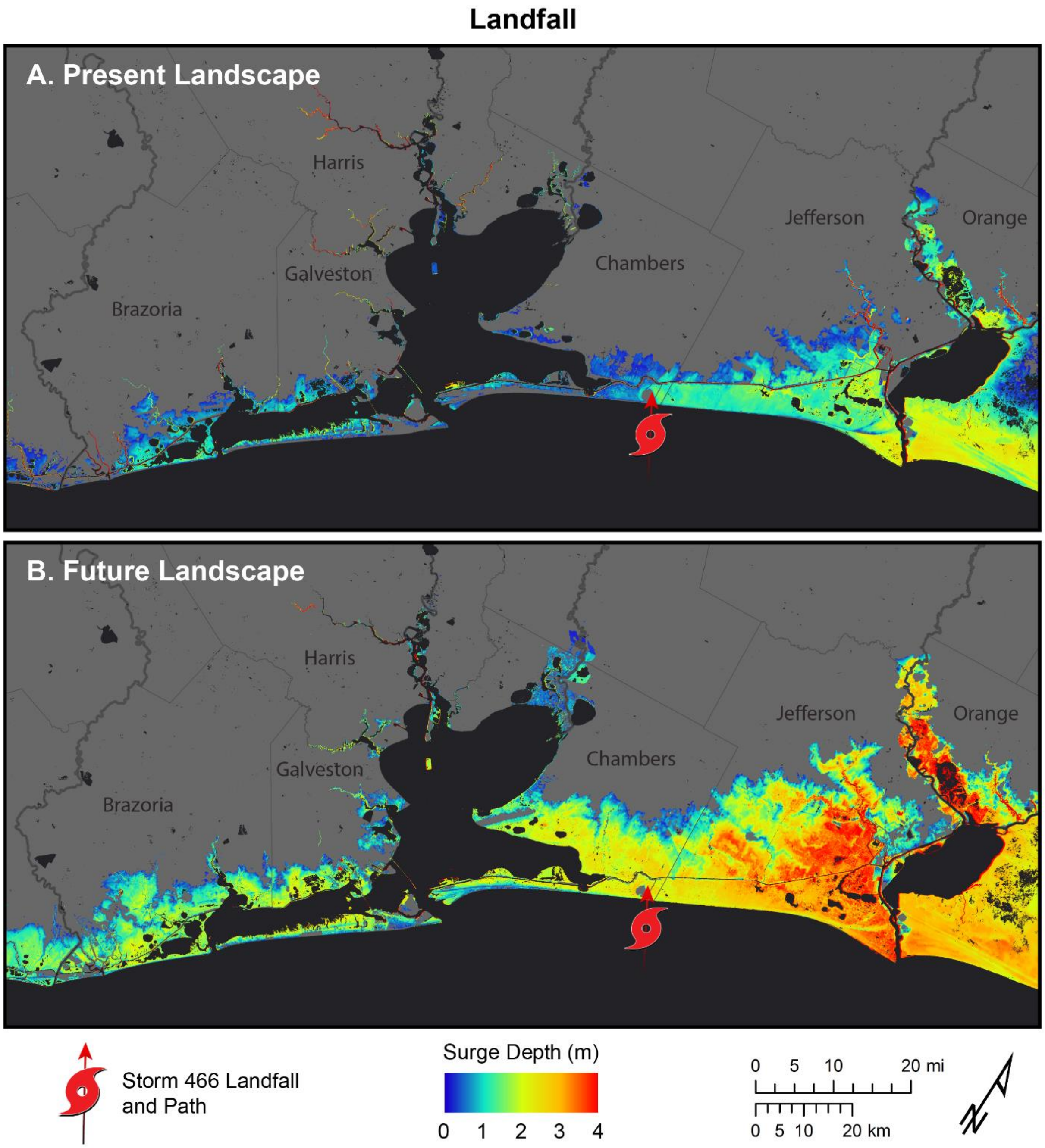

Figure 6-75: Water depth when storm 466 made landfall on A) Present landscape and on B) Future landscape

12 hours After Landfall

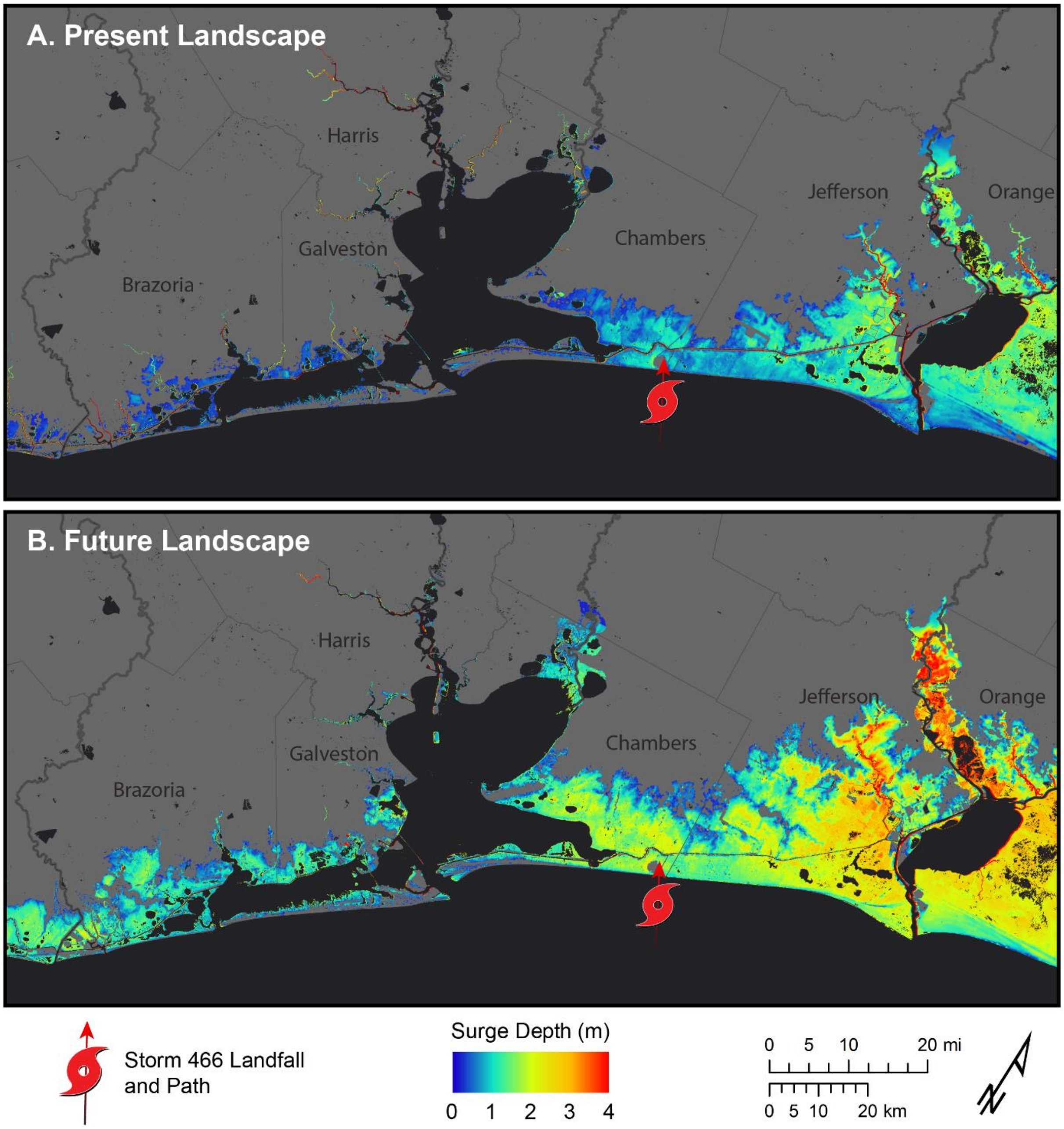

Figure 6-76: Water depth 12 hours after storm 466 made landfall on A) Present landscape and on B) Future landscape

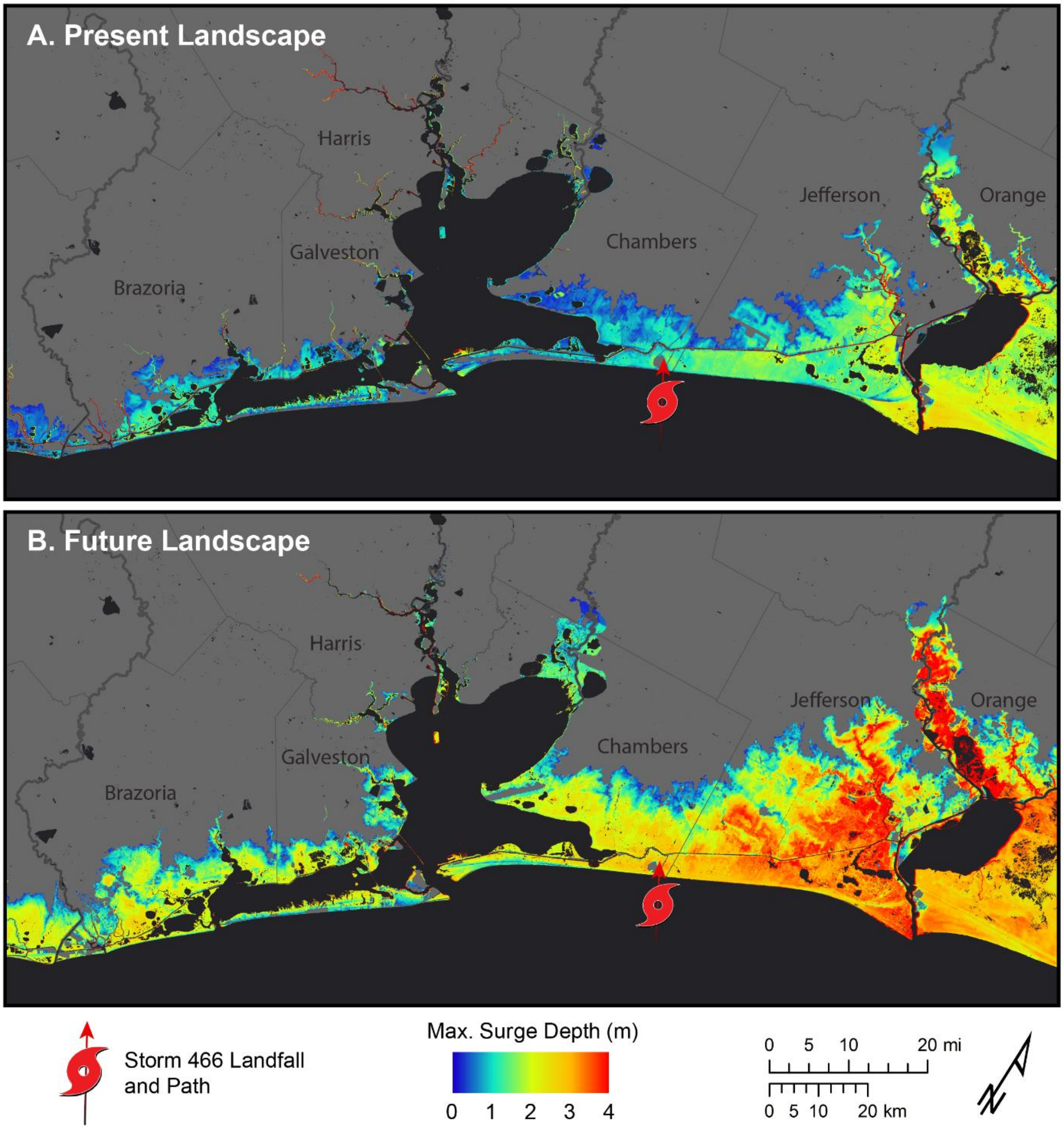

Figure 6-77: Maximum water depth due to storm 466 on A) Present landscape and on B) Future landscape

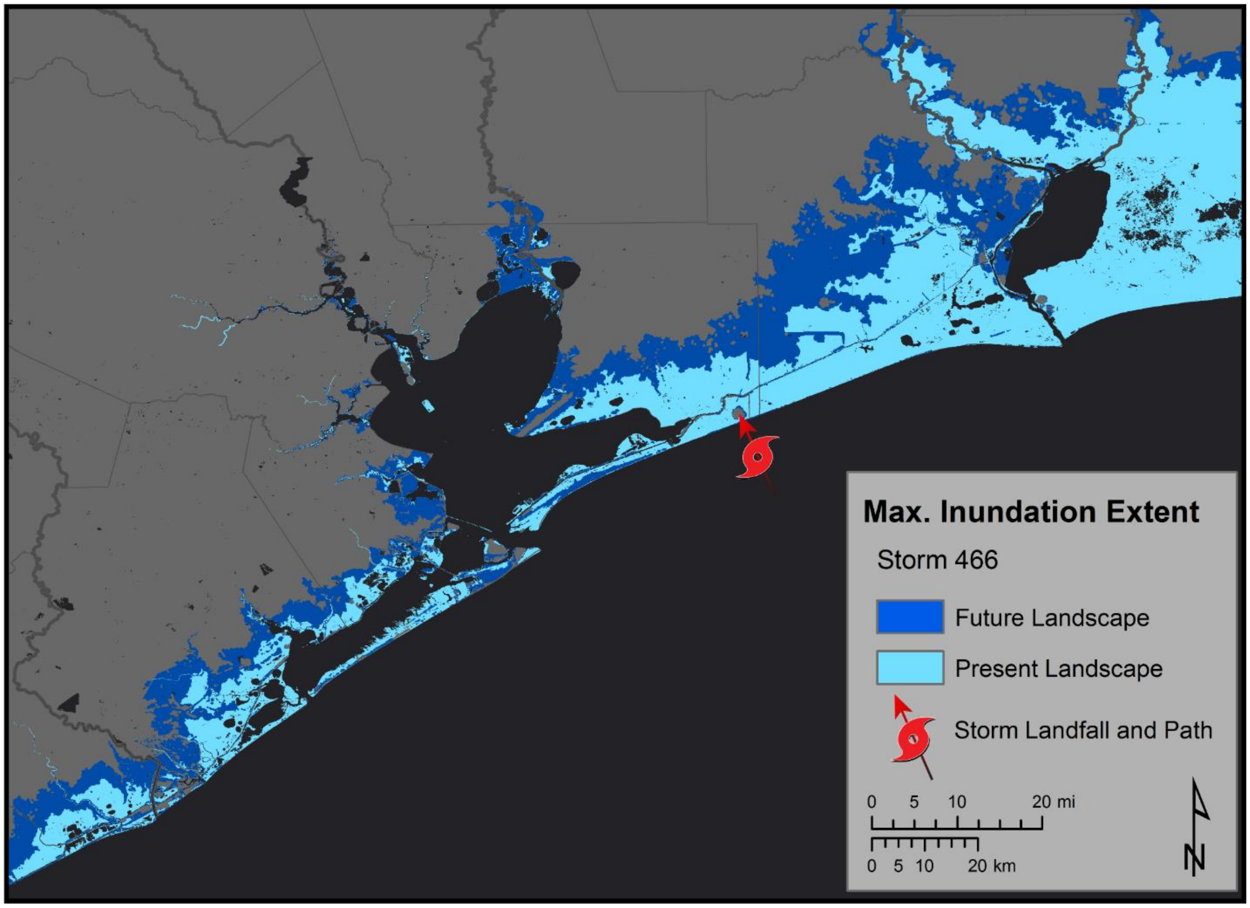

Figure 6-78: Maximum extent of inundation due to storm 466. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Storm 154

Storm 154 had slightly higher wind speed and forward speed than Storm 466 but with a very different landfall track headings: Storm 466 had a heading of -80° and Storm 154 had a heading of -20°. Although the eye of these storms were only 50 miles apart, the impact they had were quite different (Figure 6-79). The forerunner surge of Storm 154 was able to increase the water levels in inland channels and lakes, and also inundate the backside of barrier islands hours before landfall in the present landscape. Under the future landscape condition, the barrier island was mostly inundated with 1-2 m of water and there was higher storm surge inundation east of Galveston Bay in Chambers and Jefferson County hours before landfall. During landfall, the area already inundated by the forerunner surge received an additional 2-3 m of water in the present landscape. In the future landscape, the additional 2-3 m of water depth was observed not only in the east of Galveston Bay but also in Brazoria and Galveston County (Figure 6-80).

The area of storm surge inundation due to Storm 154 in Region 1 was much higher than Storm 466 in the present landscape in comparison to the future landscape. An additional 182 sq. mile of land was inundated by Storm 154 in the present landscape in comparison to storm 466, while only 52 sq. mile more land was inundated by Storm 154 in the future landscape. The total area of inundation from Storm 154 within Region 1 increased from 807 sq. mile in the present landscape to 1303 sq. mile in the future landscape, which was an increase of almost 61% (Figure 6-81).

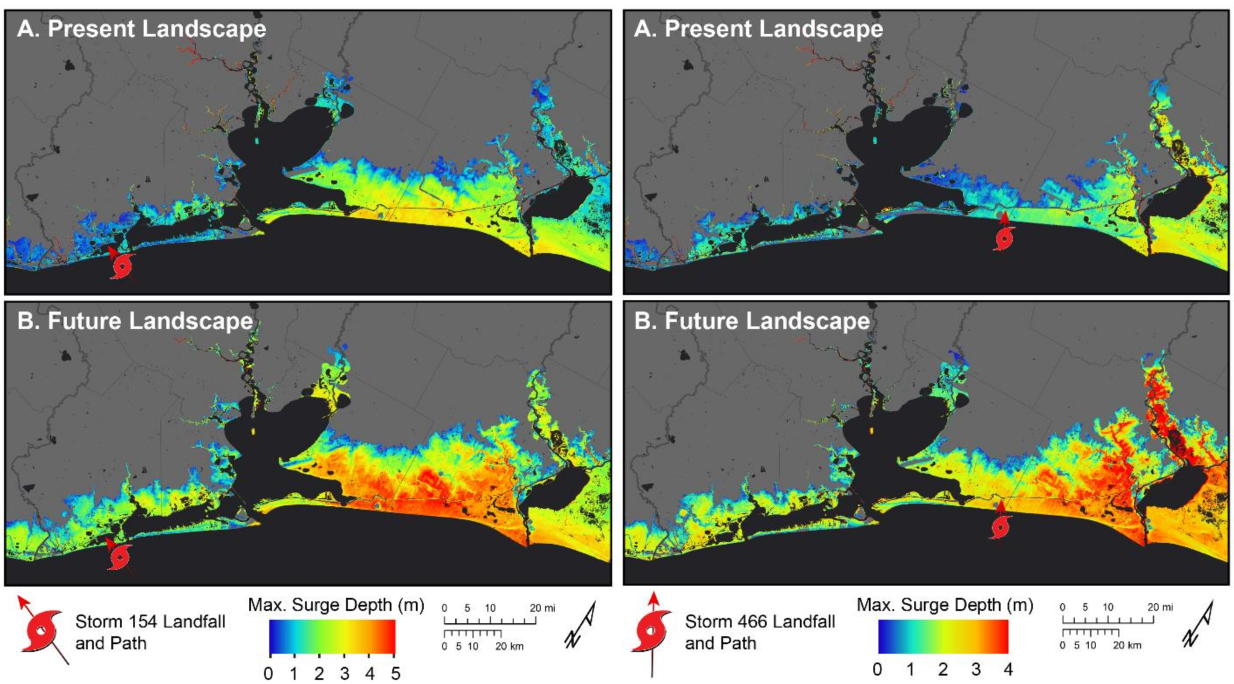

Figure 6-79: Comparison of the maximum storm surge depth between storm 154 (left maps) and 466 (right maps) on A) Present landscape and on B) Future landscape.

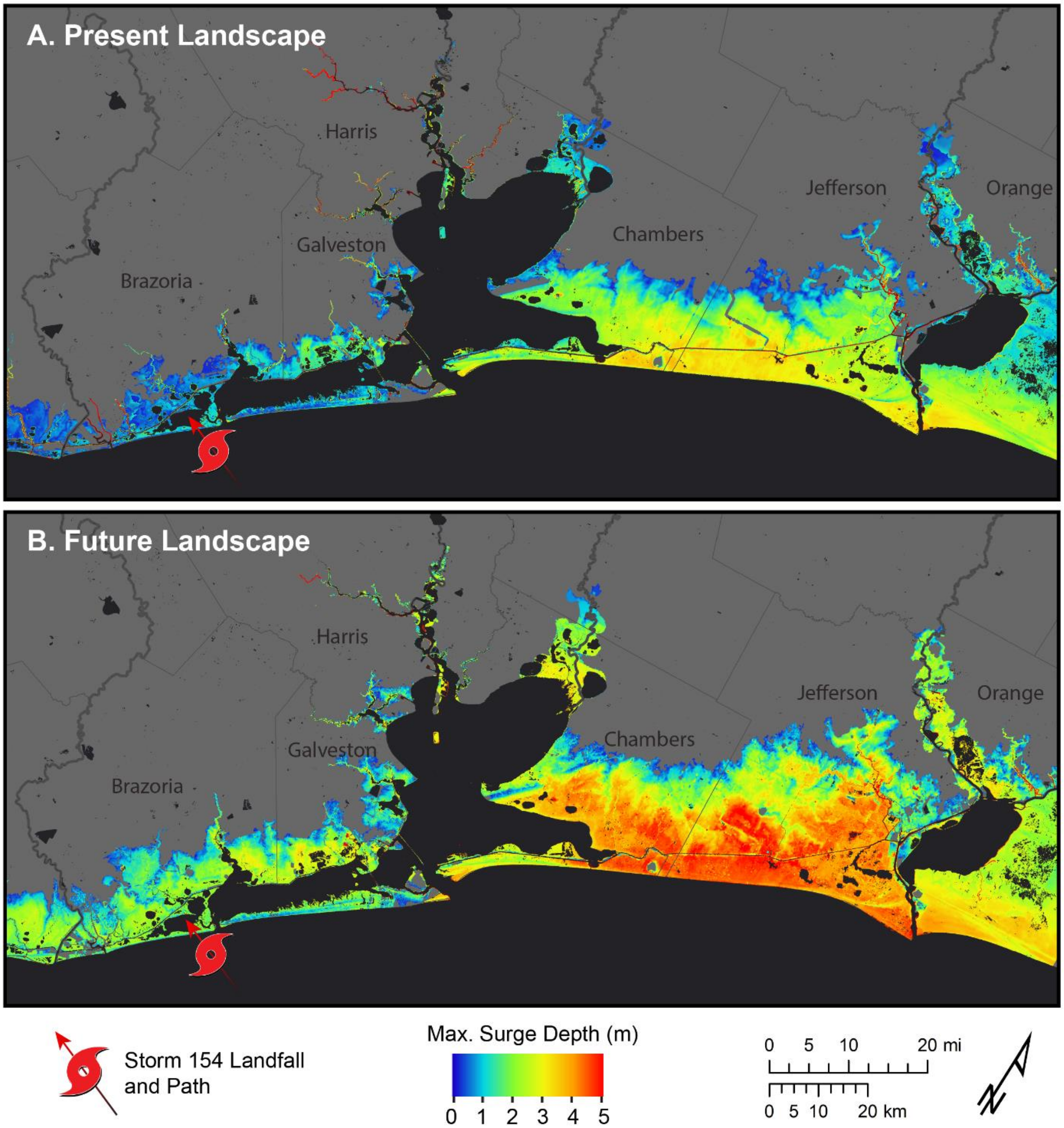

Figure 6-80: Maximum surge depth due to storm 154 on A) Present landscape and on B) Future landscape

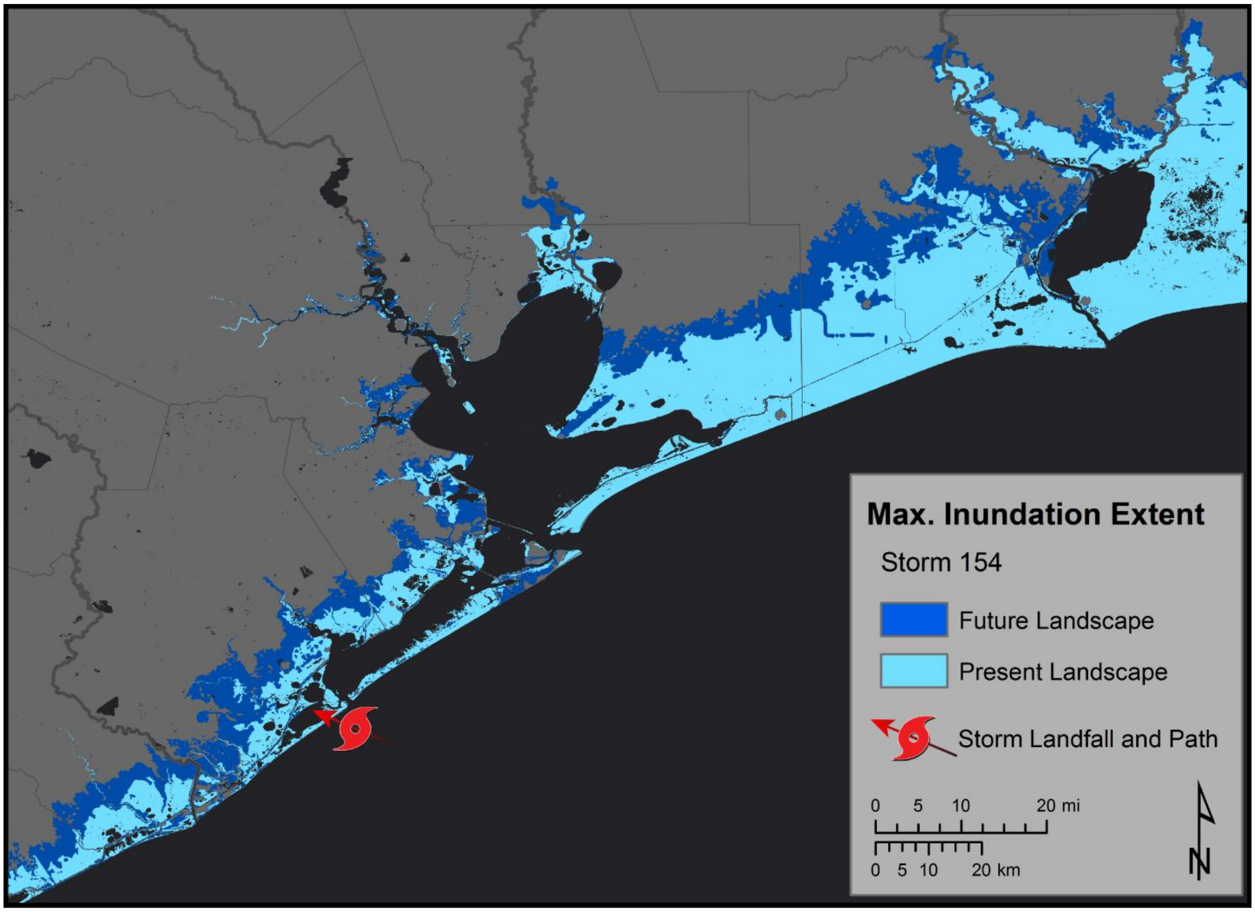

Figure 6-81: Maximum extent of inundation due to storm 154. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Region 2

There were two storms that made landfall in Region 2 – Storm 146 and Storm 240. Storm 146 made landfall on Matagorda Peninsula with a maximum wind speed of 106 mph. Storm 146 was the fastest moving storm among the six selected storms with a forward speed of 21 mph and was also the largest storm with an RMW of 39 miles. Storm 240 made landfall on Matagorda Island with a maximum wind speed of 104 mph and an RMW of 28 miles. Storm 240 was also a fast-moving storm with a forward speed of 20 mph.

Storm 146

The surge due to the large wind field of Storm 146 was able to fill in the bays and inland lakes hours before the landfall in the present landscape. However, more inland penetration of surge and higher water levels were observed over the future landscape at the same hours completely inundating the barrier islands with 2-3 m of water well before the storm's landfall. During landfall there was an extensive buildup of surge penetrating farther inland in both the present and future condition as the bays and inland lakes were already filled with extra water from the forerunner surge. Higher storm surge depths were observed in Brazoria and Galveston County than in the communities around Matagorda Bay and San Antonio Bay in both the present and future landscape due to Storm 146 (Figure 6-82).

Almost 175 sq. mile of land was lost due to sea level rise and was converted to open water in Region 2. The total inundation exclusively due to storm surge from Storm 146 within Region 2 increased from 244 sq. mile in the present landscape to 487 sq. mile in the future landscape, a change of almost 100%. Because Storm 146 made landfall on the northern end of Region 2, it had a greater impact in Region 1 in both the present and future landscape. The total area of inundation from Storm 146 in Region 2 was lower than the total inundation area of each of the two storms that made landfall in Region 1 (Storm 466 and Storm 154).

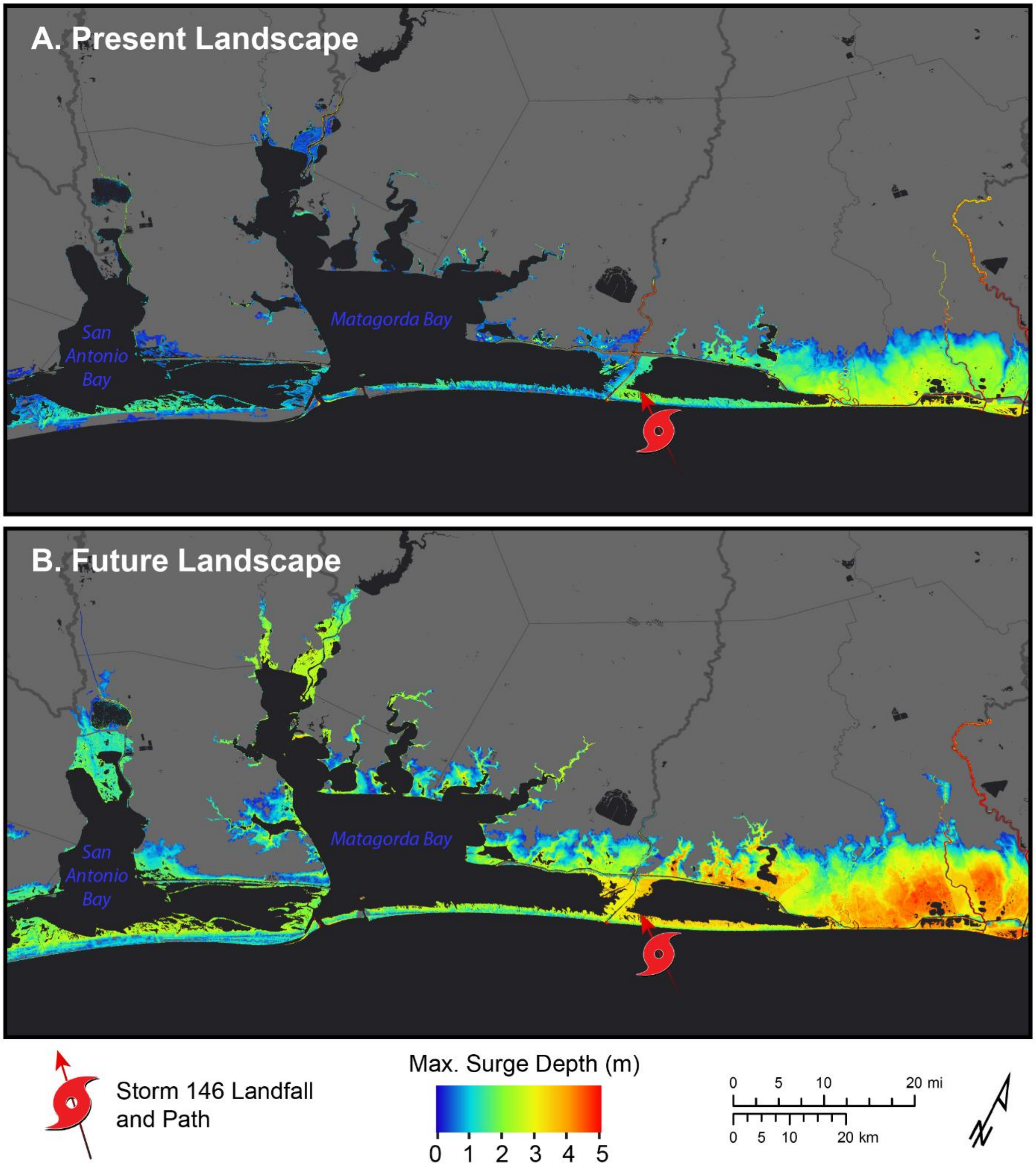

Figure 6-82: Maximum surge depth due to storm 146 on A) Present landscape and on B) Future landscape

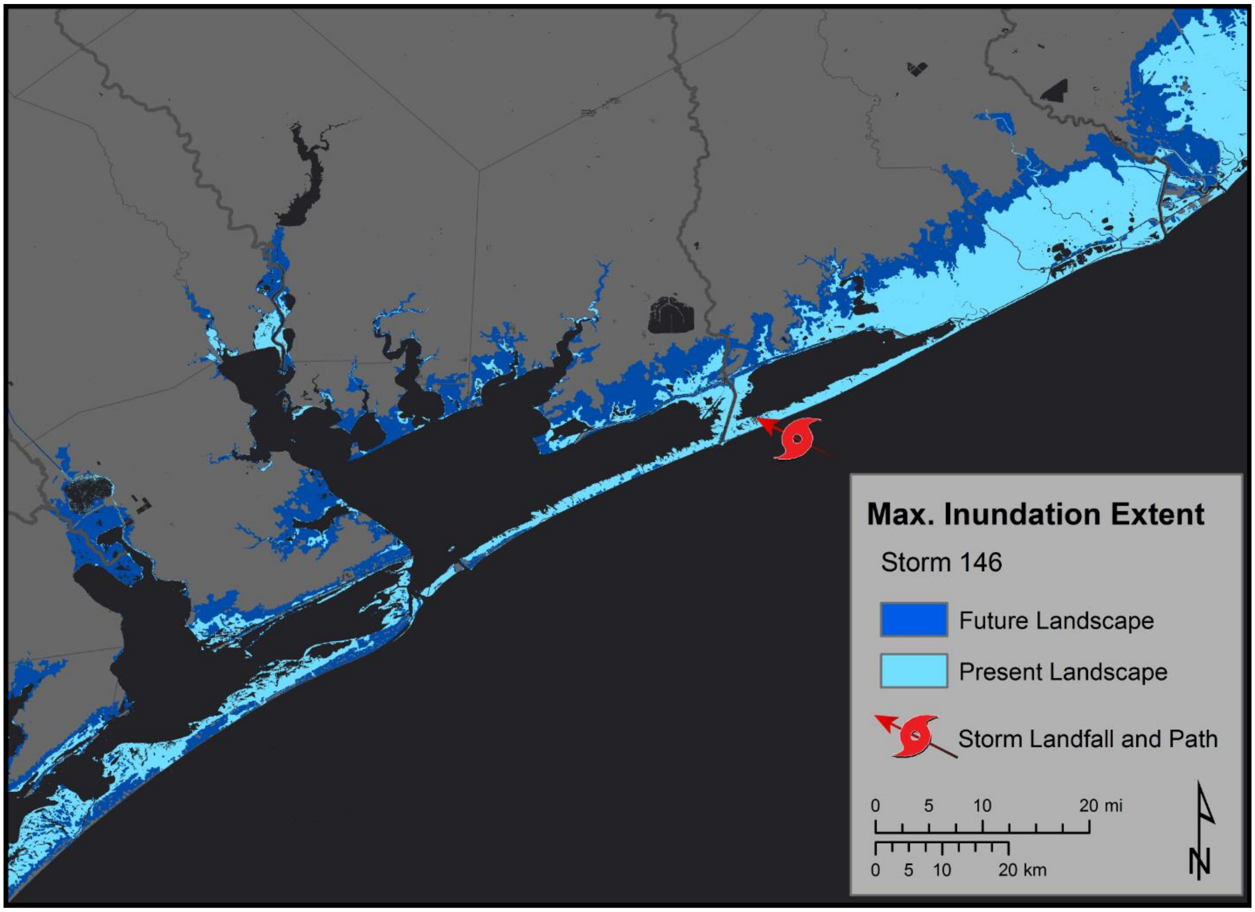

Figure 6-83: Maximum extent of inundation due to storm 146. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Storm 240

Although both Storm 146 and Storm 240 had very similar characteristics and made landfall 40 miles apart from each other, the depth and extent of water they pushed inland were quite different (Figure 6-84). Both storms had similar inundation extent in the eastern section of Region 2 due to the low-lying nature of the region, but the amount of water that moved inland was different. For example, more inundation and higher water depth was observed in Matagorda Peninsula due to Storm 240 at landfall than Storm 146 although Storm 146 made landfall on the peninsula.

Storm 240 had a greater impact in and around the Matagorda Bay system in both the present and future landscape than Storm 146. An additional 97 sq. mile of land was inundated due to Storm 240 than Storm 146 in the present landscape whereas 155 sq. mile more land was inundated in the future landscape. Therefore, the total inundation due to storm surge of Storm 240 within Region 2 increased from 340 sq. mile in the present landscape to 642 sq. mile in the future landscape, which was an increase of almost 89%.

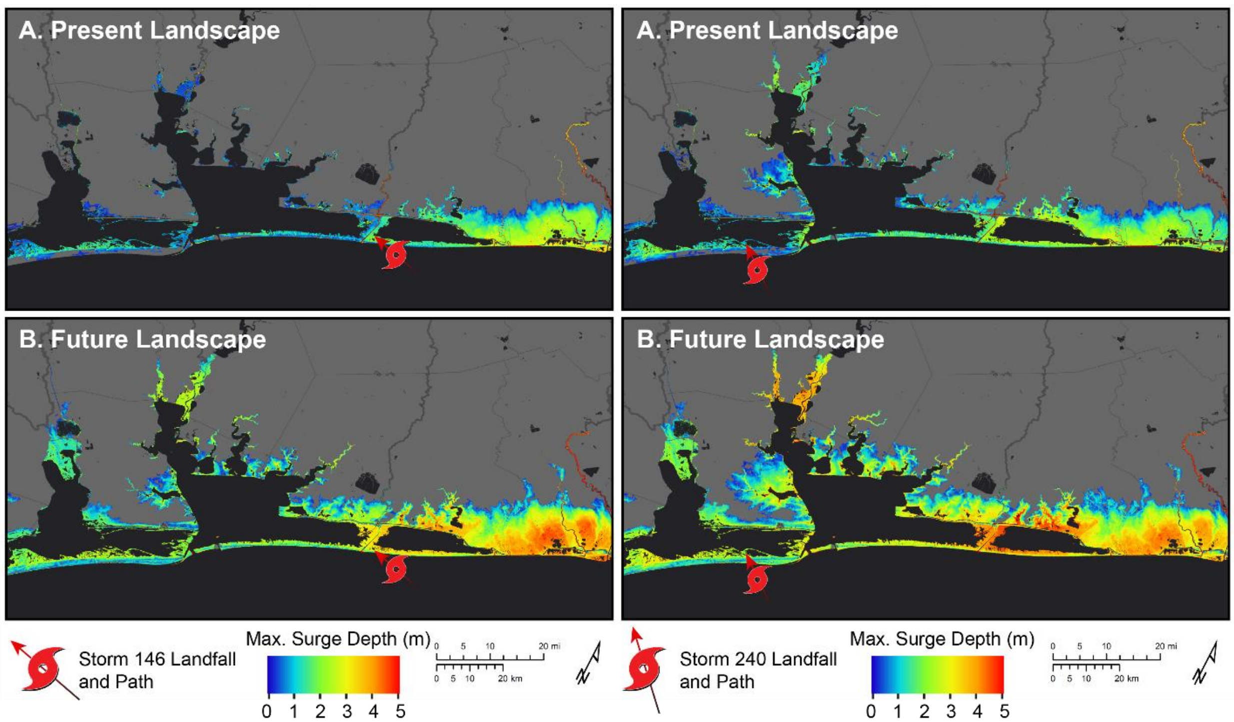

Figure 6-84: Comparison of the maximum storm surge depth between storm 146 (left maps) and 240 (right maps) on A) Present landscape and on B) Future landscape.

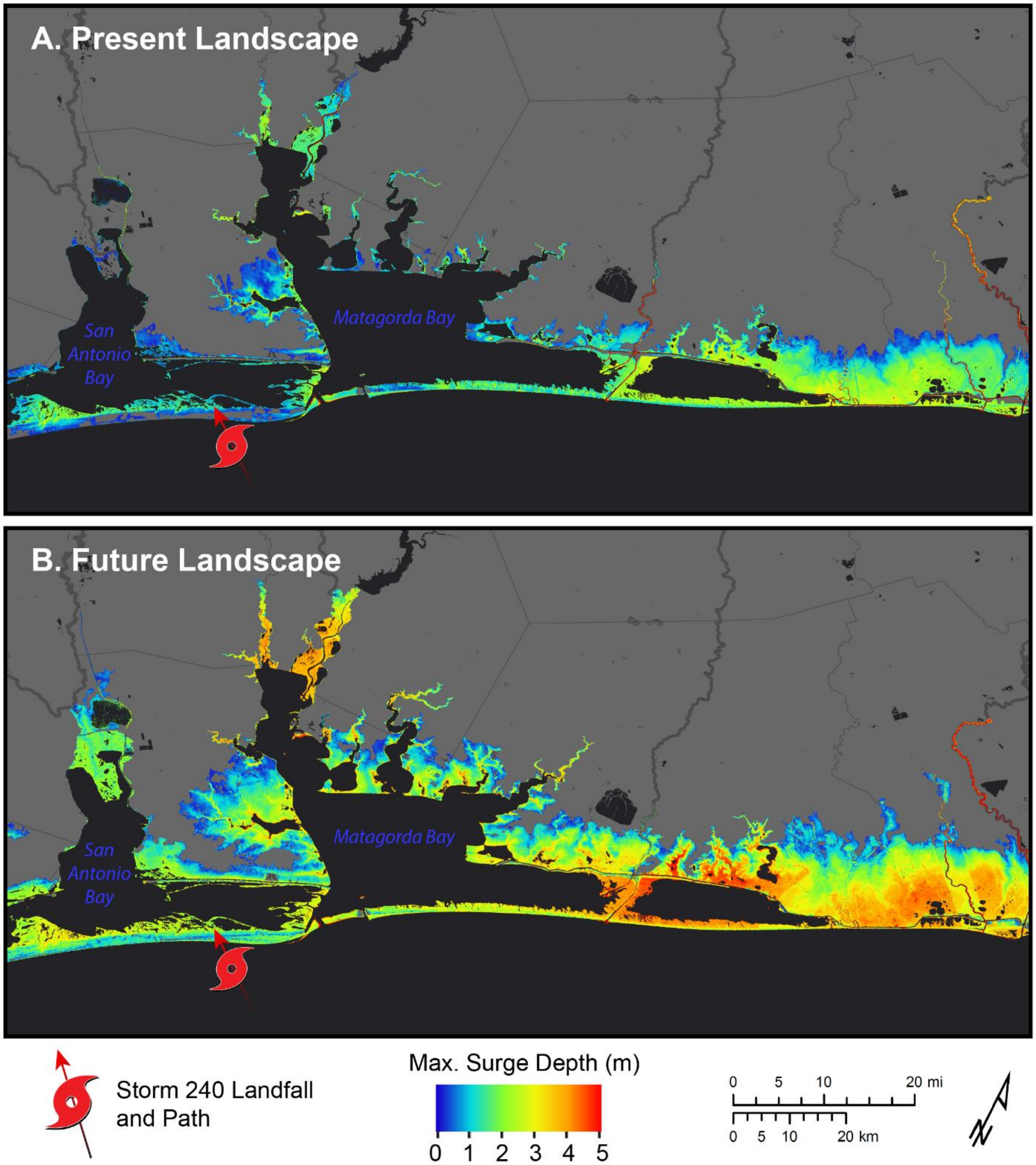

Figure 6-85: Maximum surge depth due to storm 240 on A) Present landscape and on B) Future landscape

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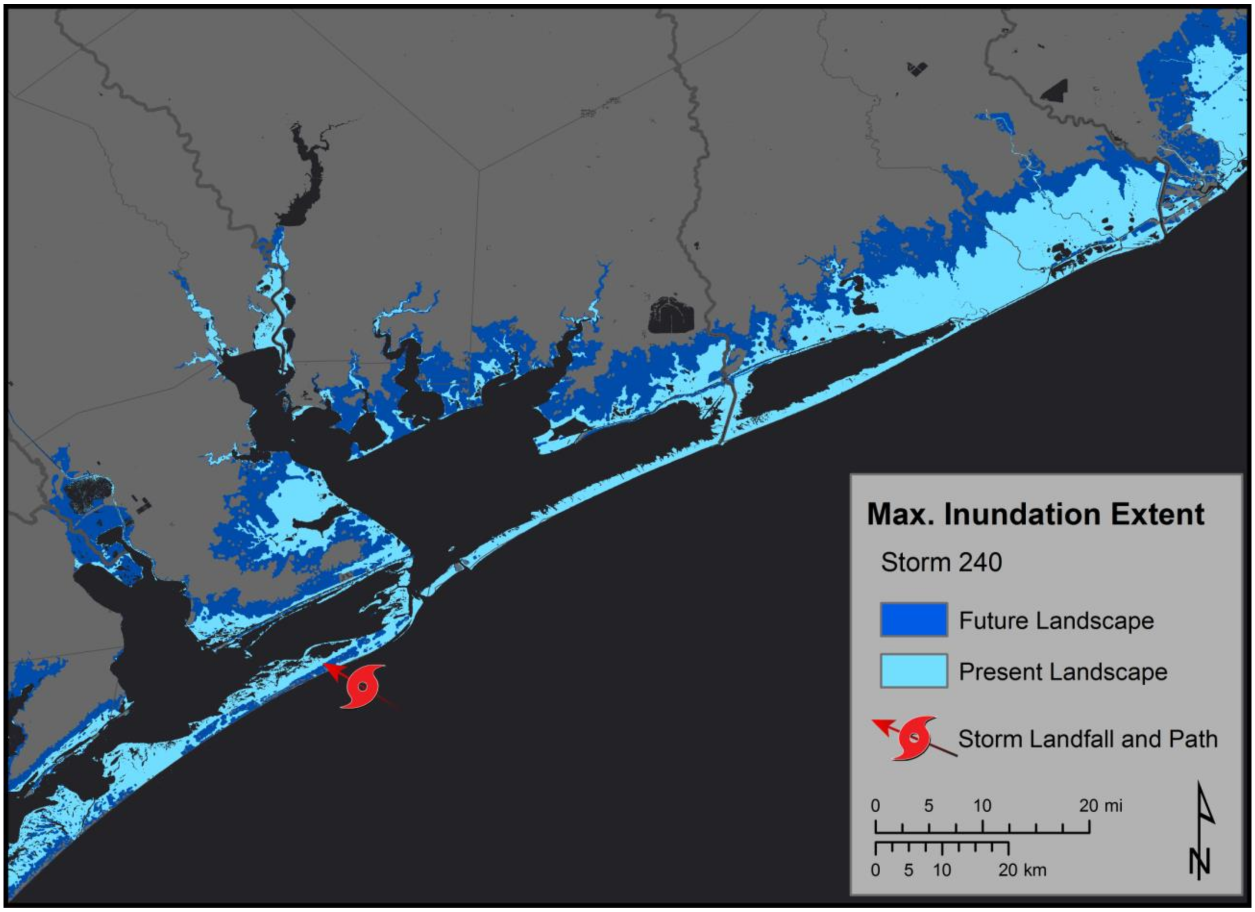


Figure 6-86: Maximum extent of inundation due to storm 240. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Region 3

Storm 416 made landfall in Region 3 at the northern end of North Padre Island (Figure 81). This storm had the highest maximum wind speed of 113 mph and was the smallest among the selected six storms with an RMW of 17 miles. Storm 416 had a forward speed of 13 mph.

The forerunner surge of Storm 416 in the present condition was not large enough to penetrate as far inland as the future condition storm. It was sufficient to increase water level in bays and inland channel and lakes and inundated the back side of the barrier islands around Corpus Christ Bay and the Nueces River Delta in the present landscape. However, under the future landscape condition, the barrier islands were nearly completely inundated with 2-3 m of water hours before the landfall.

During and after the landfall of Storm 416, the surge height increased significantly in the area already inundated from the forerunner surge in both the present and future landscape. There was more inland penetration of surge not only around the Nueces River Delta but also around Baffin Bay, Oso Bay and Aransas Bay in the present landscape. There was higher storm surge around all the bay systems in Region 3 in the future landscape.

In Region 3, about 140 sq. miles of land in the present landscape is inundated by sea level rise in the year 2100. The total area of inundation exclusively due to storm surge from Storm 416 within Region 3 increased from 181 sq. mile in the present landscape to 426 sq. mile in the future landscape, an increase of 135% (Figure 6-88).

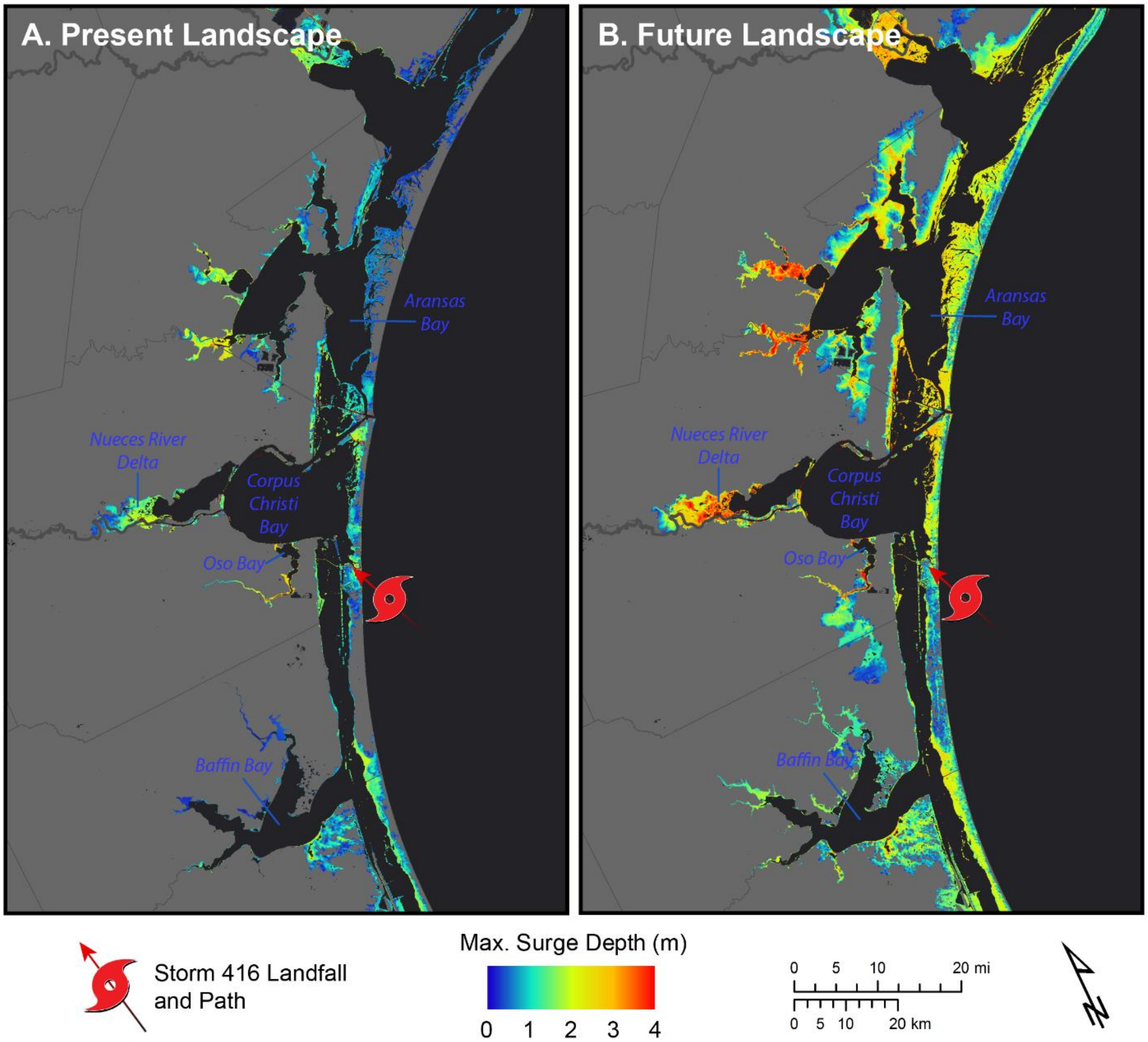


Figure 6-87: Maximum surge depth due to storm 416 on A) Present landscape and on B) Future landscape

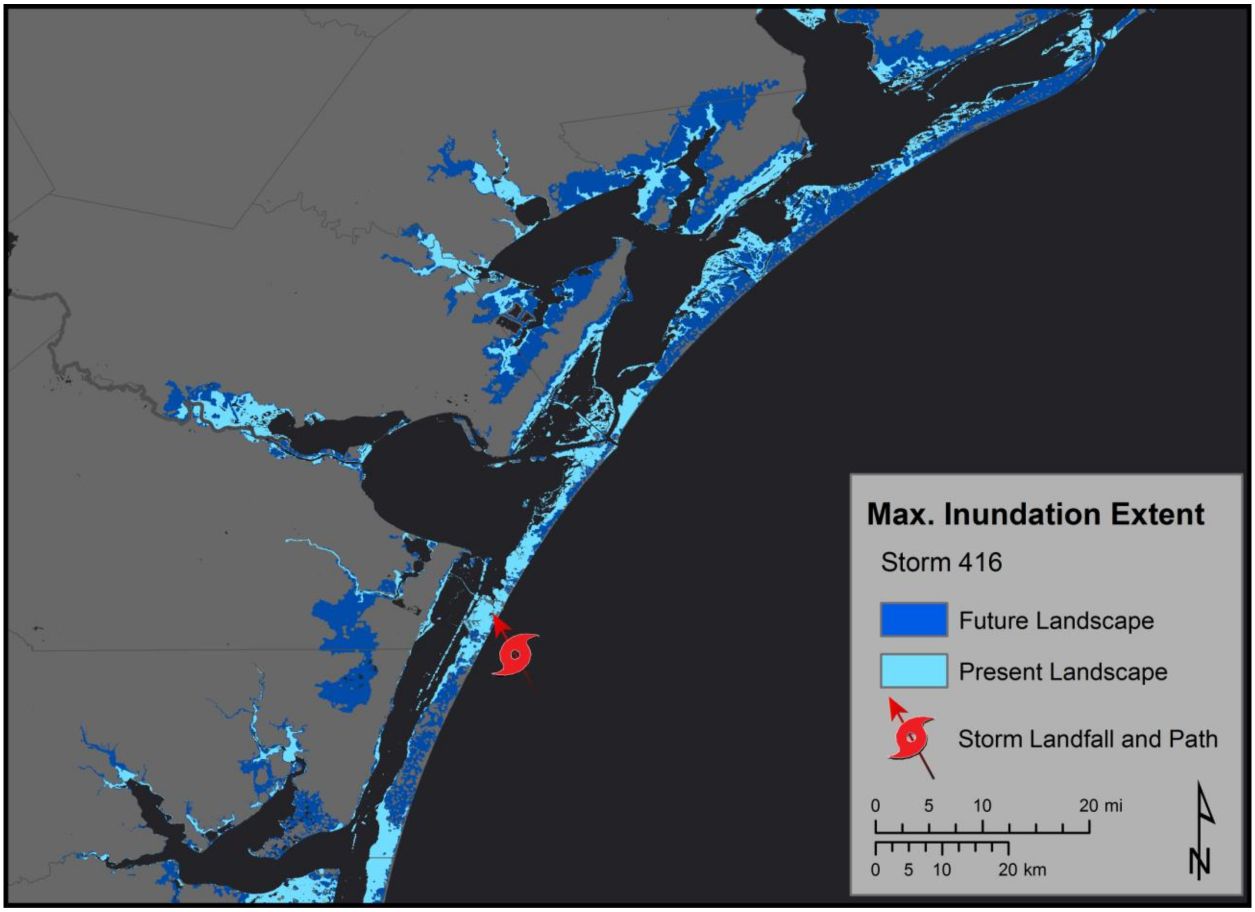


Figure 6-88: Maximum extent of inundation due to storm 416. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Region 4

Storm 400 made landfall 65 miles south of the U.S.-Mexico border with a maximum wind speed of 99 mph and an RMW of 34 miles (Figure 6-89). Storm 400 had a forward speed of 16 mph.

Under the present landscape condition, there was minimal impact from the forerunner surge in the north of Region 4 but was enough to increase water levels in the Laguna Madre as well as in the cities of Port Isabel and Brownsville. The water levels were higher in the future landscape condition, penetrating farther inland, and the coast and bays had 2-3 m of water well before the landfall.

After Storm 400 made landfall 65 miles south of the U.S.-Mexico border, the surge height increased in the area already inundated by the forerunner surge in both the present and future landscape. The northern section of Region 4 in Kenedy County that did not see inundation in the present landscape was inundated with a surge depth of 2-3 m in the future landscape.

The amount of land loss due to sea level rise in Region 4 was the highest in the Texas coast. It was estimated that around 377 sq. mile of land will be converting to open water in Region 4 due to sea level rise by 2100. The total inundated area due to storm surge of Storm 400 within Region 4 increased from 452 sq. mile in the present landscape to 755 sq. mile in the future landscape which is an increase of 67% (Figure 6-90).

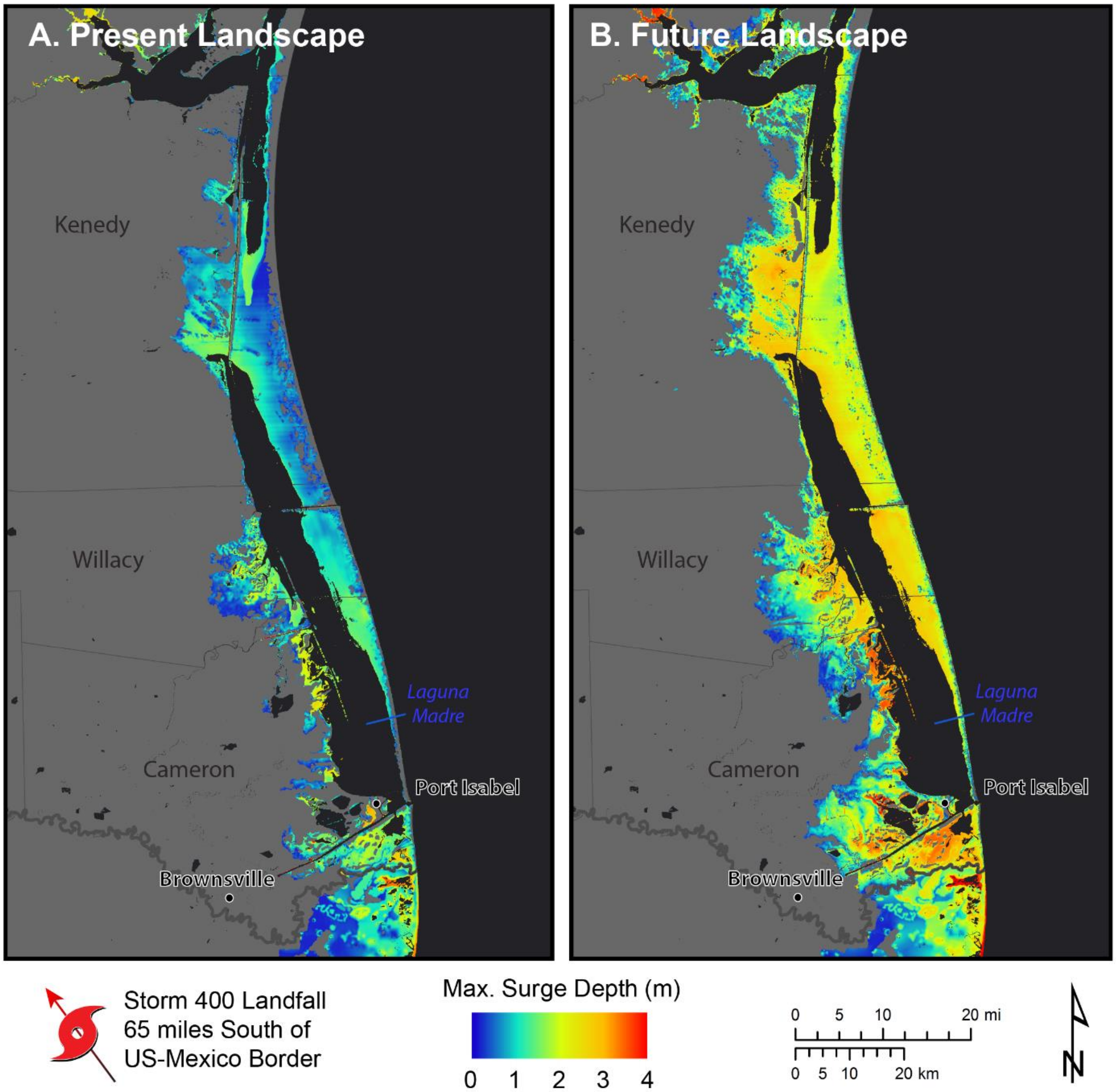


Figure 6-89: Maximum surge depth due to storm 400 on A) Present landscape and on B) Future landscape

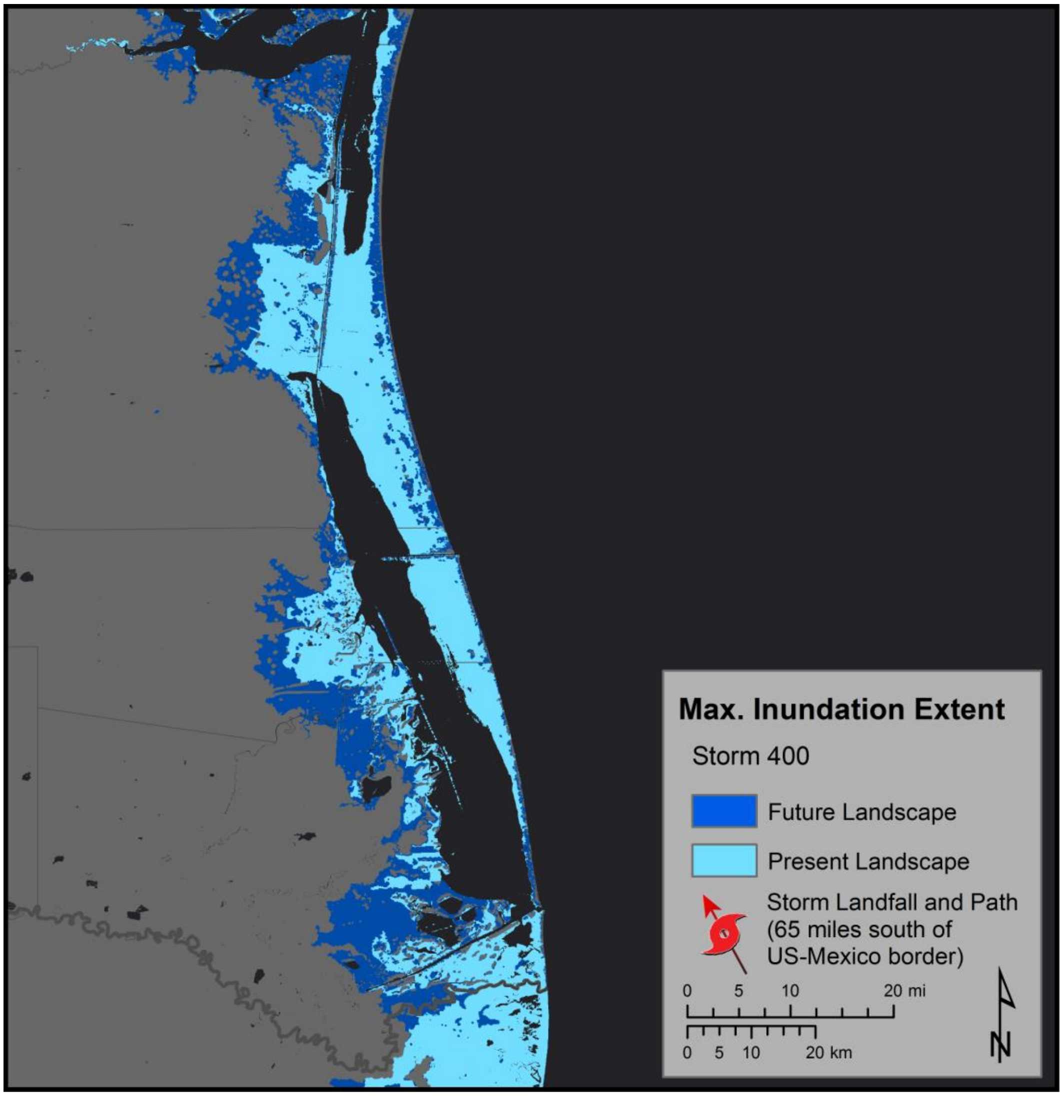


Figure 6-90: Maximum extent of inundation due to storm 400. The light blue is the extent of the storm surge over the present-day landscape. Dark blue is the extent of the storm surge over the future landscape

Modeling Resiliency Projects

Region 1

SLAMM

Six large scale BUDM restoration projects were built out in Region 1 to simulate raising the elevation of the project site every 25 years to offset the rate of RSLR. The landscape change analysis in SLAMM showed positive results as the 2100 "with project" areas closely replicate the present day landscape (Figure 6-91, Figure 6-92 and Table 6-21).

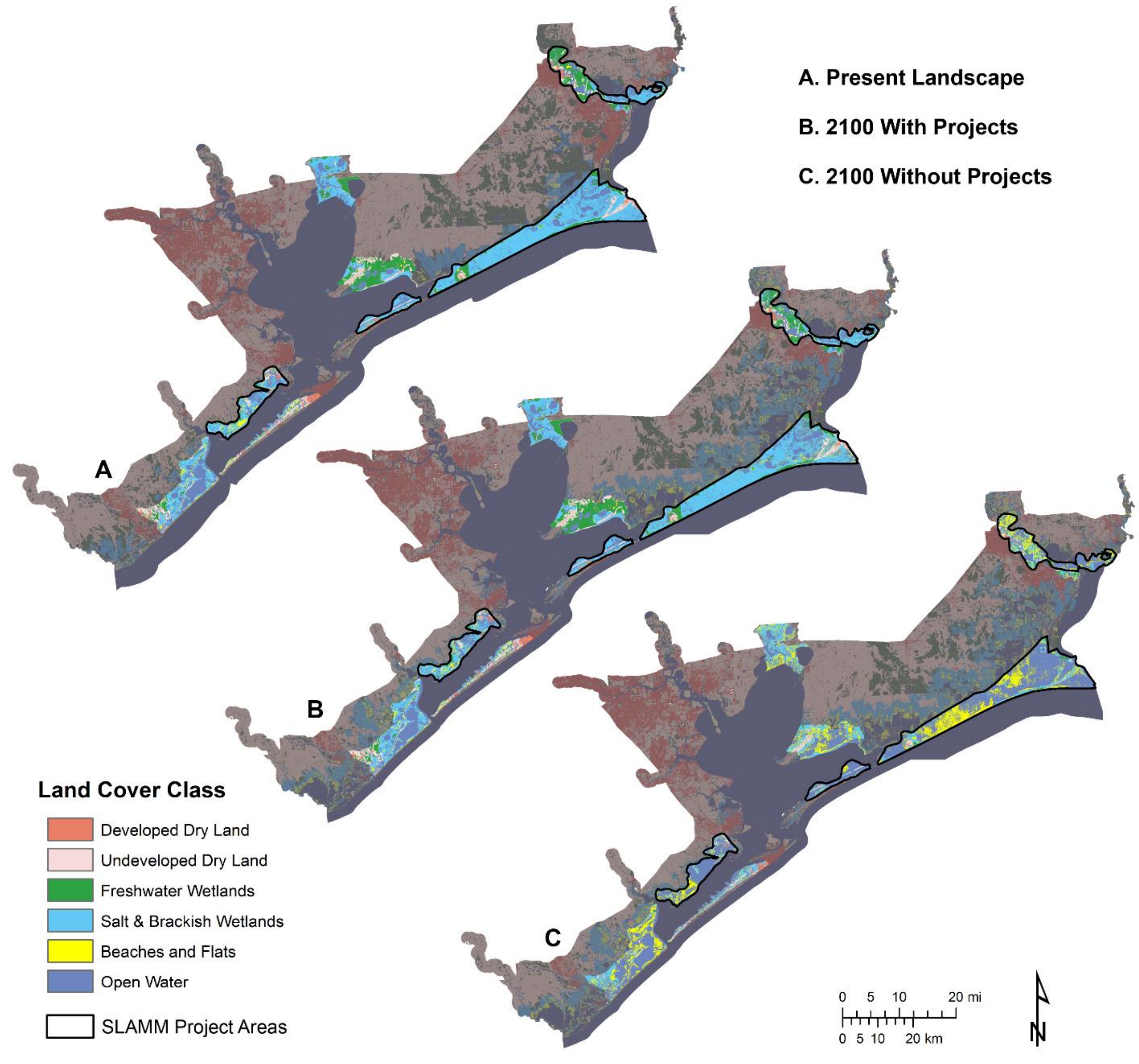


Figure 6-91: Map comparing the land cover distribution in Region 1 habitat preservation and BUDM restoration project areas on A) the present landscape (2007), B) the future landscape (2100) with projects, and C) the future landscape (2100) without projects.

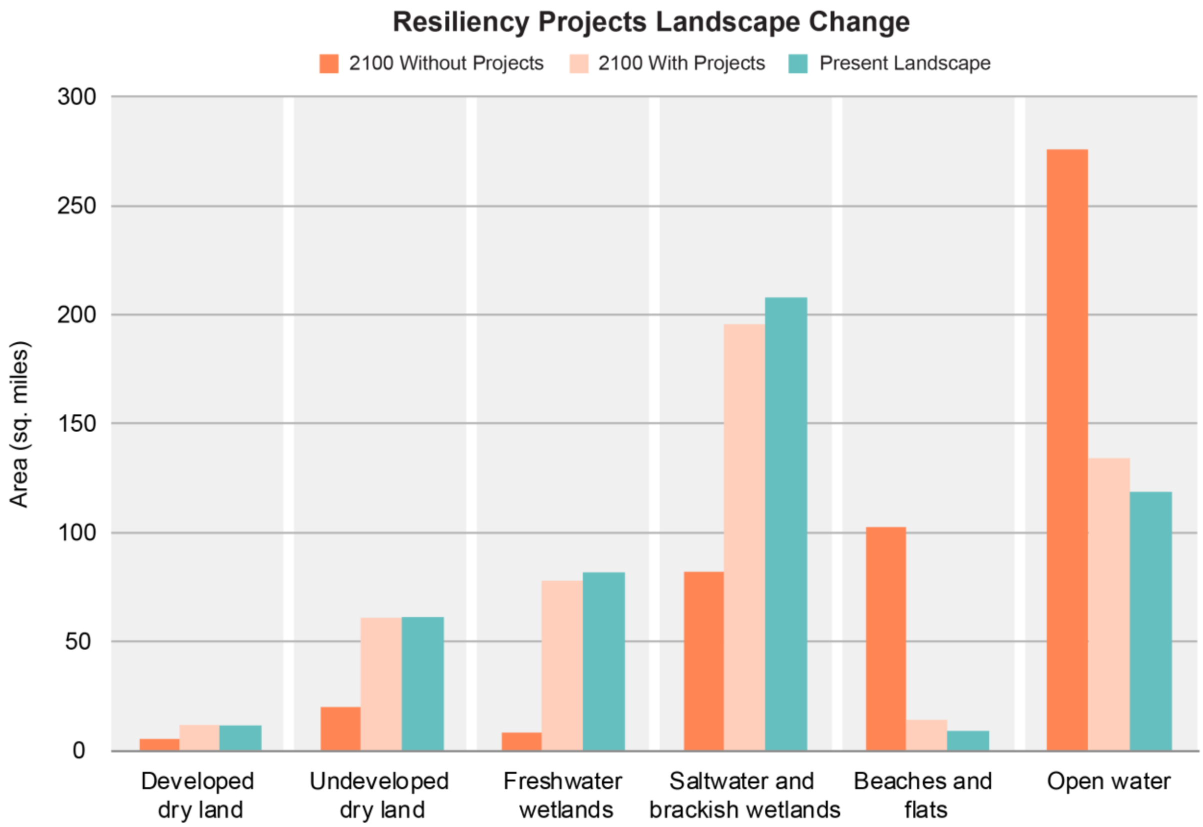


Figure 6-92: Graph comparing the land cover distribution in Region 1 habitat preservation and BUDM restoration project areas on the present landscape (2007), the future landscape (2100) with projects, and the future landscape (2100) without projects.

Table 6-21: The percent difference between land cover types in Region 1 habitat preservation and BUDM restoration project areas in 2007, 2100 with projects, and 2100 without projects.

Land cover class	2100 w/o Projects (sq. miles)	2100 w/ Projects (sq. miles)	Present landscape	% Diff (with and without projects)
Developed dry land	5.69	11.91	12.09	109.31
Undeveloped dry land	20.24	60.92	61.85	201.02
Freshwater wetlands, non-tidal	8.57	77.75	82.85	807.44
Salt & brackish wetlands, tidal	81.96	195.61	209.40	138.66
Beaches and flats	102.44	14.53	9.21	-85.82
Open water	275.82	134.10	119.47	-51.38

SWAN+ADCIRC

Storm 154 was selected to investigate the impact of storm surge with and without Region 1 resiliency projects (habitat preservation and BUDM restoration project areas) in the future landscape. Storm 154 made landfall on the eastward end of Follet's Island with a forward speed of 12 mph and a maximum wind speed of 108 mph (Figure 6-93). Storm 154 was a rather large storm with an RMW of 37 miles. Figure 6-93 shows the maximum water depth due to storm 154 with and without projects implemented in the future landscape. Comparing the effect of resiliency projects on storm surge, the results show that the large-scale projects help to reduce the water depth, however not the extent of inundation. For example, the large BUDM project at Texas Point Wildlife Refuge helped to decrease the water depth within the project area as well as inland in Chambers and Jefferson County. Relatively small projects along the Beaumont/Neches River and within the Trinity River Delta did not significantly reduce the water depth or inundation extent.

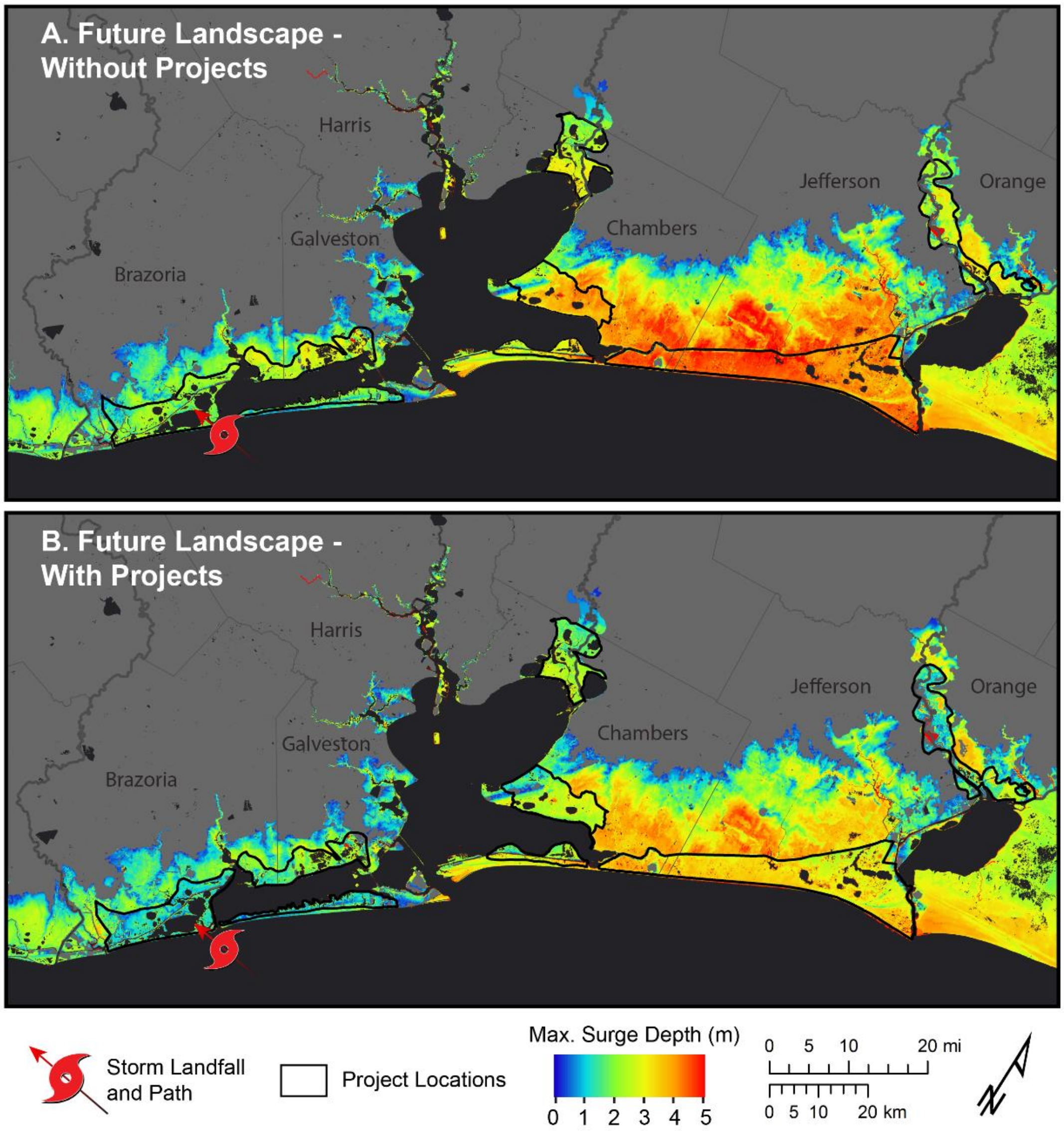


Figure 6-93: Comparison of maximum storm surge depth due to storm 154 in the future landscape A) Without resiliency projects and B) With resiliency projects

Region 3

SLAMM

Three large scale BUDM restoration projects were built out in Region 3 to simulate raising the elevation of the project site every 25 years to offset the rate of RSLR. The landscape change analysis in SLAMM shows positive results as the 2100 "With Project" areas closely replicate the present day landscape (Figure 6-94, Figure 6-95 and Table 6-22).

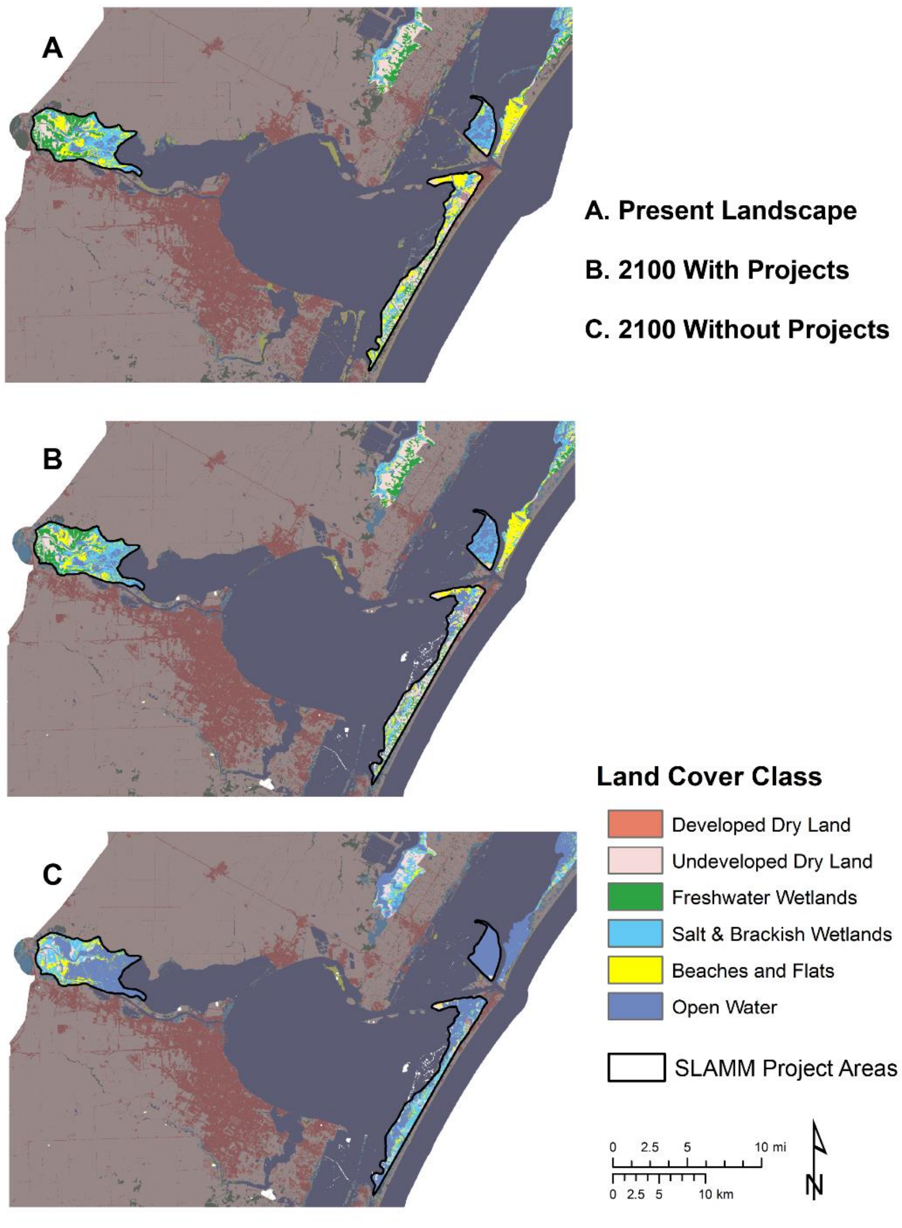


Figure 6-94: Map comparing the land cover distribution in Region 3 BUDM restoration project areas on A) the present landscape (2007), B) the future landscape (2100) with conservation projects, and C) the future landscape (2100) without projects.

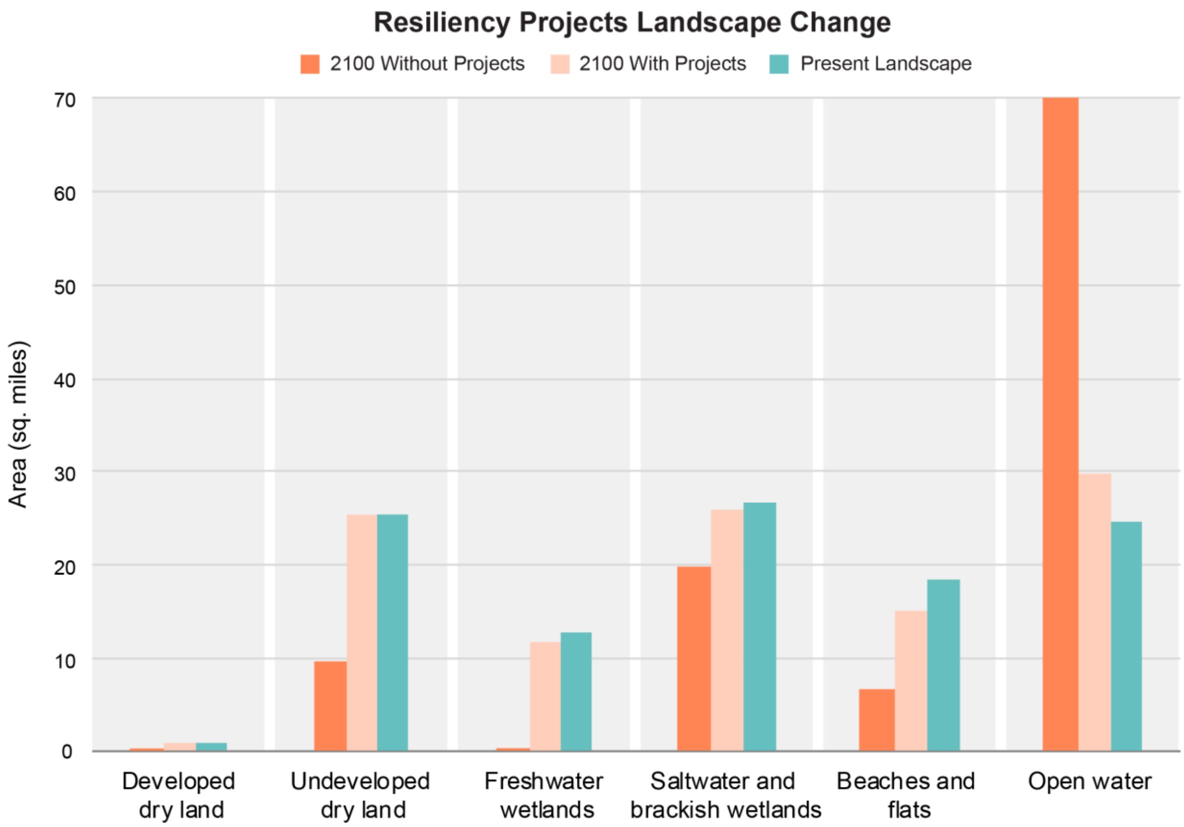


Figure 6-95: Graph comparing the land cover distribution in Region 3 BUDM restoration project areas on the present landscape (2007), the future landscape (2100) with projects, and the future landscape (2100) without projects.

Table 6-22: The percent difference between land cover types in Region 3 project areas in 2007, 2100 with projects, and 2100 without projects.

Land cover class	2100 w/o Projects (sq miles)	2100 w/ Projects (sq miles)	Present landscape	% Diff (with and without projects)
Developed dry land	0.36	0.78	0.79	119.61
Undeveloped dry land	9.66	25.23	25.34	161.30
Freshwater wetlands, non-tidal	0.14	11.76	12.80	8534.80
Salt & brackish wetlands, tidal	21.00	25.82	26.67	22.98
Beaches and flats	7.00	14.92	18.49	113.07
Open water	70.25	29.60	24.53	-57.86

SWAN+ADCIRC

Storm 416 was selected to investigate the impact of storm surge with and without Region 3 resiliency projects in the future landscape. Storm 416 made landfall on the northern end of North Padre Island with a forward speed of 13 mph and a maximum wind speed of 113 mph (Figure 6-96). Storm 416 is one of the smaller sized storms with an RMW of 17 miles. Figure 86 shows the maximum water depth due to storm 416 with and without resiliency projects implemented in the future landscape. Comparing the effect of resiliency projects on storm surge in Region 3, the results show minimal change in water depth and extent of inundation around project sites. However, the large-scale project in the Nueces River Delta did succeed in reducing surge depth within the project site as well as the extent of inundation west of the project site. The project site on Live Oak Peninsula also succeeded in reducing the extent of inundation.

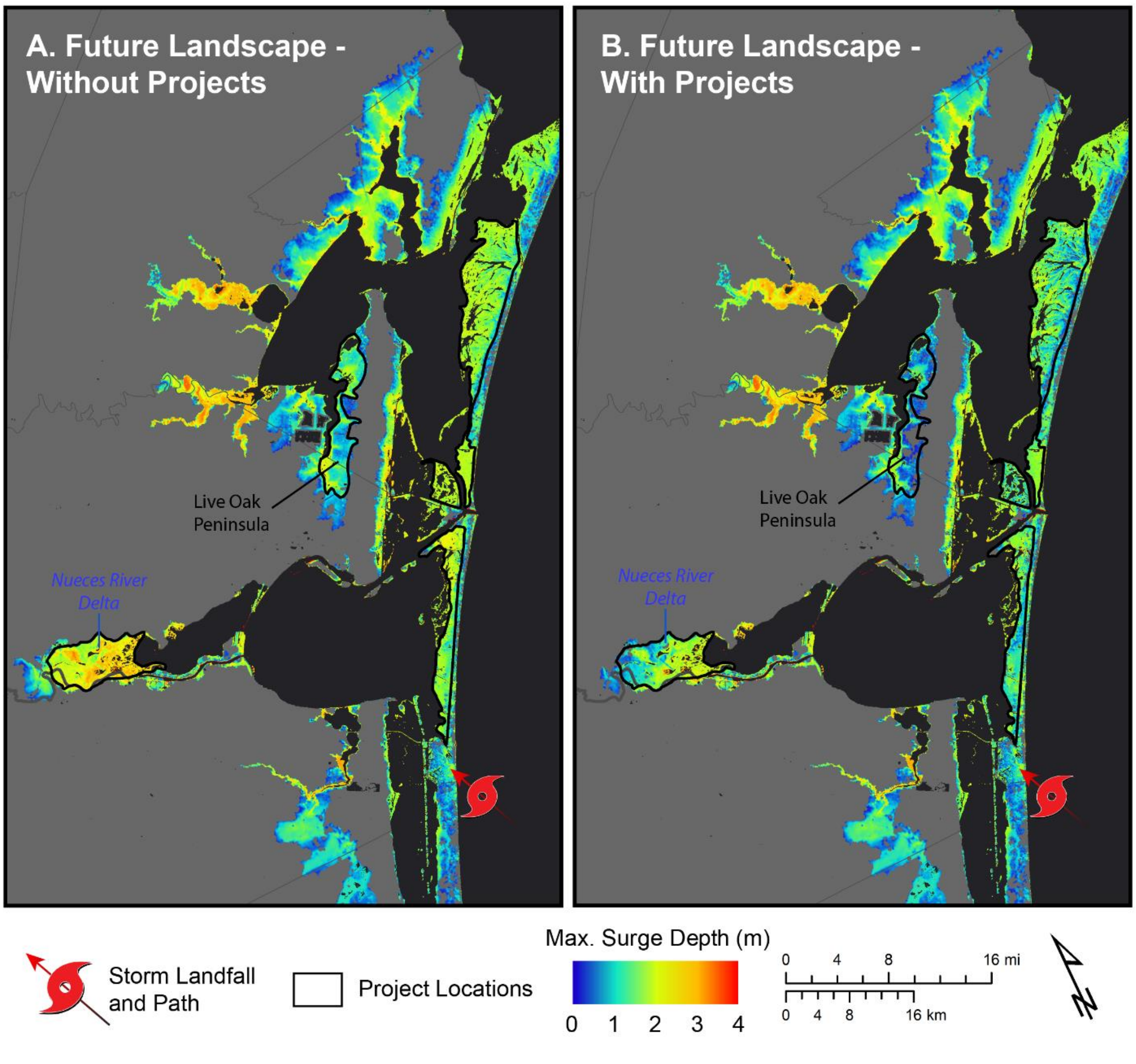


Figure 6-96: Comparison of maximum storm surge depth due to storm 416 in the future landscape A) Without resiliency projects and B) With resiliency projects

III. CONCLUSIONS

Because of relative sea level rise (RSLR), critical habitats will migrate landwards or be lost to open water, thus increasing the vulnerability of the natural and built environments to coastal storms by allowing farther inland penetration of storm surge. The conversion of vegetated wetlands to open water or intertidal flats reduces the amount of surface friction, which increases the inland effects of storm surge. Habitats can only migrate landward if there is open, undeveloped space available for them to occupy. Increasing development along the coast will decrease these open spaces and put more communities at risk of inundation. The purpose of this work is to provide a scale of relative vulnerability to habitat loss and storm surge along the Texas coast.

In Region 1, the amount of RSLR by 2100 is the highest in Texas – making it the most at-risk section of the coast. A projected net loss of fresh water wetlands increases this already high vulnerability. Although there is a net gain in salt and brackish water wetlands (18 sq. miles), the presence of extensive development on Galveston Island impedes the migration of wetlands on the barrier island, and by 2100 the marshes fringing the island are lost – along with the protection they provide. In the future landscape with sea level as much as 1.84 meters higher in some areas, the projected increase in the area of inundation from modeled Category 2 storms ranges from an additional 496 sq. miles to 624 sq. miles. This extended envelope of storm surge inundation coupled with a predicted substantial increase in development going into the future makes preparing these communities of paramount importance.

Region 2 is the only region on the Texas coast projected to suffer a net loss of both salt and fresh water wetlands by 2100. The loss of these two important habitats dramatically increases the vulnerability of the coastal communities on the middle coast as sea level is projected to increase 1.6 meters by 2100. A resultant increase in the area of inundation from modeled Category 2 storms ranging from 307 to 361 additional sq. miles shows the negative impacts of rising sea level and habitat loss. Projects that emphasize habitat conservation and creation could help this region increase its resiliency.

In Region 3, a net loss of fresh water wetlands in 2100 coupled with a projected rise in sea level up to 1.51 meters results in an additional 245 sq. miles of storm surge inundation from a modeled Category 2 storm. In this section of the coast, a net gain of 32% in the area of salt and brackish water wetlands by 2100 on the backside of the barrier islands and around the landward margins of the bays may aid in making this section of the coast relatively less vulnerable -- if those marshes are indeed allowed the space to migrate. Land and habitat conservation may be of particular importance in this region.

In Region 4, similarly to Region 3, there is a net increase in salt and brackish water wetlands and net decrease in fresh water wetlands. The net increase of salt and brackish water wetlands is significant – 415% of additional area is gained. This gain is driven by the expanse of transitional marshes inland as sea level rises - at the expense of fresh water wetlands and undeveloped dry land. However, the loss of sand flats and beaches here is the highest anywhere on the coast. Much of the barrier island is lost, especially along the backside. This is significant as the island provides storm protection, important habitat and is a major part of the regional economy. Landscape changes combined with a RSLR amount of about 1.4 meters results in an additional 303 sq. miles of inundated land from a Category 2 storm. Measures that protect the barrier island may be critical to increase the resiliency of the lower Texas coast.

The with-project models produced showed encouraging results closely replicating the present-day landscape between the present day and the year 2100. However, limitations within the models themselves make it difficult to sum up quantifiable Hazus outputs illustrating the benefits of the future-with-project conditions. For instance, in the current developed models, there remain some small, isolated land areas that show dramatic impacts due to relative sea level rise. These areas, in most cases, would likely make a more gradual transition of land cover type (due to habitat migration, etc.) than the models are able to predict using the current input parameters and modeling methodologies. The models need additional enhancements before they can be used to quantify accurately the expected economic damages.

There are other limitations to this work and modeling in general. For example: not every coastal process that will occur up until the year 2100 is capable of being modeled; assumptions are made about the amount and rate of RSLR; the outputs from one model and all of its assumptions are fed into another model with its own constraints. Even given these limitations, a better understanding of the coastal dynamics, the processes driving those dynamics, and how communities are affected by those various forces can be achieved by modeling. A greater understanding of the issues the coast may face in the future will aid in preparing for potential consequences.

These results emphasize the need for multiple lines of defense up and down the Texas coast to increase resiliency. These strategies will differ from community to community given the relative sensitivity of various parameters that might tilt the landscape in one direction or the other or change the pattern of storm surge in the future. The best way to increase ecosystem and community resiliency is to focus on ecosystem conservation and restoration coupled with responsible development.

F. Building and Economic Damages Modeling

Hazus is a GIS-based FEMA modeling program that estimates damages and potential losses from natural hazards such as floods and hurricanes. For the 2019 Resiliency Plan, Hazus was used to analyze the impacts of storm surge and sea level rise on the built environment and populations.

This study focused on loss estimates analyzed in Hazus for physical damage to residential and non-residential structures such as commercial buildings, schools and critical facilities, along with business interruptions. The goal of running the different scenarios through Hazus was to better quantify the reduction in damages and associated losses provided by the implementation of large-scale nature-based projects and to quantify relative increases to the level of risk along the coast for future conditions (2100) in comparison to present day.

As noted above, economic damages are not currently quantified for future-with-project model scenarios.

I. Model Inputs

The results of the SWAN+ADCIRC model runs were converted into inundation depth grids that were directly imported into Hazus version 4.2 SP01 (released May 2018). The no-action and with-project scenarios of SWAN+ADCIRC data were used to run a Level 2 Hazus flood analysis. A Level 2 Hazus flood analysis is defined as an analysis that includes user-provided data for either hazard or structure information. For this study, the flood hazard data was user-provided in the form of flood depth grids from SWAN+ADCIRC outputs. The structure information utilized the default Hazus General Building Stock (GBS) for Texas in Hazus v4.2 SP01, which consisted of census block data based on the 2010 census with 2018 replacement values based on RS Means. Hazus GBS data since 2015 has been dasymetrically-clipped, where the census block geometry is modified to only include land covers associated with development.

The inputs were used to produce comparable storm damage values for both scenarios (current conditions and 2100 conditions), which provided quantified damage values and damage reduction values for correlation with the future project build-out that can be applied categorically to the 2019 Resiliency Plan Tier 1 projects.

II. Model Results

Hazus version 4.2 SP01 was used for all loss analyses, utilizing cloud-based virtual machines (VMs) hosted on Amazon Web Services (AWS). Traditionally, Hazus is hosted and run on individual PCs, with each individual study area (which may cover all or a portion of a scenario) taking up to several days to complete all run-time calculations. On a project like this with a large study area and detailed flood depth grids, this traditional approach would have taken several months. The use of AWS VMs allowed for the development of a large number of Hazus instances to run multiple study areas at the same time. Also, the AWS VMs have the flexibility to be configured to run faster than traditional PCs by using faster processors and expanded run-time available working memory. Benchmark testing for this project found the AWS VMs decreased runtime by over 50% and use of multiple Hazus instances allowed all calculations to be performed in weeks instead of months.

Loss estimates were modeled in Hazus for physical damage resulting from storm surge and sea level rise on residential and non-residential structures such as commercial buildings, schools, and critical facilities, along with business interruptions. The models targeted the impacts on 6 metro areas on the Texas coast: Beaumont/Port Arthur/Orange, Houston/Galveston, Freeport, Calhoun/Matagorda, Corpus Christi/Coastal Bend, and South Padre Island. The models were run for current conditions and future conditions (2100) with no action. The resulting Hazus data provided information for each metro area regarding estimated physical damage and approximate economic loss estimates. Four tables were generated for each metro area to summarize their physical and economic loss.

Hazus model results for physical damage data included statistics regarding building use per metro area, and physical damage occurring to those buildings as a result of storm surge and sea level rise. Hazus categorized buildings as either residential or non-residential (primarily commercial). Residential buildings were further classified into: 1 story, 2 story, 3 story, or split level. Commercial buildings were classified as low rise, midrise, or high rise. These classifications were summarized into tables for each metro area, which can be found in the **"Building Statistics"** table under each metro area's results below.

The **"Physical Damage Results"** table under each metro area summarizes the physical damages that are predicted to occur to the buildings due to storm surge and sea level rise. Water levels output from the SWAN+ADCIRC results were analyzed to determine the percentage of physical damage that would occur in each building. The total number of buildings with damages was determined by summing the number of buildings with any percentage of damage, ranging from 1 percent to 100 percent. Buildings damaged by 50 percent or greater are defined by FEMA as having substantial damage and are a subset of the total number of buildings with damages. The total number of buildings included in the study area was estimated using Hazus data at the census block level based on census population data and non-residential third-party data sources.

In addition to the physical damages, Hazus models also included economic loss estimates for each metro area. Losses were modeled by Hazus for seven different economic categories. According to the Hazus User Manual, the seven economic loss categories are defined as:

1. **Building Loss** – building repair or replacement costs for damaged or destroyed buildings
2. **Content Loss** – damaged furniture or equipment that is not an essential part of the building or business
3. **Inventory Loss** – damage to property within the building that is part of the occupant's business activities
4. **Relocation Cost** – disruption costs of relocation when buildings or portions of buildings are unusable while being repaired, and rental costs of temporary space

5. **Income Loss** – losses in productivity, services, or sales that occur when building damage disrupts commercial activity
6. **Rental Income Loss** – loss of rental income to building owners when the building or portions of the building are unusable while being repaired
7. **Wage Loss** – loss of income of employees when building damage disrupts business activities

These seven categories add up to the total loss in economic damages resulting from storm surge and sea level rise. Economic loss values generated in Hazus are approximate (particularly considering that 2018 development conditions are used to determine both the current condition and 2100 scenario results), are given in 2018 U.S. dollars (USD), and are summarized in the **"Economic Damage Results"** table under each metro area's results.

In addition to the economic loss categories, Hazus also tabulated ranges of total estimated building losses and tabulated the number of census blocks falling within that range in each metro area. A summary of these results may be found in the **"Total Building Loss per Census Block"** table under each metro area's results.

i. Beaumont/Port Arthur/Orange Storm Landfall Results

About 66% of residential buildings in Beaumont/Port Arthur/Orange are classified as one story, and 97% of non-residential buildings are considered low-rise (Table 6-23). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 586% by 2100 if no action were to occur (Table 6-24). Due to the increase of building damages, the cost of building losses would increase by 680% and the total economic loss would increase by 416% for the metro area (Table 6-25). In 2100, results show that an additional 3,168, or 3%, of census blocks would be impacted by the hurricane modeled (Table 6-26).

The results from Table 6-24 are shown spatially in Figure 6-97 for current conditions and Figure 6-98 for future conditions. The results from Table 6-25 are shown spatially in Figure 6-99 for current conditions and Figure 6-100 for future conditions.

Table 6-23: Beaumont/Port Arthur/Orange Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	97%
Residential 2 Story	32%	Percent Mid Rise	2%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-24: Beaumont/Port Arthur/Orange Storm Landfall - Physical Damage Results

		Number of Buildings Current Conditions	2100 No Action	Percent Increase in Damages
Buildings Damaged 1 to 10%		411	906	120%
Buildings Damaged 11 to 20%		1,705	6,139	260%
Buildings Damaged 21 to 30%		479	3,105	548%
Buildings Damaged 31 to 40%		303	1,434	373%
Buildings Damaged 41 to 50%		218	1,163	433%
Buildings Damaged 51 to 60%		0	34	-
Buildings Damaged 61 to 70%		153	966	531%
Buildings Damaged 71 to 80%		86	872	914%
Buildings Damaged 81 to 90%		58	833	1336%
Buildings Damaged 91 to 100%		757	13,164	1639%
Totals	**Number of Buildings with Damages**	**4,170**	**28,616**	**586%**
	Number of Buildings with Substantial Damages	1,054	15,869	1406%
	Number of Buildings with No Damages	6,692	13,856	-
	Total Number of Buildings	**10,862**	**42,472**	**-**

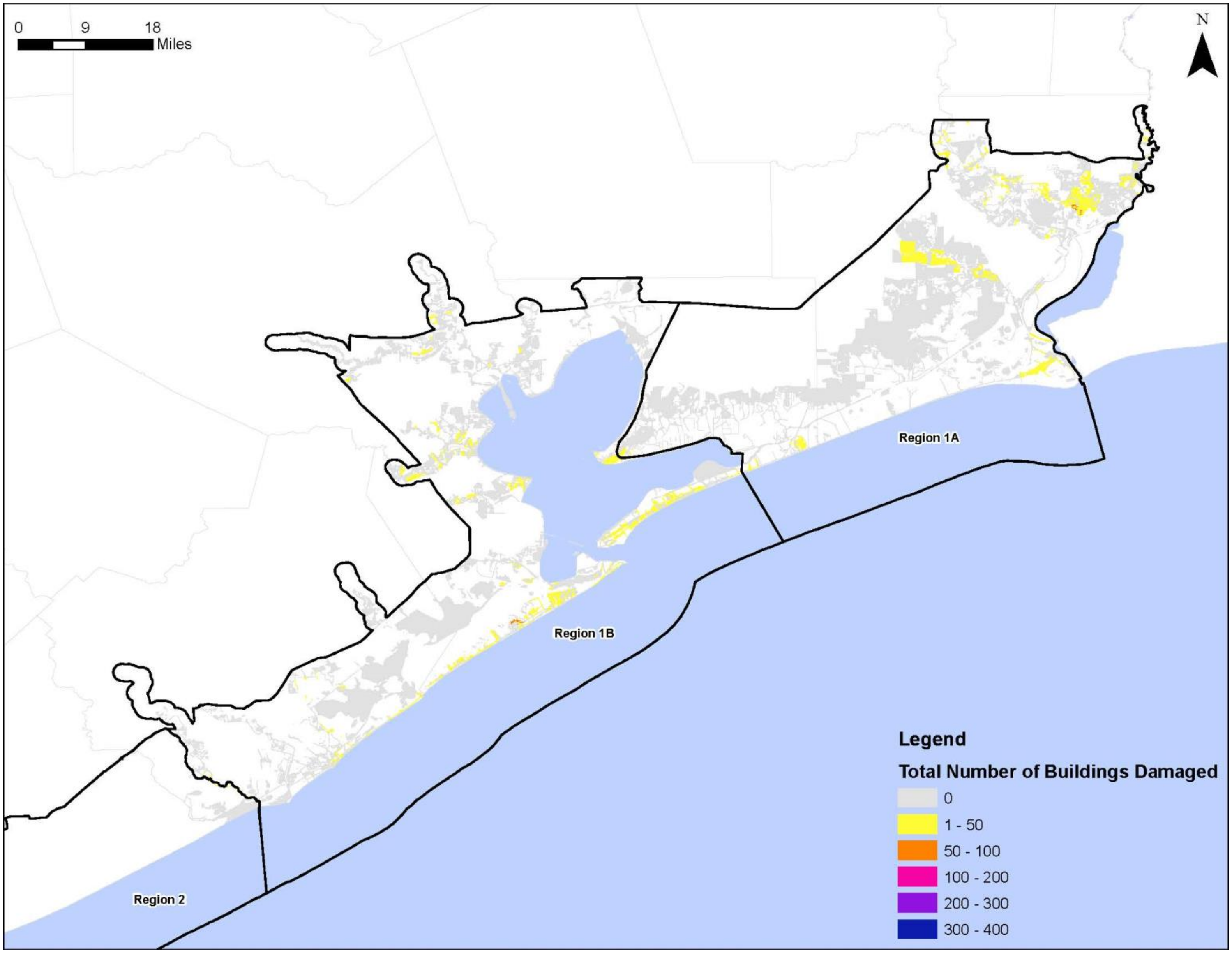


Figure 6-97: Beaumont/Port Arthur/Orange Storm Landfall – Current Condition Damaged Buildings

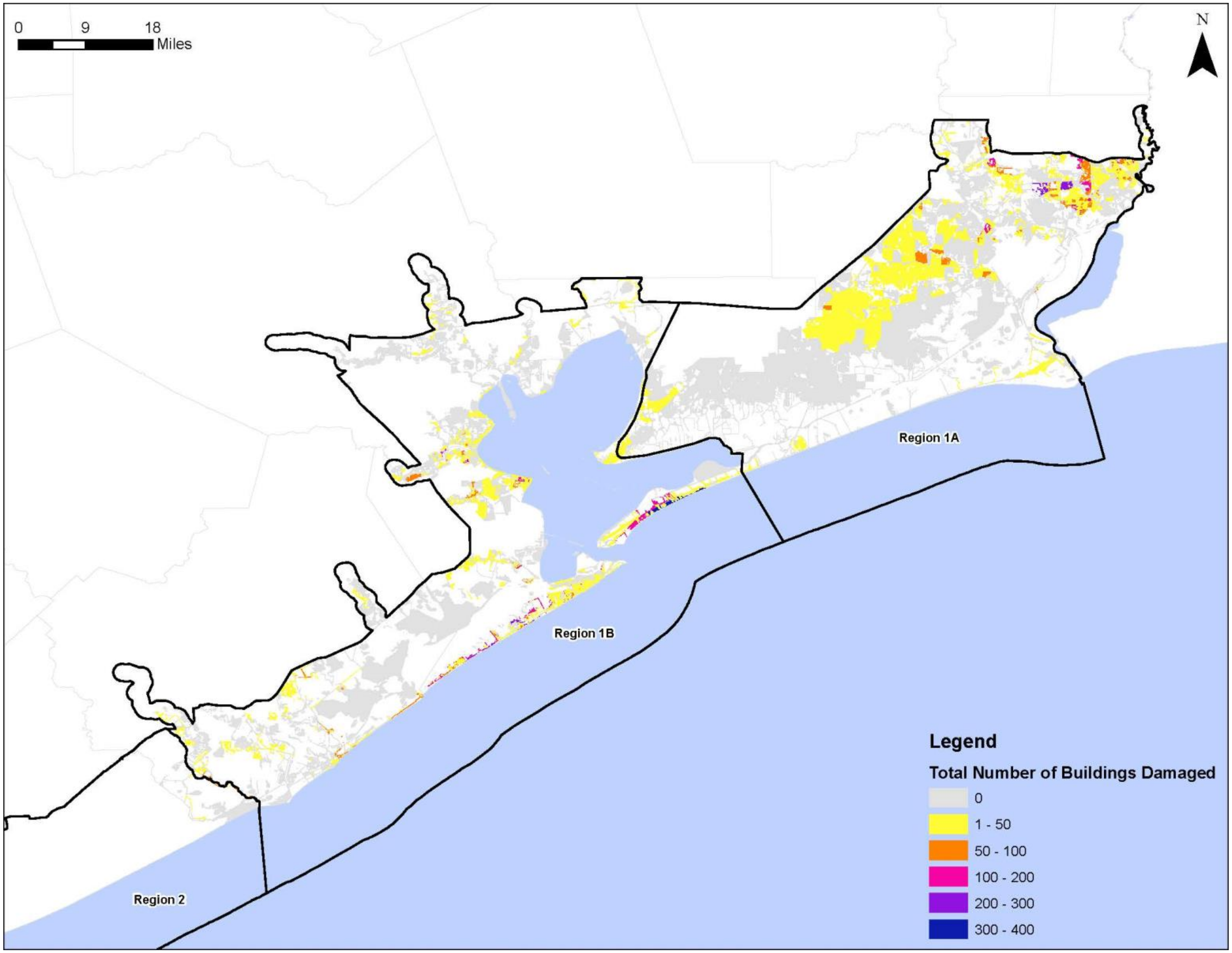


Figure 6-98: Beaumont/Port Arthur/Orange Storm Landfall – Future Condition Damaged Buildings

Table 6-25: Beaumont/Port Arthur/Orange Storm Landfall - Economic Damage Results

	Damages in $ USD 2018		
Category	Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 739,200,000	$ 5,766,009,000	680%
Content Loss	$ 654,592,000	$ 4,936,931,000	654%
Inventory Loss	$ 10,484,000	$ 76,394,000	629%
Relocation Cost	$ 407,659,000	$ 1,592,487,000	291%
Income Loss	$ 411,654,000	$ 1,191,819,000	190%
Rental Income Loss	$ 169,627,000	$ 675,177,000	298%
Wage Loss	$ 868,404,000	$ 2,589,638,000	198%
Total Loss	**$ 3,261,620,000**	**$ 16,828,455,000**	**416%**

Table 6-26: Beaumont/Port Arthur/Orange Storm Landfall - Total Building Loss per Census Block

	Number of Census Blocks		
Total Loss Range per Census Block	Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	112,101	108,933	-3%
Census Block Loss $1-$100,000	1,138	836	-27%
Census Block Loss $100,001-$500,000	968	1,378	42%
Census Block Loss $500,001-$1M	362	1,122	210%
Census Block Loss $1M-$5M	550	2,225	305%
Census Block Loss $5M-$10M	71	403	468%
Census Block Loss $10M-$20M	34	219	544%
Census Block Loss $20M-$30M	5	68	1260%
Census Block Loss $30M-$40M	2	18	800%
Census Block Loss $40M-$50M	0	14	-
Census Block Loss $50M-$100M	3	14	367%
Census Block Loss $100M+	1	5	400%
Total Number of Census Blocks		**115,235**	

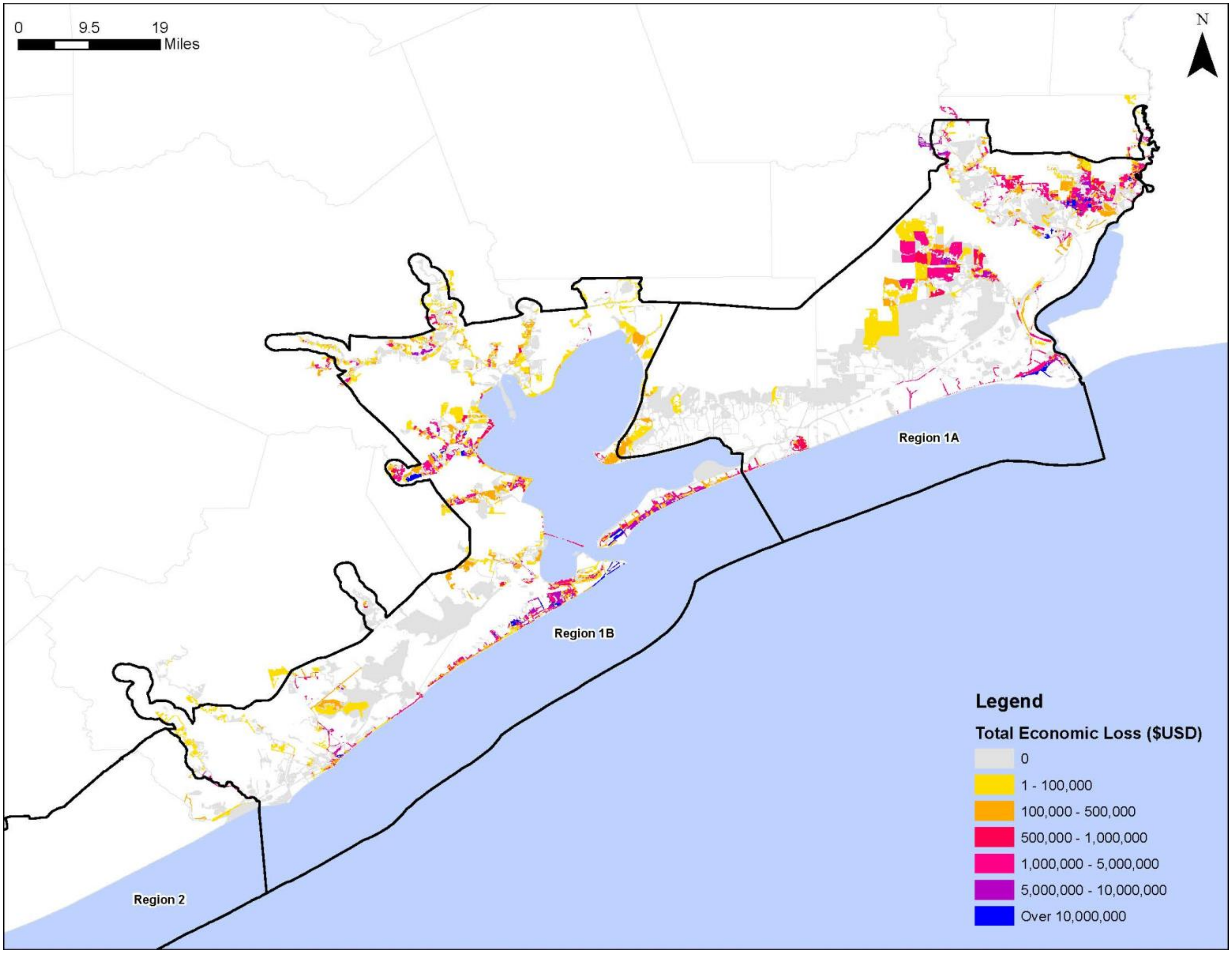


Figure 6-99: Beaumont/Port Arthur/Orange Storm Landfall – Current Condition Economic Loss

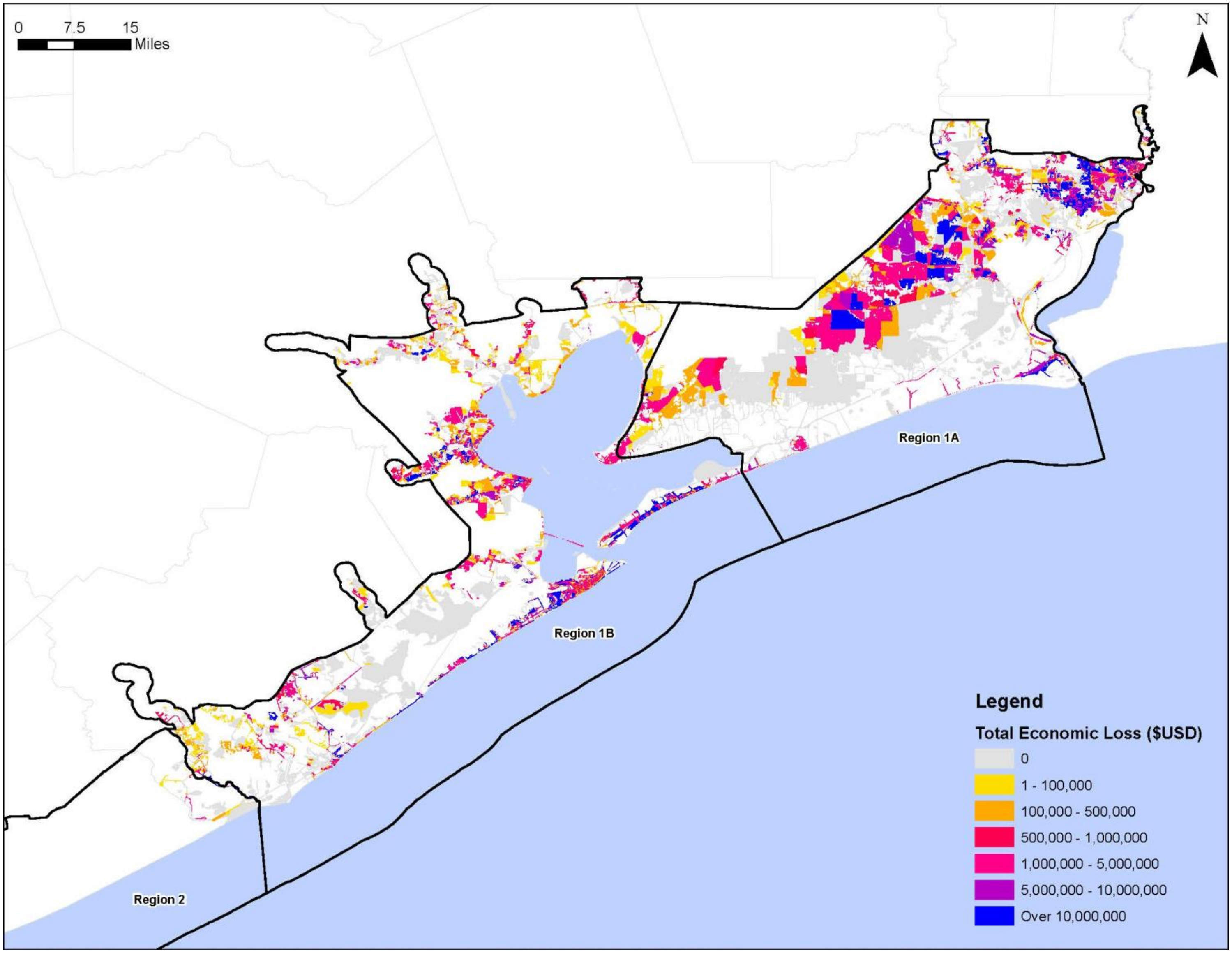


Figure 6-100: Beaumont/Port Arthur/Orange Storm Landfall – Future Condition Economic Loss

ii. Houston/Galveston Storm Landfall Results

About 66% of residential buildings in Houston/Galveston are classified as one story, and 97% of non-residential buildings are considered low rise (Table 6-27). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 329% by 2100 if no action were to occur (Table 6-28). Due to the increase of building damages, the cost of building losses would increase by 367% and the total economic loss would increase by 283% for the metro area (Table 6-29). In 2100, results show that an additional 2,958, or 3%, of census blocks would be impacted by the hurricane modeled (Table 6-30).

The results from Table 6-28 are shown spatially in Figure 6-101 for current conditions and Figure 6-102 for future conditions. The results from Table 6-29 are shown spatially in Figure 6-103 for current conditions and Figure 6-104 for future conditions.

Table 6-27: Houston/Galveston Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	97%
Residential 2 Story	32%	Percent Mid Rise	2%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-28: Houston/Galveston Storm Landfall - Physical Damage Results

		Number of Buildings		
		Current Conditions	2100 No Action	Percent Increase in Damages
Buildings Damaged 1 to 10%		481	1,339	178%
Buildings Damaged 11 to 20%		2,174	7,169	230%
Buildings Damaged 21 to 30%		756	2,954	291%
Buildings Damaged 31 to 40%		396	1,546	290%
Buildings Damaged 41 to 50%		318	1,316	314%
Buildings Damaged 51 to 60%		0	93	-
Buildings Damaged 61 to 70%		243	935	285%
Buildings Damaged 71 to 80%		149	819	450%
Buildings Damaged 81 to 90%		109	689	532%
Buildings Damaged 91 to 100%		1,612	9,881	513%
Totals	**Number of Buildings with Damages**	**6,238**	**26,741**	**329%**
	Number of Buildings with Substantial Damages	2,113	12,417	488%
	Number of Buildings with No Damages	7,247	17,379	-
	Total Number of Buildings	**13,485**	**44,120**	**-**

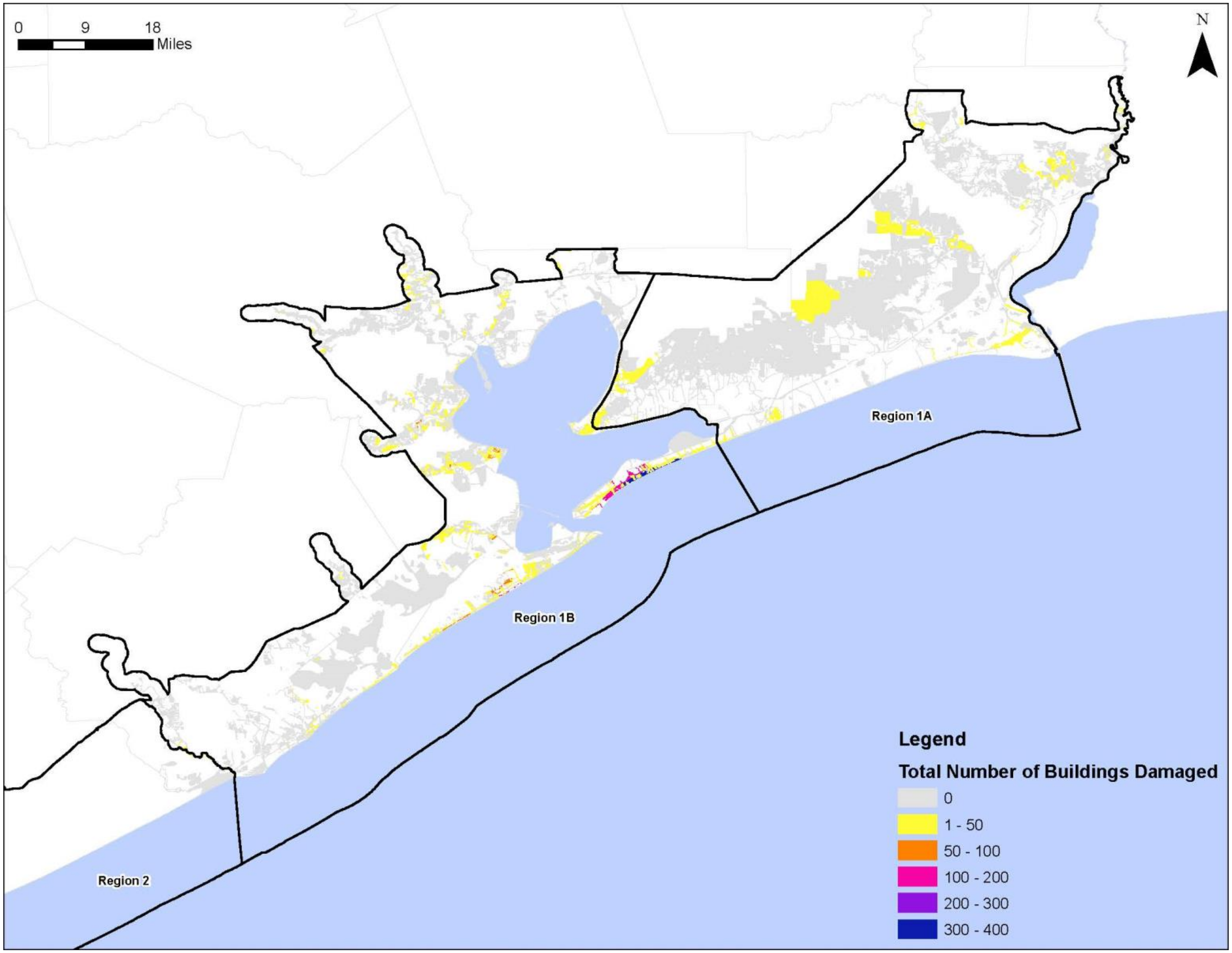


Figure 6-101: Houston/Galveston Storm Landfall – Current Condition Damaged Buildings

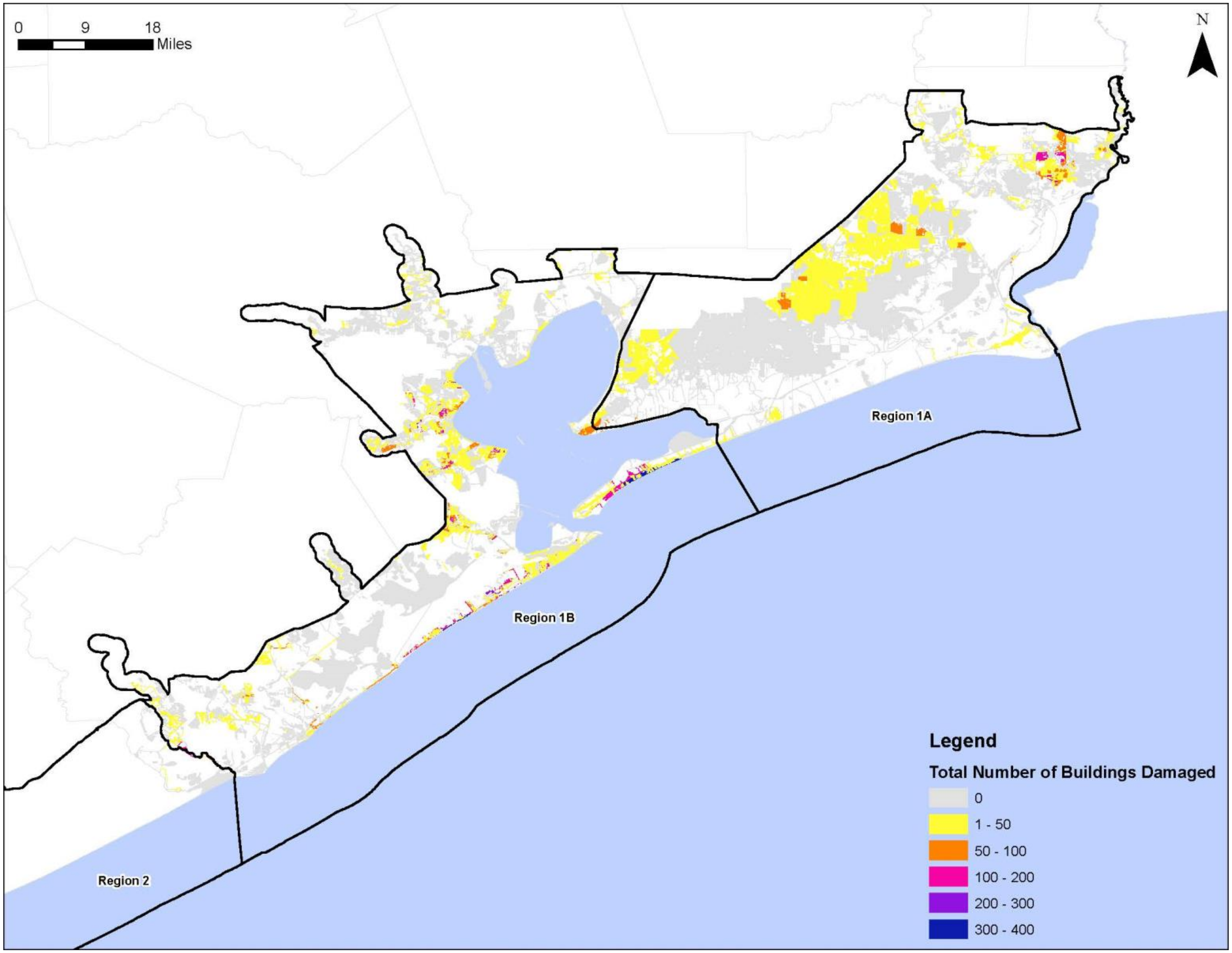


Figure 6-102: Houston/Galveston Storm Landfall – Future Condition Damaged Buildings

Table 6-29: Houston/Galveston Storm Landfall - Economic Damage Results

Category	Damages in $ USD 2018 Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 1,150,389,000	$ 5,367,706,000	367%
Content Loss	$ 987,784,000	$ 4,458,201,000	351%
Inventory Loss	$ 17,887,000	$ 68,876,000	285%
Relocation Cost	$ 494,338,000	$ 1,597,977,000	223%
Income Loss	$ 439,041,000	$ 1,198,179,000	173%
Rental Income Loss	$ 212,277,000	$ 693,466,000	227%
Wage Loss	$ 850,185,000	$ 2,530,997,000	198%
Total Loss	**$ 4,151,901,000**	**$ 15,915,402,000**	**283%**

Table 6-30: Houston/Galveston Storm Landfall - Total Building Loss per Census Block

Total Loss Range per Census Block	Number of Census Blocks Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	111,644	108,686	-3%
Census Block Loss $1-$100,000	1,174	968	-18%
Census Block Loss $100,001-$500,000	1,120	1,650	47%
Census Block Loss $500,001-$1M	443	1,146	159%
Census Block Loss $1M-$5M	670	2,089	212%
Census Block Loss $5M-$10M	81	357	341%
Census Block Loss $10M-$20M	41	189	361%
Census Block Loss $20M-$30M	11	55	400%
Census Block Loss $30M-$40M	3	20	567%
Census Block Loss $40M-$50M	4	16	300%
Census Block Loss $50M-$100M	2	13	550%
Census Block Loss $100M+	1	5	400%
Total Number of Census Blocks		**115,194**	

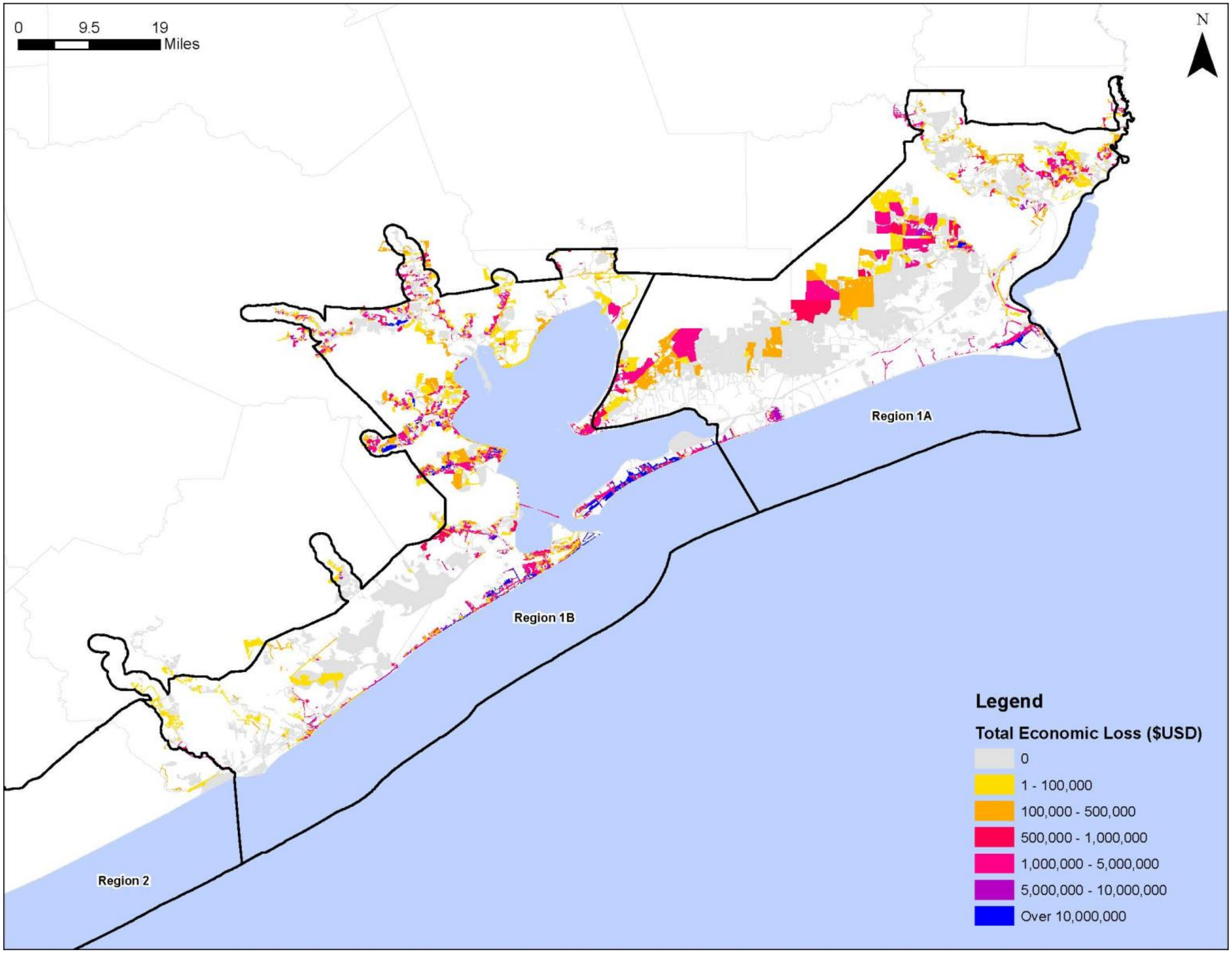


Figure 6-103: Houston/Galveston Storm Landfall – Current Condition Economic Loss

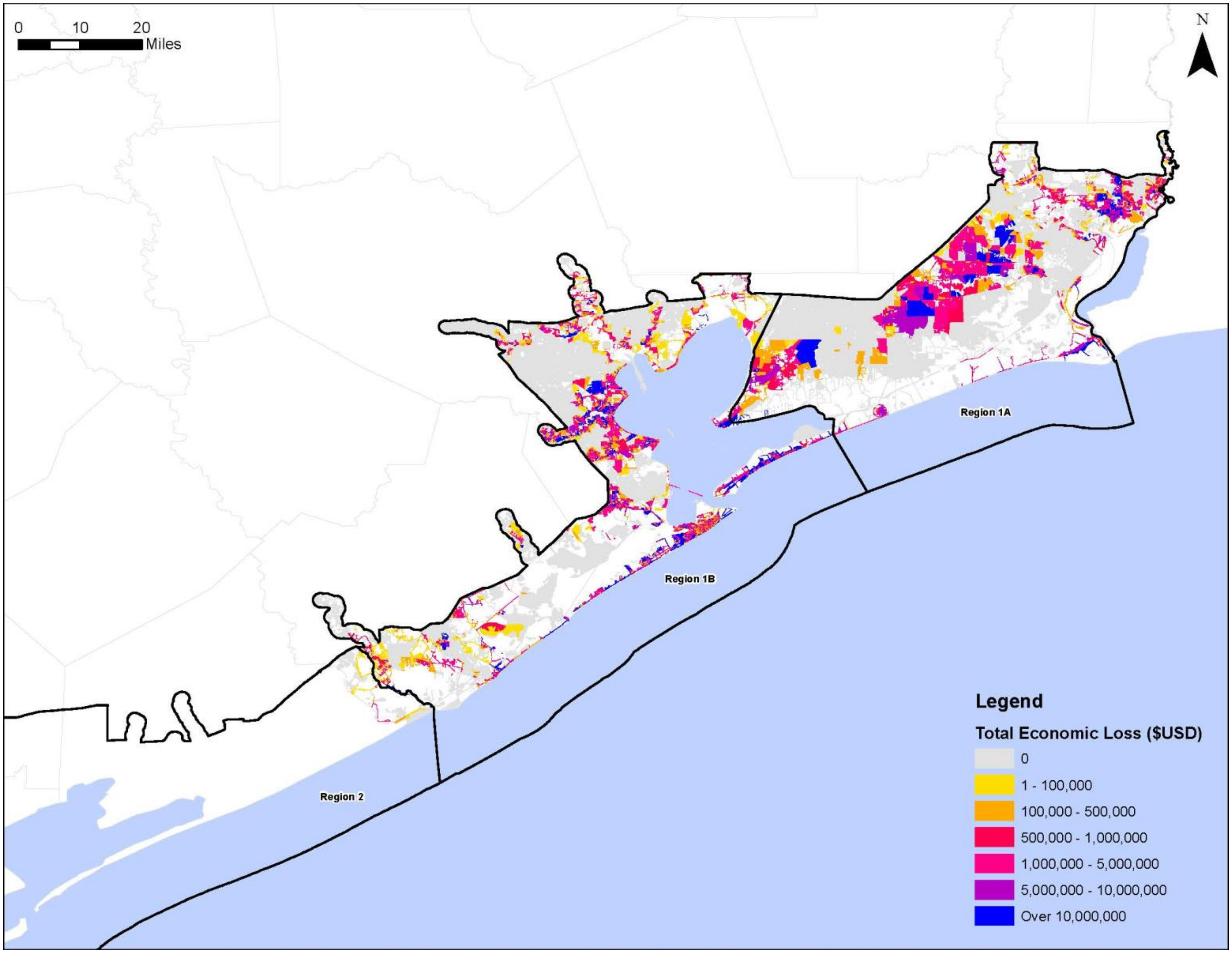


Figure 6-104: Houston/Galveston Storm Landfall – Future Condition Economic Loss

iii. Freeport Storm Landfall Results

About 66% of residential buildings in Freeport are classified as one story, and 97% of non-residential buildings are considered low-rise (Table 6-31). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 193% by 2100 if no action were to occur (Table 6-32). Due to the increase of building damages, the cost of building losses would increase by 208% and the total economic loss would increase by 178% for the metro area (Table 6-33). In 2100, results show that an additional 2,649, or 2%, of census blocks would be impacted by the hurricane modeled (Table 6-34).

The results from Table 6-32 are shown spatially in Figure 6-105 for current conditions and Figure 6-106 for future conditions. The results from Table 6-33 are shown spatially in Figure 6-107 for current conditions and Figure 6-108 for future conditions.

As visible in each of the figures, a storm that directly hits Freeport would inundate much of the Houston-Galveston metro area as well. This causes the total loss estimates for the Freeport storm to be much higher, as it also includes damages to the Houston/Galveston area.

Table 6-31: Freeport Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	97%
Residential 2 Story	32%	Percent Mid Rise	2%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-32: Freeport Storm Landfall - Physical Damage Results

		Number of Buildings		Percent Increase in Damages
		Current Conditions	2100 No Action	
Buildings Damaged 1 to 10%		692	1,580	128%
Buildings Damaged 11 to 20%		3,603	8,571	138%
Buildings Damaged 21 to 30%		2,058	5,023	144%
Buildings Damaged 31 to 40%		725	2,581	256%
Buildings Damaged 41 to 50%		441	1,737	294%
Buildings Damaged 51 to 60%		0	143	-
Buildings Damaged 61 to 70%		353	1,268	259%
Buildings Damaged 71 to 80%		374	1,094	193%
Buildings Damaged 81 to 90%		389	1,012	160%
Buildings Damaged 91 to 100%		6,556	21,492	228%
Totals	**Number of Buildings with Damages**	**15,191**	**44,501**	**193%**
	Number of Buildings with Substantial Damages	7,672	25,009	226%
	Number of Buildings with No Damages	9,041	11,898	-
	Total Number of Buildings	**24,232**	**56,399**	**-**

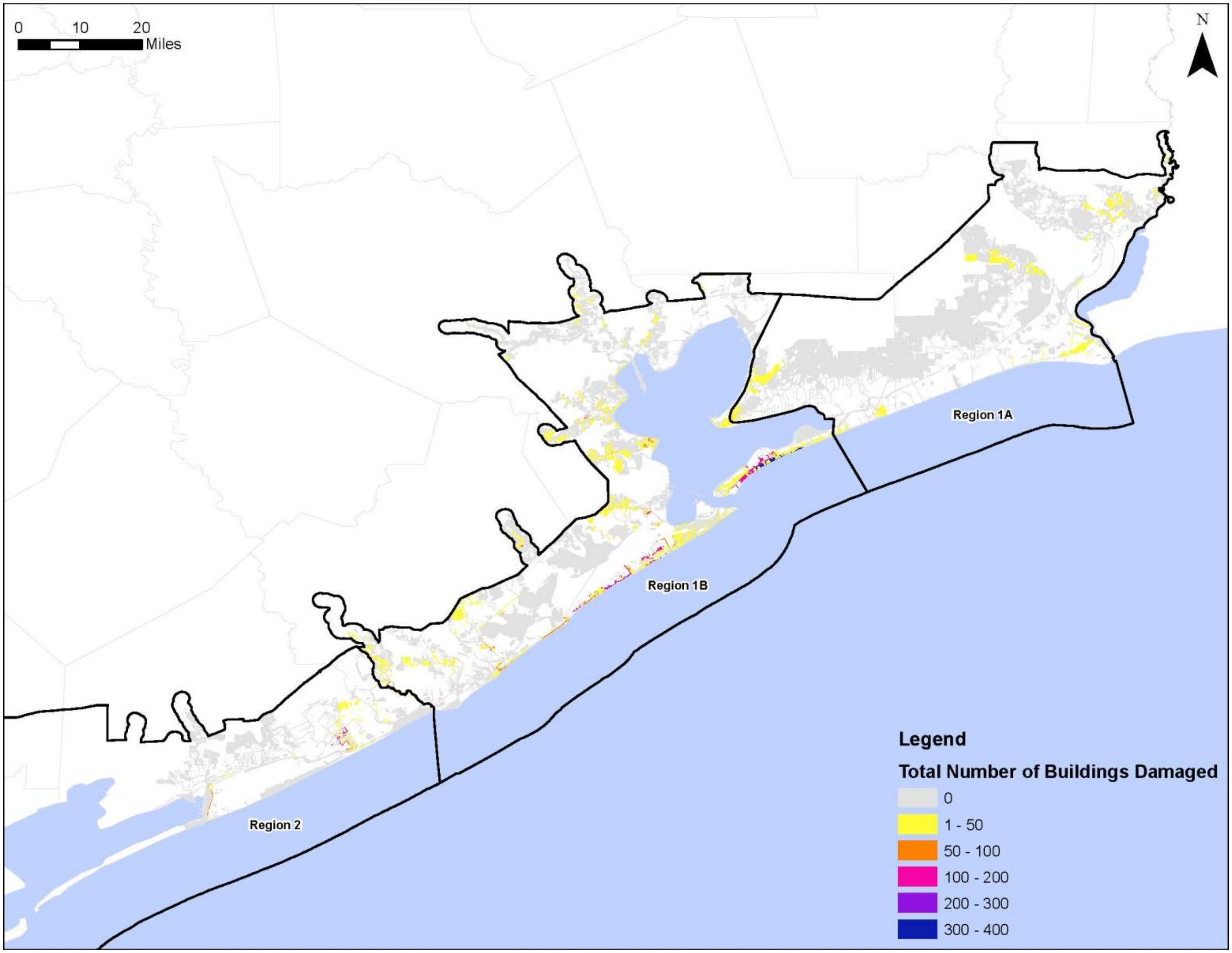


Figure 6-105: Freeport Storm Landfall – Current Condition Damaged Buildings

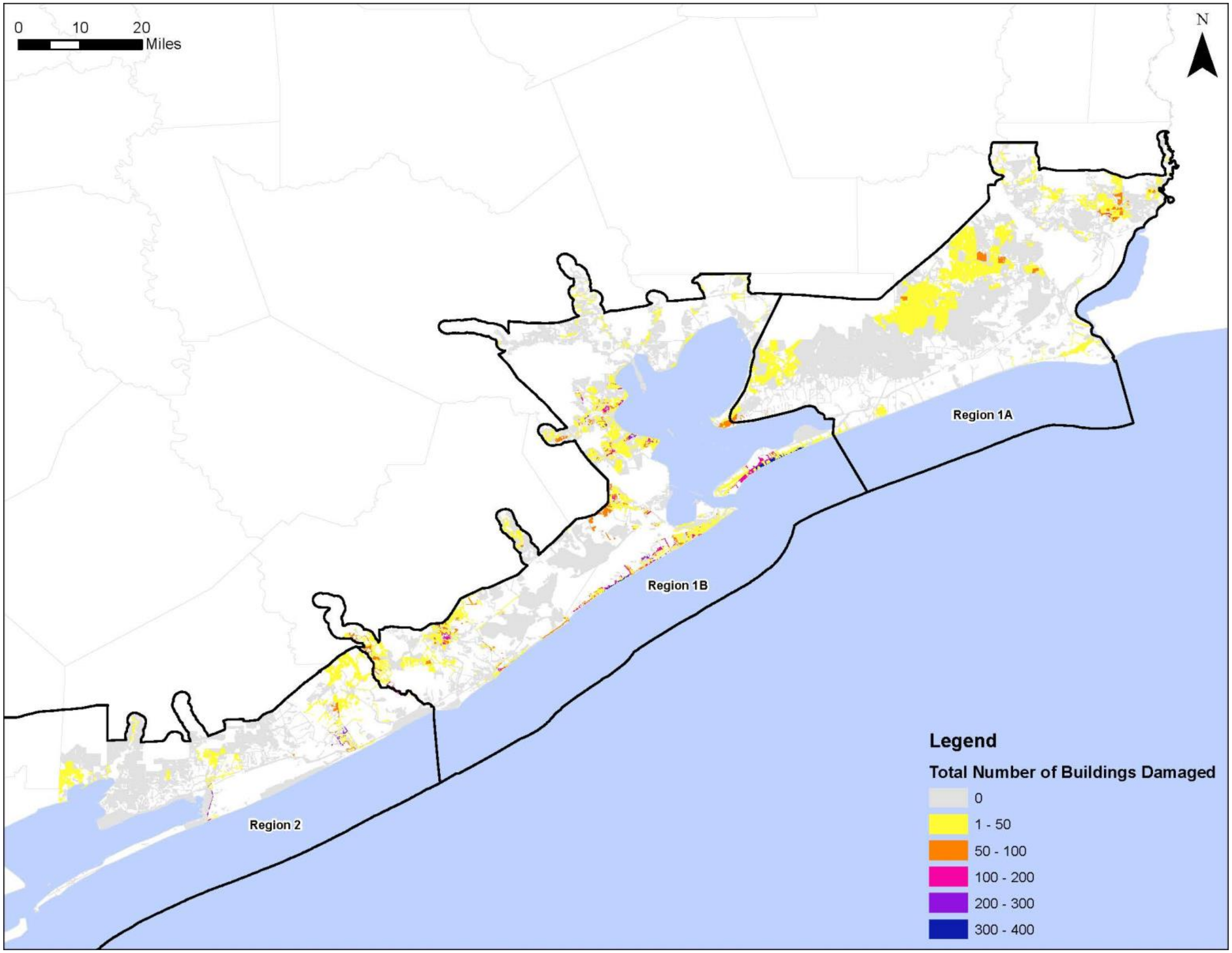


Figure 6-106: Freeport Storm Landfall – Future Condition Damaged Buildings

Table 6-33: Freeport Storm Landfall - Economic Damage Results

Category	Damages in $ USD 2018 Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 2,984,291,000	$ 9,203,648,000	208%
Content Loss	$ 2,401,881,000	$ 7,486,778,000	212%
Inventory Loss	$ 31,257,000	$ 97,224,000	211%
Relocation Cost	$ 902,154,000	$ 2,207,505,000	145%
Income Loss	$ 708,075,000	$ 1,544,377,000	118%
Rental Income Loss	$ 389,553,000	$ 953,204,000	145%
Wage Loss	$ 1,445,351,000	$ 3,134,145,000	117%
Total Loss	**$ 8,862,562,000**	**$ 24,626,881,000**	**178%**

Table 6-34: Freeport Storm Landfall - Total Building Loss per Census Block

Total Loss Range per Census Block	Number of Census Blocks Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	111,004	108,355	-2%
Census Block Loss $1-$100,000	1,165	981	-16%
Census Block Loss $100,001-$500,000	1,400	1,338	-4%
Census Block Loss $500,001-$1M	697	1,046	50%
Census Block Loss $1M-$5M	1,137	2,985	163%
Census Block Loss $5M-$10M	176	549	212%
Census Block Loss $10M-$20M	102	282	176%
Census Block Loss $20M-$30M	29	99	241%
Census Block Loss $30M-$40M	14	42	200%
Census Block Loss $40M-$50M	9	24	167%
Census Block Loss $50M-$100M	7	32	357%
Census Block Loss $100M+	3	10	233%
Total Number of Census Blocks		**115,743**	

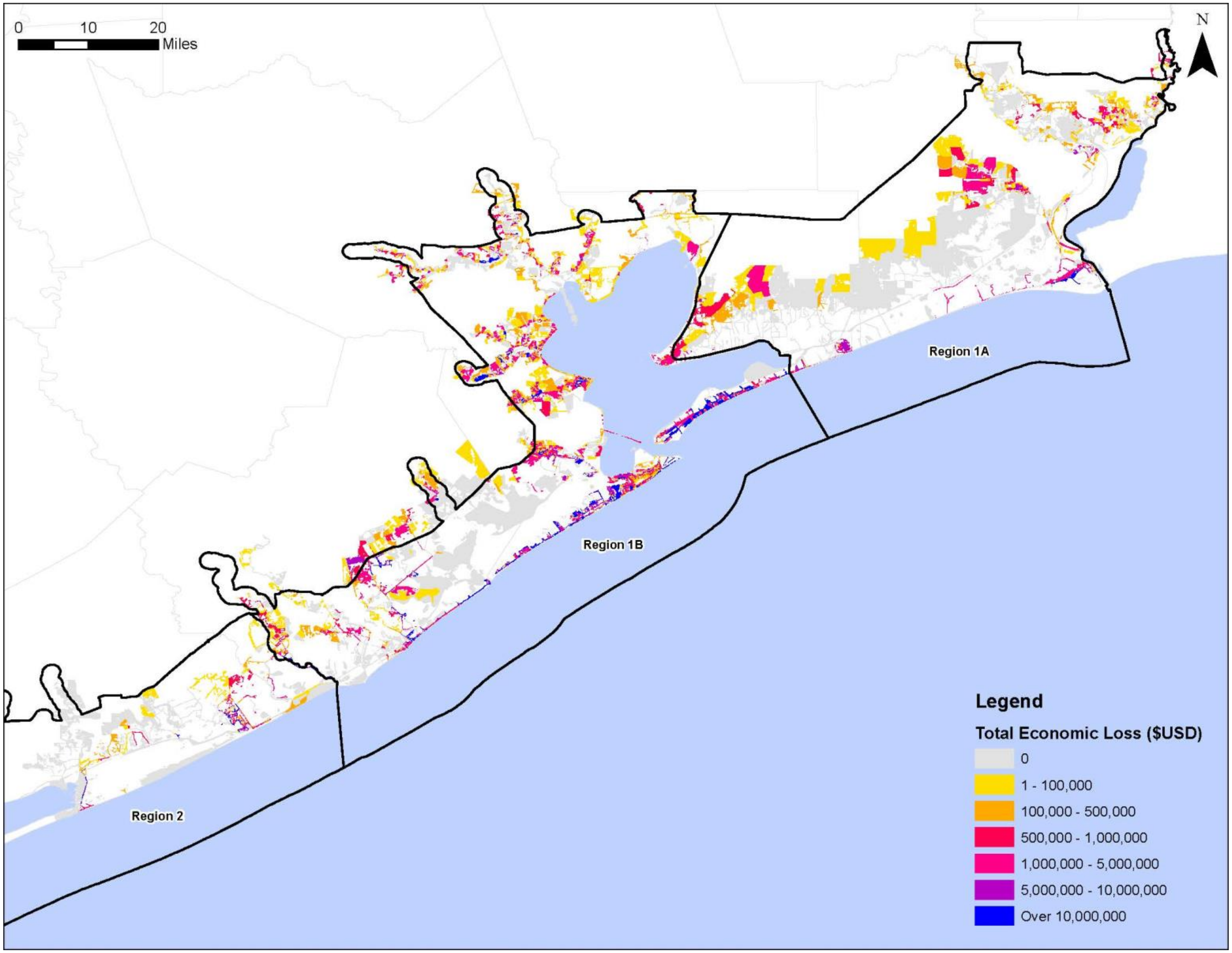


Figure 6-107: Freeport Storm Landfall – Current Condition Economic Loss

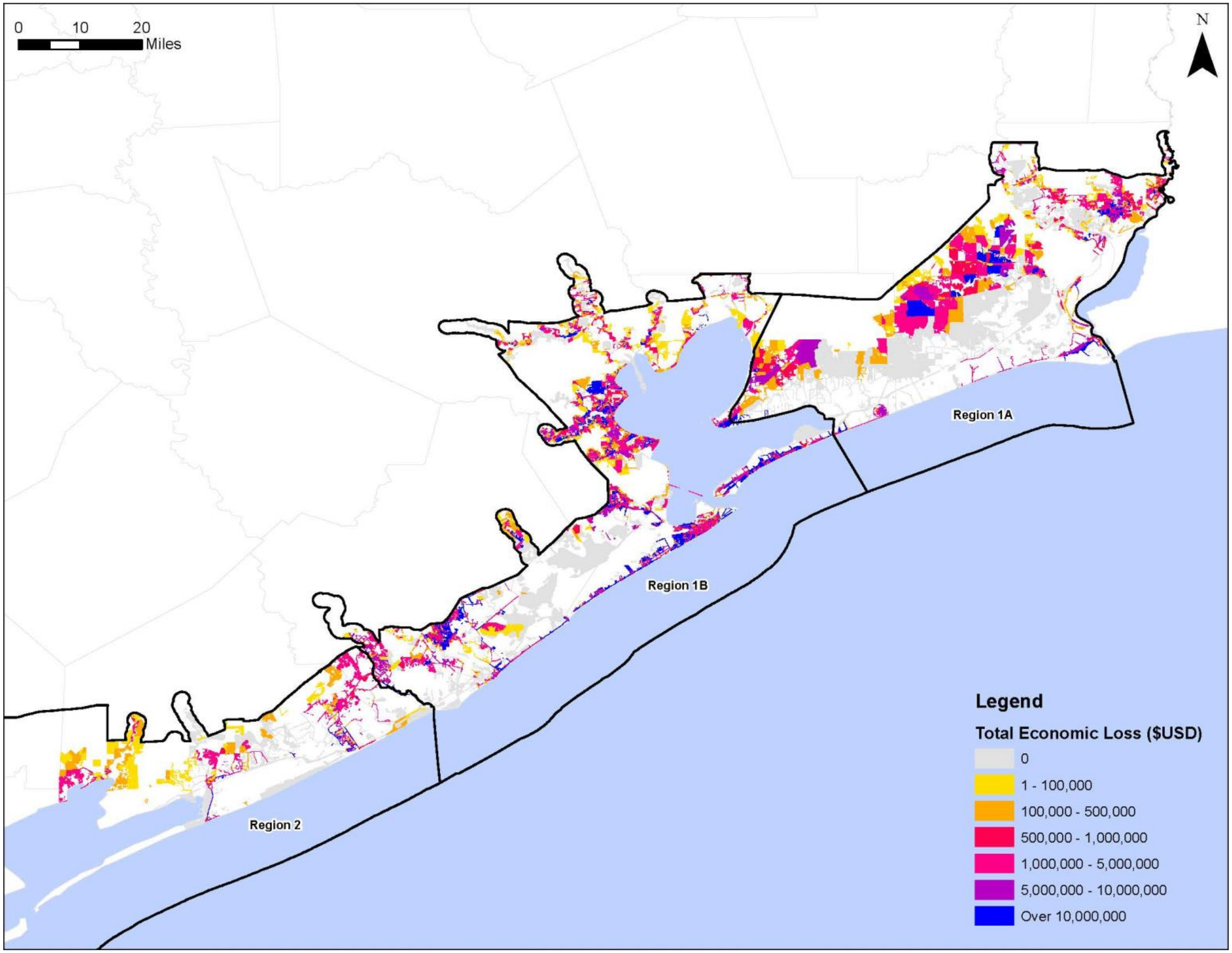


Figure 6-108: Freeport Storm Landfall – Future Condition Economic Loss

iv. Calhoun/Matagorda Storm Landfall Results

About 66% of residential buildings in Calhoun/Matagorda are classified as one story, and 87% of non-residential buildings are considered low-rise (Table 6-35). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 956% by 2100 if no action were to occur (Table 6-36). Due to the increase of building damages, the cost of building losses would increase by 1,294% and the total economic loss would increase by 1,120% for the metro area (Table 6-37). In 2100, results show that an additional 1,409, or 4%, of census blocks would be impacted by the hurricane modeled (Table 6-38).

The results from Table 6-36 are shown spatially in Figure 6-109 for current conditions and Figure 6-110 for future conditions. The results from Table 6-37 are shown spatially in Figure 6-111 for current conditions and Figure 6-112 for future conditions.

Table 6-35: Calhoun/Matagorda Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	87%
Residential 2 Story	32%	Percent Mid Rise	12%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-36: Calhoun/Matagorda Storm Landfall - Physical Damage Results

		Number of Buildings		
		Current Conditions	**2100 No Action**	**Percent Increase in Damages**
Buildings Damaged 1 to 10%		66	403	511%
Buildings Damaged 11 to 20%		300	2,192	631%
Buildings Damaged 21 to 30%		76	967	1172%
Buildings Damaged 31 to 40%		50	463	826%
Buildings Damaged 41 to 50%		44	411	834%
Buildings Damaged 51 to 60%		0	17	-
Buildings Damaged 61 to 70%		22	310	1309%
Buildings Damaged 71 to 80%		14	274	1857%
Buildings Damaged 81 to 90%		11	248	2155%
Buildings Damaged 91 to 100%		273	3,752	1274%
Totals	**Number of Buildings with Damages**	**856**	**9,037**	**956%**
	Number of Buildings with Substantial Damages	320	4,601	1338%
	Number of Buildings with No Damages	1,556	5,653	-
	Total Number of Buildings	**2,412**	**14,690**	**-**

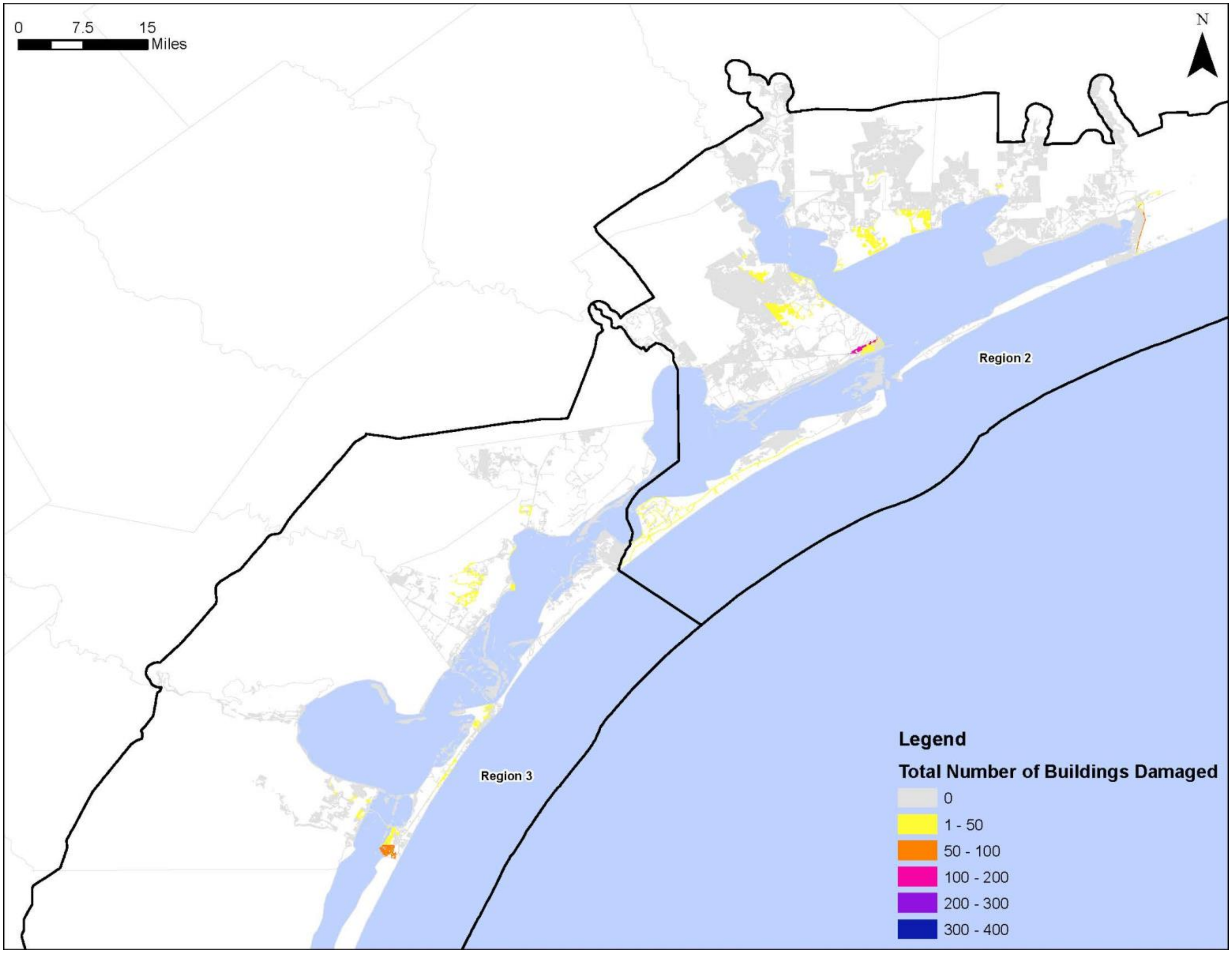


Figure 6-109: Calhoun/Matagorda Storm Landfall – Current Condition Damaged Buildings

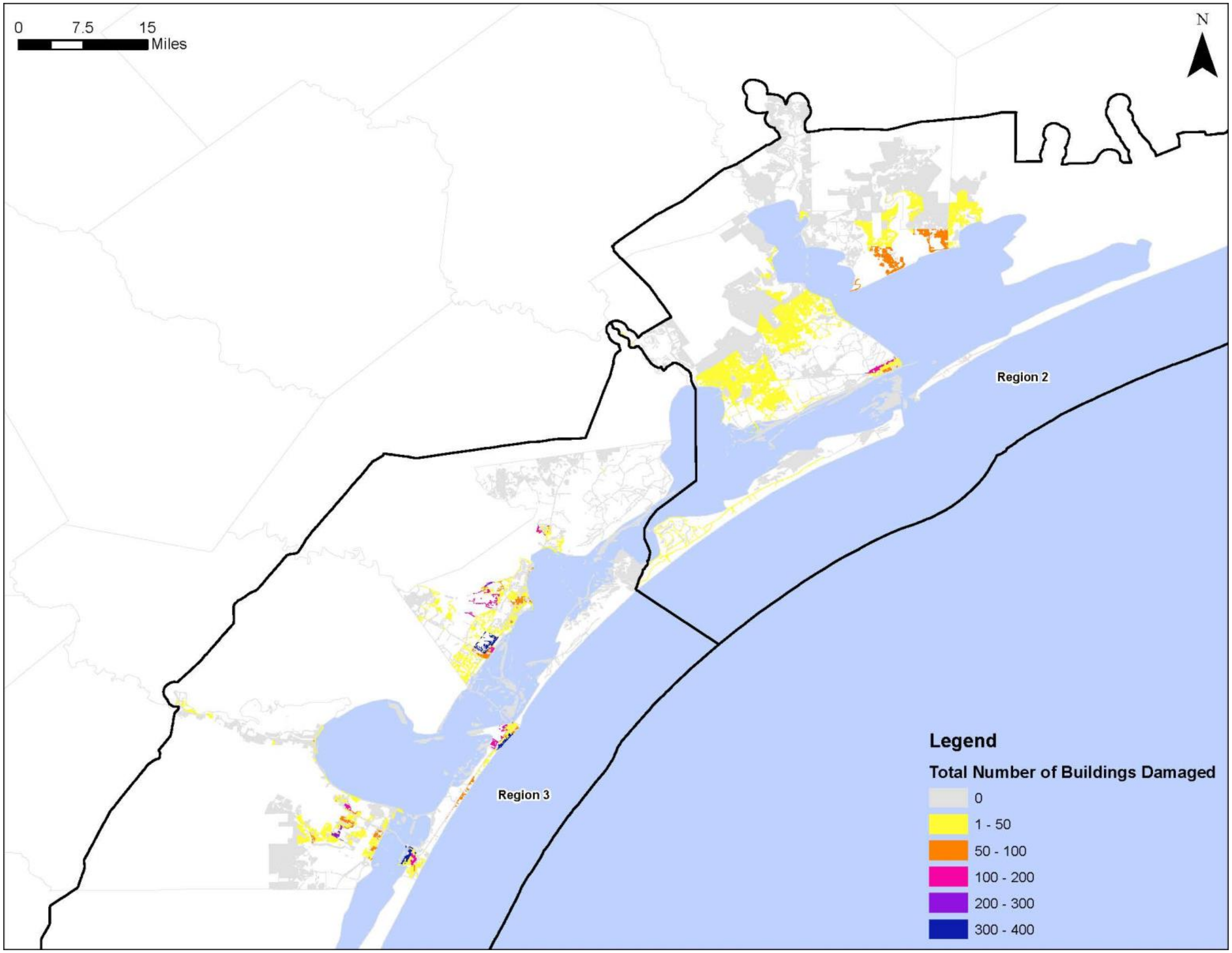


Figure 6-110: Calhoun/Matagorda Storm Landfall – Future Condition Damaged Buildings

Table 6-37: Calhoun/Matagorda Storm Landfall - Economic Damage Results

Category	Damages in $ USD 2018 Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 127,395,000	$ 1,775,592,000	1294%
Content Loss	$ 94,818,000	$ 1,524,380,000	1508%
Inventory Loss	$ 706,000	$ 14,852,000	2004%
Relocation Cost	$ 72,309,000	$ 527,818,000	630%
Income Loss	$ 48,845,000	$ 572,216,000	1071%
Rental Income Loss	$ 33,490,000	$ 277,339,000	728%
Wage Loss	$ 81,114,000	$ 905,844,000	1017%
Total Loss	**$ 458,677,000**	**$ 5,598,041,000**	**1120%**

Table 6-38: Calhoun/Matagorda Storm Landfall - Total Building Loss per Census Block

Total Loss Range per Census Block	Number of Census Blocks Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	36,894	35,485	-4%
Census Block Loss $1-$100,000	354	424	20%
Census Block Loss $100,001-$500,000	255	654	156%
Census Block Loss $500,001-$1M	66	337	411%
Census Block Loss $1M-$5M	77	559	626%
Census Block Loss $5M-$10M	11	93	745%
Census Block Loss $10M-$20M	6	69	1050%
Census Block Loss $20M-$30M	1	13	1200%
Census Block Loss $30M-$40M	0	10	-
Census Block Loss $40M-$50M	0	7	-
Census Block Loss $50M-$100M	0	7	-
Census Block Loss $100M+	0	6	-
Total Number of Census Blocks		**37,664**	

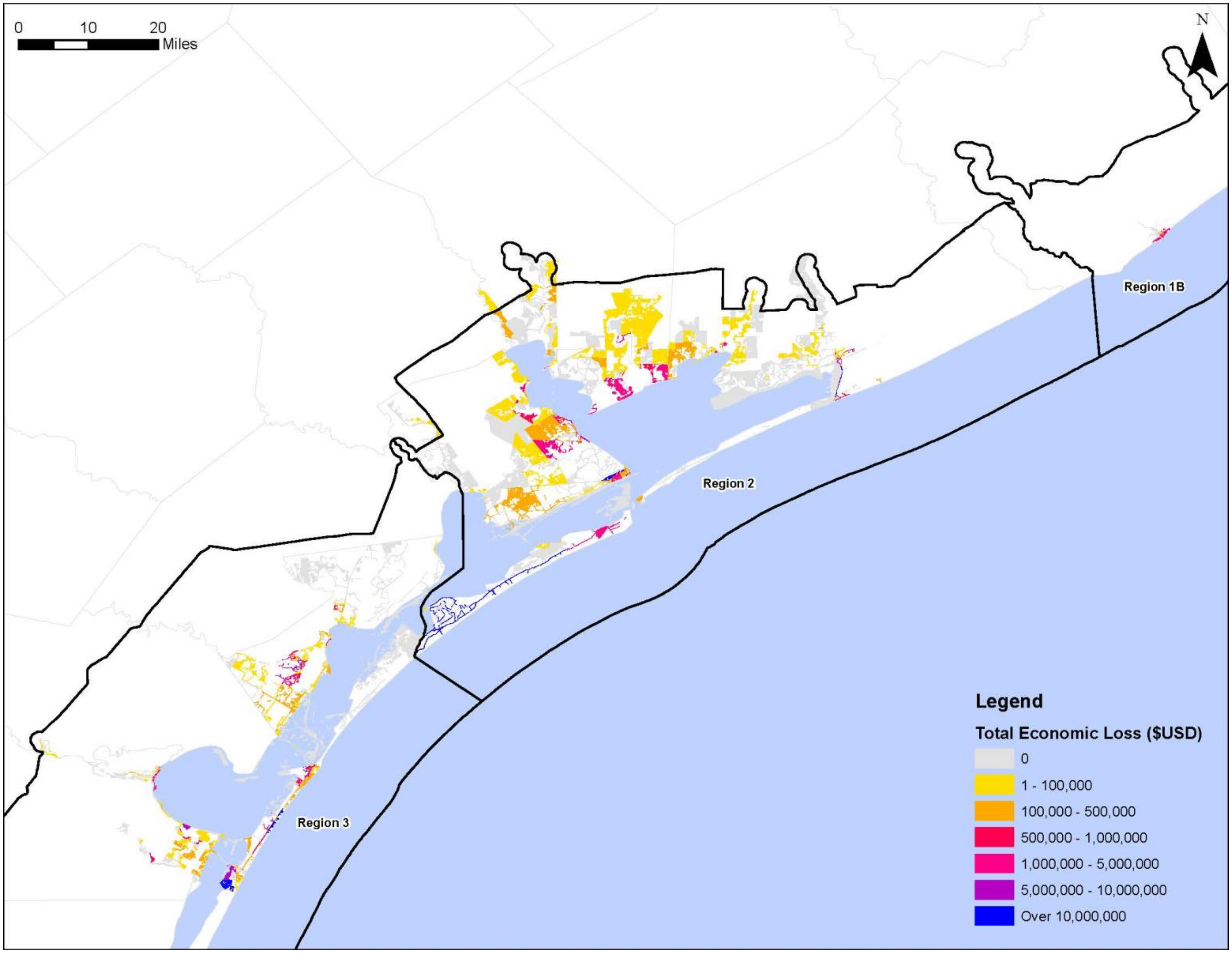


Figure 6-111: Calhoun/Matagorda Storm Landfall – Current Condition Economic Loss

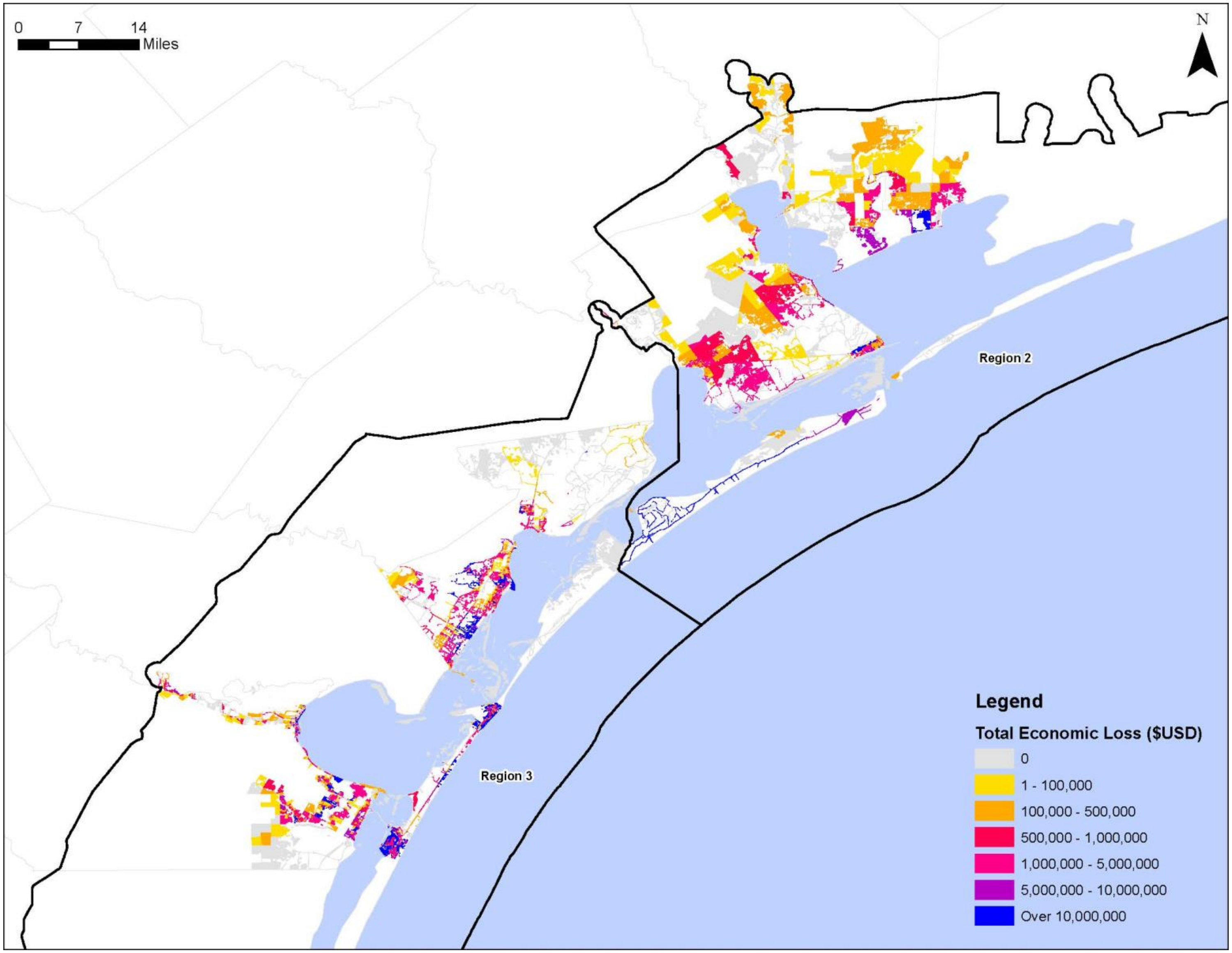


Figure 6-112: Calhoun/Matagorda Storm Landfall – Future Condition Economic Loss

v. Corpus Christi/Coastal Bend Storm Landfall Results

About 66% of residential buildings in Corpus Christ/Coastal Bend are classified as one story, and 97% of non-residential buildings are considered low-rise (Table 6-39). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 346% by 2100 if no action were to occur (Table 6-40). Due to the increase of building damages, the cost of building losses would increase by 439% and the total economic loss would increase by 254% for the metro area (Table 6-41). In 2100, results show that an additional 1,342, or 7%, of census blocks would be impacted by the hurricane modeled (Table 6-42).

The results from Table 6-40 are shown spatially in Figure 6-113 for current conditions and Figure 6-114 for future conditions. The results from Table 6-41 are shown spatially in Figure 6-115 for current conditions and Figure 6-119 for future conditions.

Table 6-39: Corpus Christi/Coastal Bend Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	97%
Residential 2 Story	32%	Percent Mid Rise	2%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-40: Corpus Christi/Coastal Bend Storm Landfall - Physical Damage Results

		Number of Buildings		
		Current Conditions	2100 No Action	Percent Increase in Damages
Buildings Damaged 1 to 10%		204	431	111%
Buildings Damaged 11 to 20%		810	2,458	203%
Buildings Damaged 21 to 30%		229	1,119	389%
Buildings Damaged 31 to 40%		121	531	339%
Buildings Damaged 41 to 50%		99	474	379%
Buildings Damaged 51 to 60%		0	26	-
Buildings Damaged 61 to 70%		83	364	339%
Buildings Damaged 71 to 80%		60	311	418%
Buildings Damaged 81 to 90%		41	278	578%
Buildings Damaged 91 to 100%		510	4,349	753%
Totals	**Number of Buildings with Damages**	**2,157**	**10,341**	**379%**
	Number of Buildings with Substantial Damages	694	5,328	668%
	Number of Buildings with No Damages	2,967	5,877	-
	Total Number of Buildings	**5,124**	**16,218**	**-**

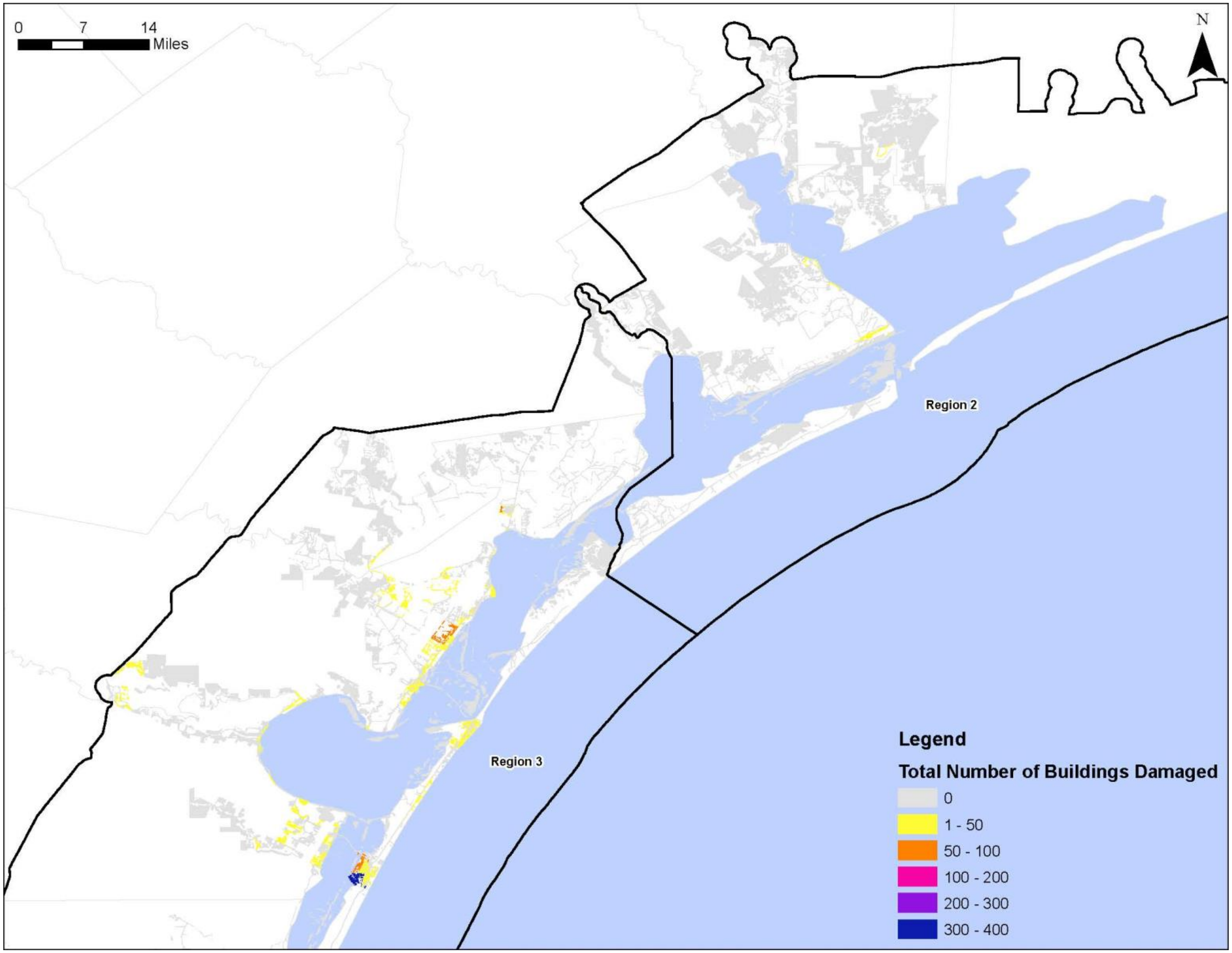


Figure 6-113: Corpus Christ/Coastal Bend Storm Landfall – Current Condition Damaged Buildings

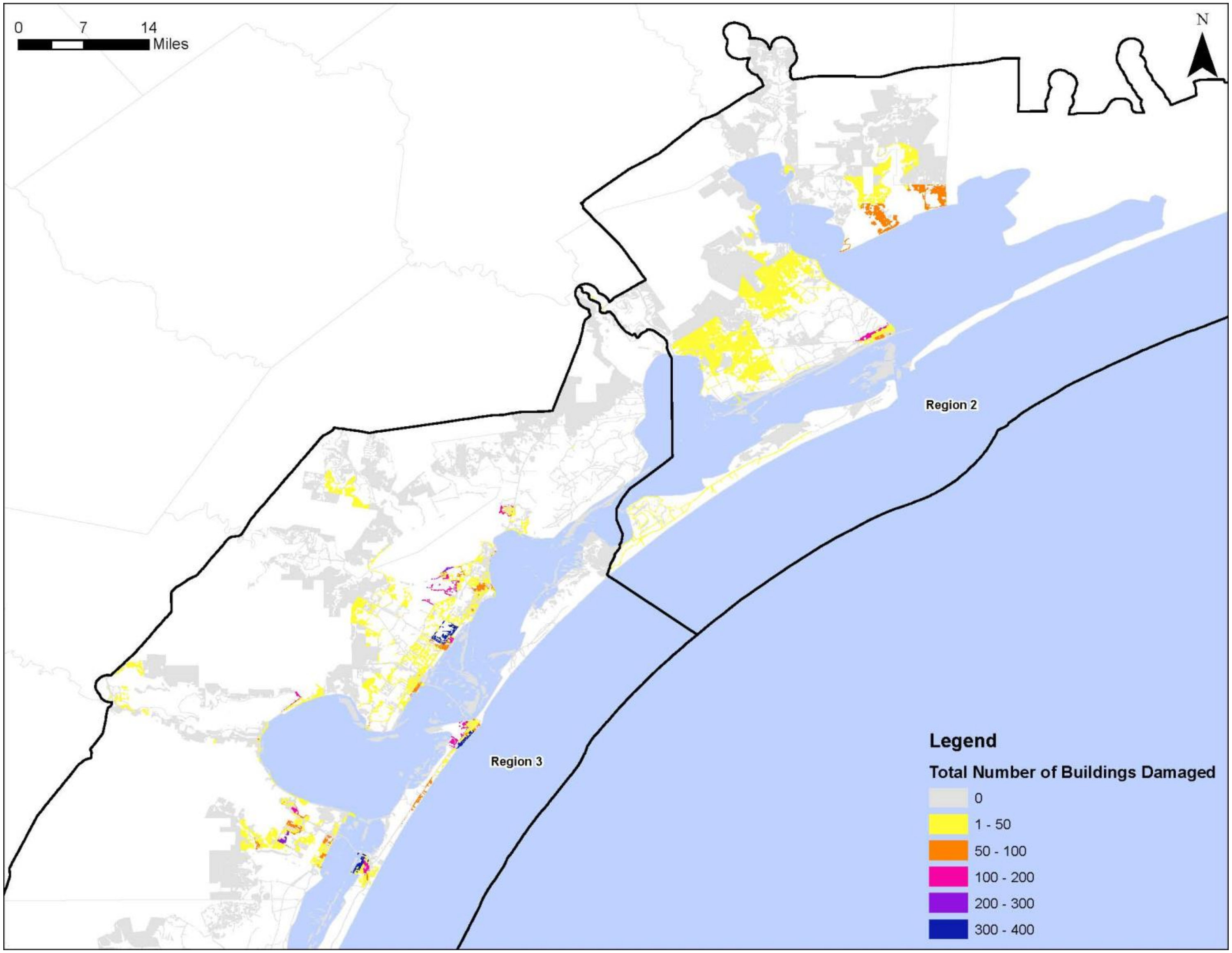


Figure 6-114: Corpus Christ/Coastal Bend Storm Landfall –Future Condition Damaged Buildings

Table 6-41: Corpus Christi/Coastal Bend Storm Landfall - Economic Damage Results

Category	Damages in $ USD 2018 Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 374,813,000	$ 2,020,224,000	439%
Content Loss	$ 366,456,000	$ 1,731,462,000	372%
Inventory Loss	$ 5,349,000	$ 19,749,000	269%
Relocation Cost	$ 188,276,000	$ 584,979,000	211%
Income Loss	$ 275,378,000	$ 608,904,000	121%
Rental Income Loss	$ 117,791,000	$ 303,895,000	158%
Wage Loss	$ 437,394,000	$ 981,570,000	124%
Total Loss	**$ 1,765,457,000**	**$ 6,250,783,000**	**254%**

Table 6-42: Corpus Christi/Coastal Bend Storm Landfall - Total Building Loss per Census Block

Total Loss Range per Census Block	Number of Census Blocks Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	19,077	17,735	-7%
Census Block Loss $1-$100,000	448	528	18%
Census Block Loss $100,001-$500,000	326	726	123%
Census Block Loss $500,001-$1M	145	373	157%
Census Block Loss $1M-$5M	190	663	249%
Census Block Loss $5M-$10M	39	107	174%
Census Block Loss $10M-$20M	20	78	290%
Census Block Loss $20M-$30M	6	18	200%
Census Block Loss $30M-$40M	2	11	450%
Census Block Loss $40M-$50M	0	6	-
Census Block Loss $50M-$100M	4	7	75%
Census Block Loss $100M+	1	6	500%
Total Number of Census Blocks		**20,258**	

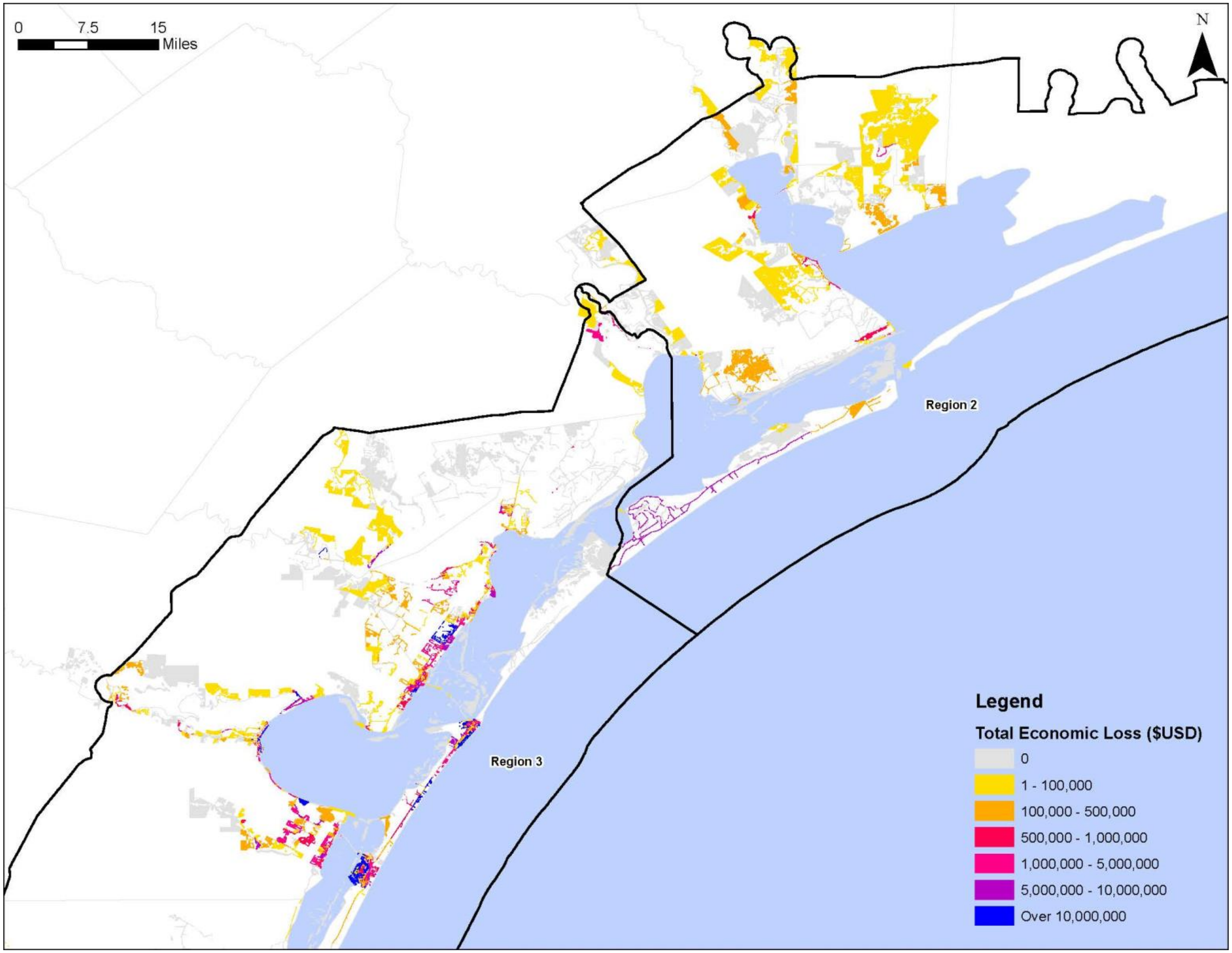


Figure 6-115: Corpus Christi/Coastal Bend Storm Landfall – Current Condition Economic Loss

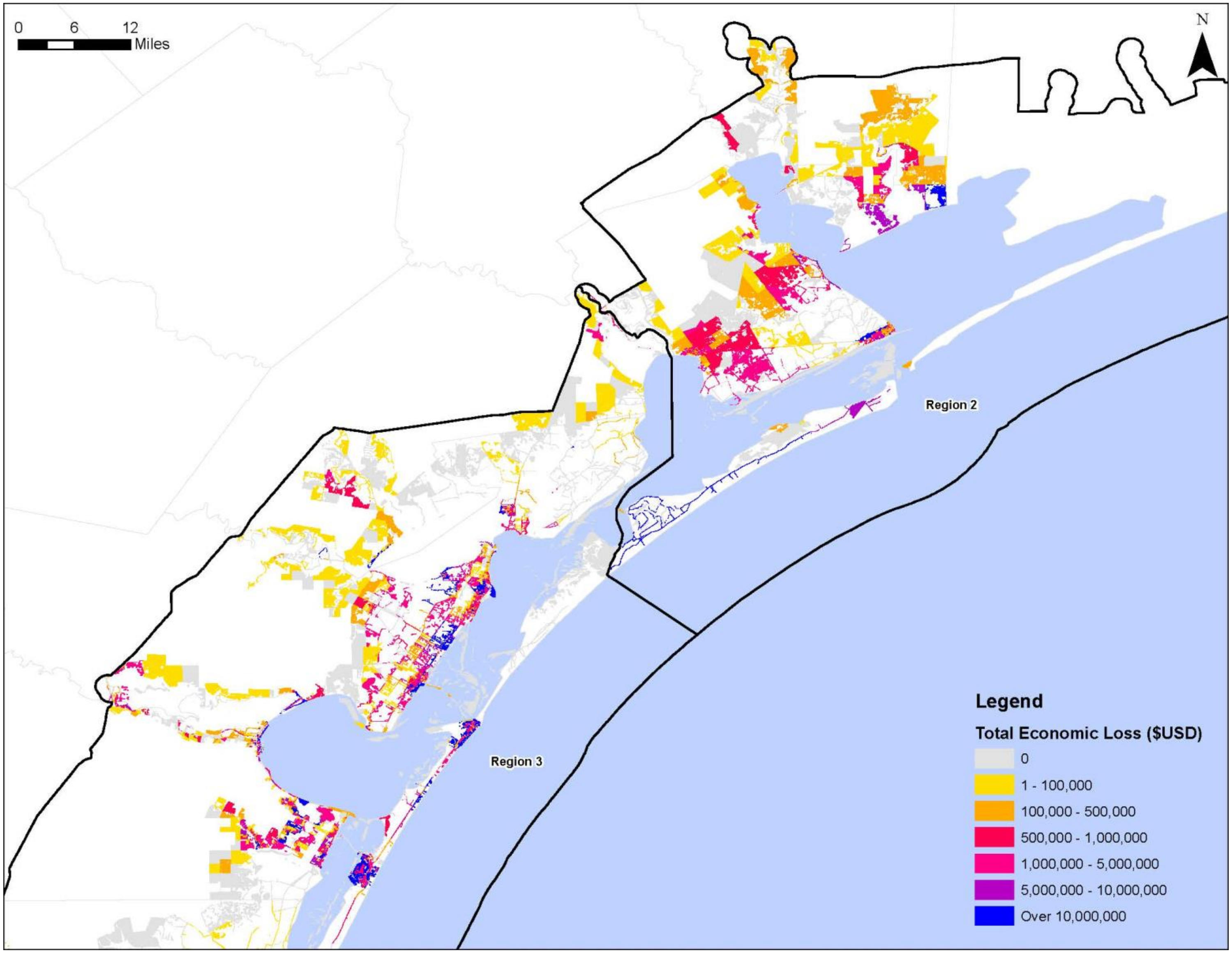


Figure 6-116: Corpus Christi/Coastal Bend Storm Landfall – Future Condition Economic Loss

vi. South Padre Island Storm Landfall Results

About 66% of residential buildings in South Padre Island are classified as one story, and 97% of non-residential buildings are considered low-rise (Table 6-43). The total number of buildings in this area with damages due to storm surge or sea level rise is project to increase by 764% by 2100 if no action were to occur (Table 6-44). Due to the increase of building damages, the cost of building losses would increase by 907% and the total economic loss would increase by 536% for the metro area (Table 6-45). In 2100, results show that an additional 1,278, or 4%, of census blocks would be impacted by the hurricane modeled (Table 6-46).

The results from Table 6-44 are shown spatially in Figure 6-117 for current conditions and Figure 6-118 for future conditions. The results from Table 6-45 are shown spatially in Figure 6-119 for current conditions and Figure 6-120 for future conditions.

Table 6-43: South Padre Island Building Statistics

Residential Building Statistics		Non-Residential Building Statistics	
Residential 1 Story	66%	Percent Low Rise	97%
Residential 2 Story	32%	Percent Mid Rise	2%
Residential 3 Story	1%	Percent High Rise	1%
Residential Split Level	1%		

Table 6-44: South Padre Island Storm Landfall - Physical Damage Results

		Number of Buildings		
		Current Conditions	2100 No Action	Percent Increase in Damages
Buildings Damaged 1 to 10%		122	449	268%
Buildings Damaged 11 to 20%		390	2,245	476%
Buildings Damaged 21 to 30%		105	876	734%
Buildings Damaged 31 to 40%		81	412	409%
Buildings Damaged 41 to 50%		48	383	698%
Buildings Damaged 51 to 60%		0	16	-
Buildings Damaged 61 to 70%		23	260	1030%
Buildings Damaged 71 to 80%		14	234	1571%
Buildings Damaged 81 to 90%		14	226	1514%
Buildings Damaged 91 to 100%		220	3,687	1576%
Totals	**Number of Buildings with Damages**	**1,017**	**8,788**	**764%**
	Number of Buildings with Substantial Damages	271	4,423	1532%
	Number of Buildings with No Damages	1,754	5,793	-
	Total Number of Buildings	**2,771**	**14,581**	**-**

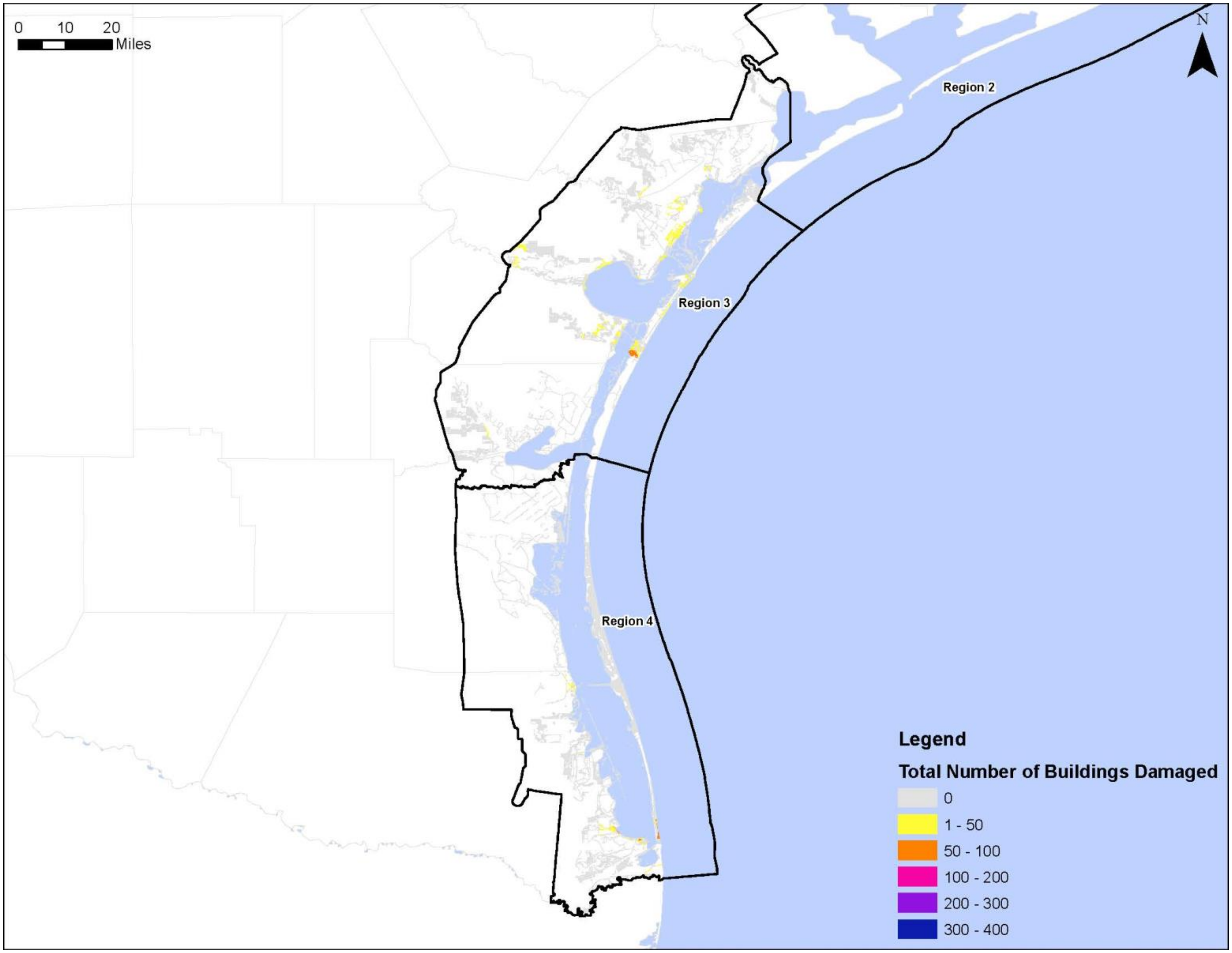


Figure 6-117: South Padre Island Storm Landfall – Current Condition Damaged Buildings

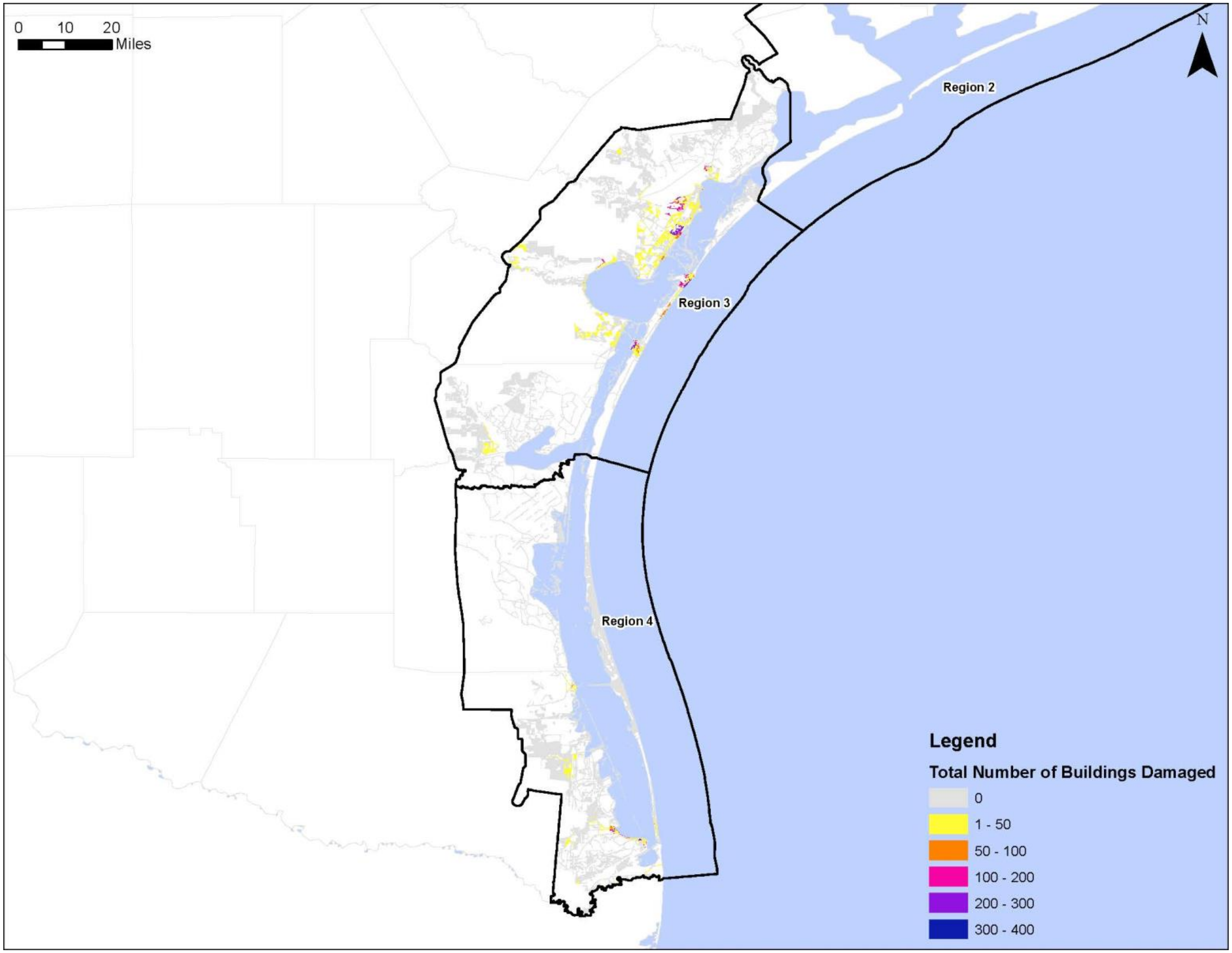


Figure 6-118: South Padre Island Storm Landfall – Future Condition Damaged Buildings

Table 6-45: South Padre Island Storm Landfall - Economic Damage Results

Category	Damages in $ USD 2018 Current Conditions	2100 No Action	Percent Change in Damages
Building Loss	$ 161,019,000	$ 1,621,327,000	907%
Content Loss	$ 148,699,000	$ 1,412,766,000	850%
Inventory Loss	$ 1,453,000	$ 16,201,000	1015%
Relocation Cost	$ 100,310,000	$ 523,398,000	422%
Income Loss	$ 154,504,000	$ 579,255,000	275%
Rental Income Loss	$ 68,791,000	$ 305,793,000	345%
Wage Loss	$ 214,088,000	$ 939,667,000	339%
Total Loss	**$ 848,864,000**	**$ 5,398,407,000**	**536%**

Table 6-46: South Padre Island Storm Landfall - Total Building Loss per Census Block

Total Loss Range per Census Block	Number of Census Blocks Current Conditions	2100 No Action	Percent Change in Damages
No Census Block Loss	30,176	28,898	-4%
Census Block Loss $1-$100,000	422	472	12%
Census Block Loss $100,001-$500,000	236	598	153%
Census Block Loss $500,001-$1M	92	322	250%
Census Block Loss $1M-$5M	118	575	387%
Census Block Loss $5M-$10M	19	108	468%
Census Block Loss $10M-$20M	7	62	786%
Census Block Loss $20M-$30M	3	14	367%
Census Block Loss $30M-$40M	2	9	350%
Census Block Loss $40M-$50M	2	9	350%
Census Block Loss $50M-$100M	0	5	-
Census Block Loss $100M+	0	5	-
Total Number of Census Blocks		**31,077**	

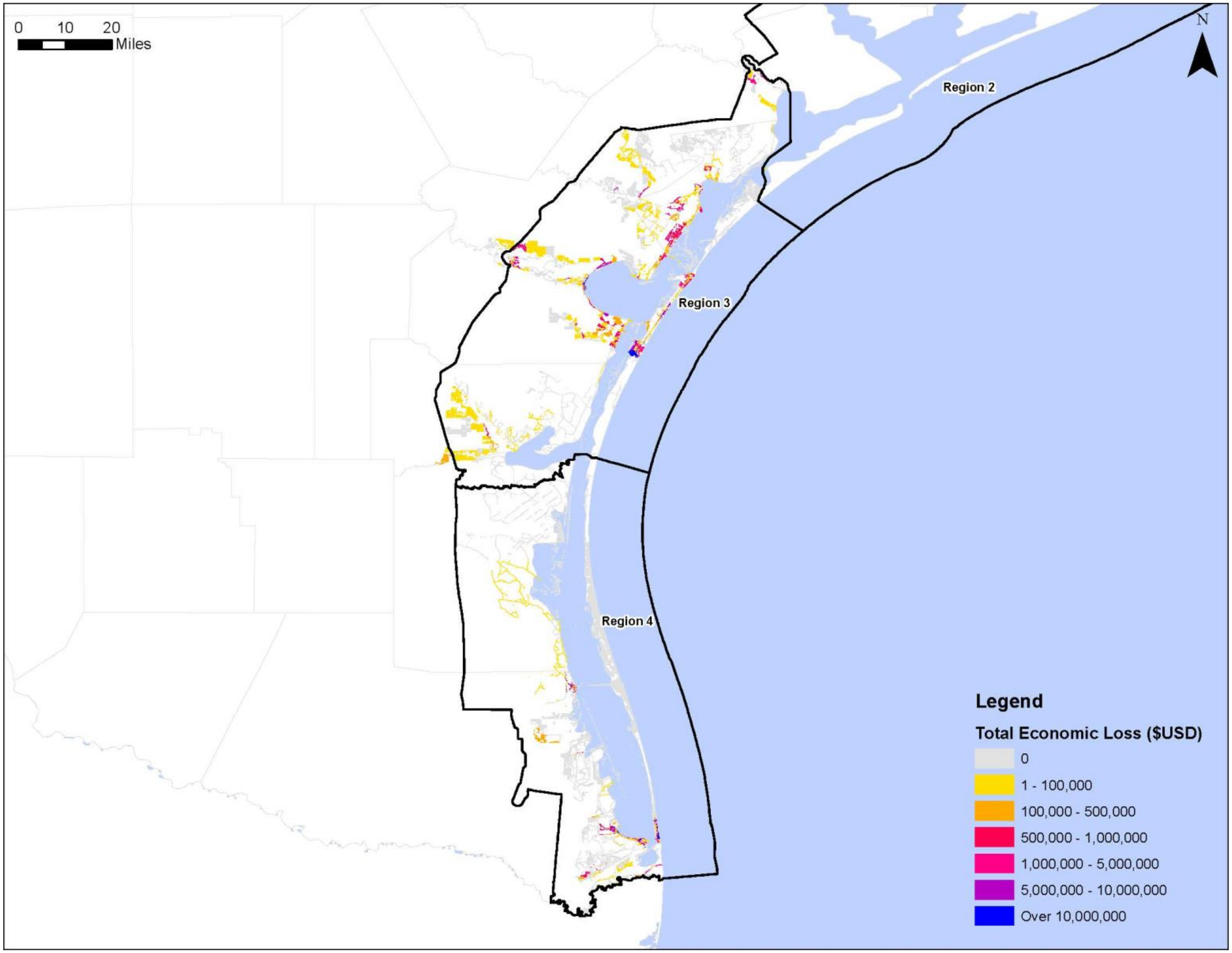


Figure 6-119: South Padre Island Storm Landfall – Current Condition Economic Loss

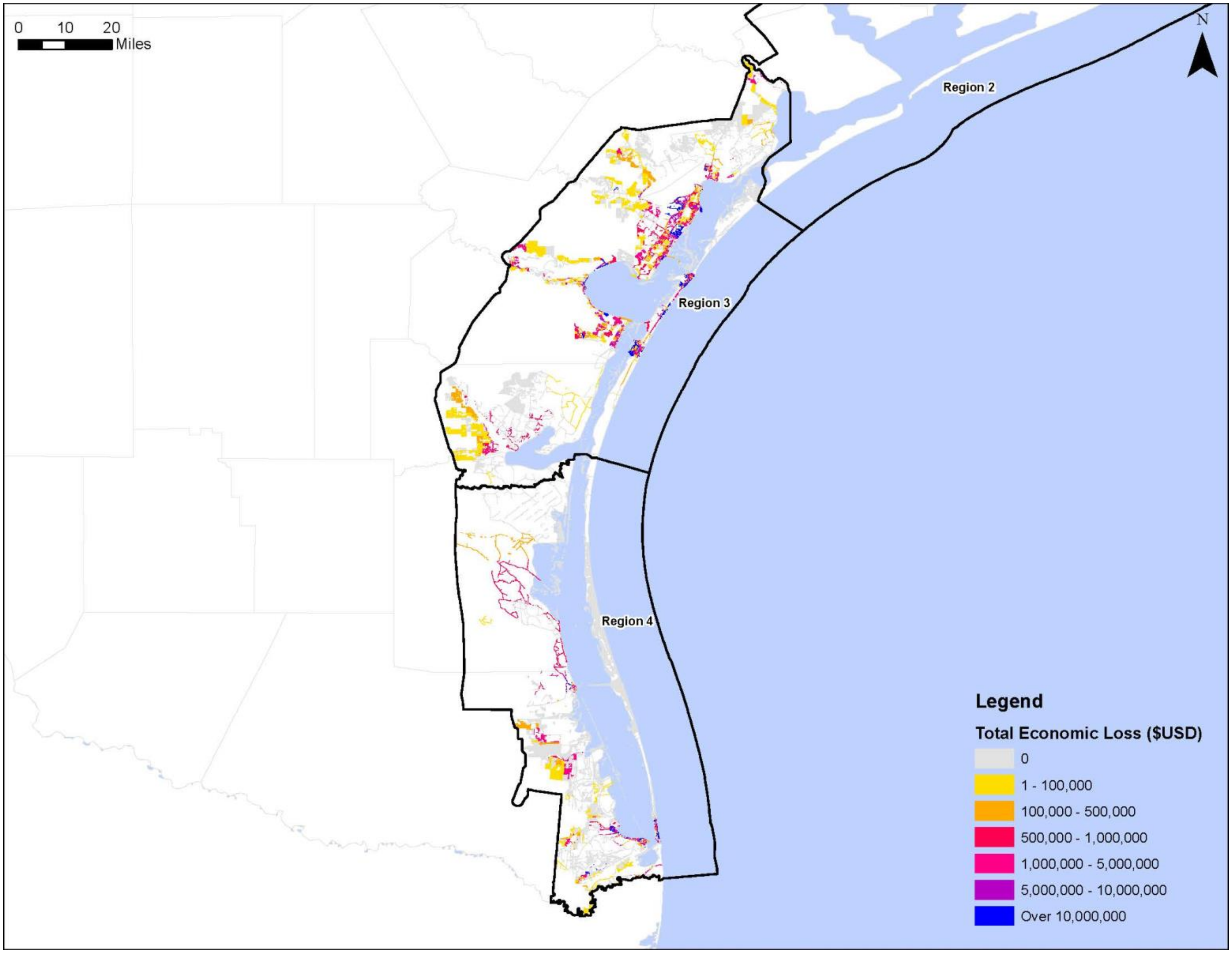


Figure 6-120: South Padre Island Storm Landfall – Future Condition Economic Loss

III. Model Review

Some important considerations should be kept in mind when reviewing these findings. Damages and associated losses do not increase in a linear fashion as flood depths increase. When comparing scenarios in a particular county where flood depths increase, the losses will often increase drastically with a relatively small change in depth. There are several main reasons for this non-linear increase. First, increases in flood depth have both a vertical and horizontal dimension. A two-foot increase in depth will not only have low-lying, previously-flooded structures with even more flooding, but will expand horizontally to flood many more structures that may have not been flooded before. This is especially true in more built-up areas, where a slightly higher scenario may flood large neighborhoods that previously had been dry. This also happens when a scenario crosses the boundary associated the FEMA Special Flood Hazard Area (100-yr or 1%-annual-chance-event), where development tends to be much denser on the “other side of the line”.

A second reason for non-linear loss increases is the nature of flood depth-damage relationships. An individual building will have different subassemblies (foundation, superstructure, roof, floors, electric and HVAC, etc.) that have different vulnerabilities to flooding. As relative flood depth increases in a structure, the damages to these subassemblies will increase at their own rates, and cumulatively may cause the overall damage to drastically increase over a relatively small flood depth increase. This is especially true in structures like mobile homes, where flood depths over 2 feet will often cause complete structure failure.

Also, this Hazus analysis made use of aggregated General Building Stock census block data, rather than individual structure data. The GBS data uses averages building characteristics and depth-damage curves to calculate damages and associated losses. If an individual structure analysis had been performed in Hazus, loss values would be different, because of the better quality of the data. The expectation is that the trends between lower and higher flood depths would be similar for larger areas such as counties. However, for individual communities or neighborhoods, it is hard to know if damages would be less or more when comparing the aggregated approach with the individual building approach. In some communities, a large group of buildings may be located just outside of the flood boundary, so the aggregated approach may overestimate the loss. However, in other cases the aggregated approach may assume most structures are on crawlspaces and located several feet above the ground, but in reality, are slab-on-grade construction and the individual building approach would produce higher damages. Usually the individual structure approach makes sense when comparing specific mitigation options that may protect a relatively smaller area like a neighborhood or individual community.

IV. Conclusions

The results of the Hazus models for each metro area of the storm analyses indicate a significant increase in physical damages and economic losses due to storm surge and sea level rise between current conditions and future conditions if no preventative actions were to be taken. On average, the total number of buildings that would be damaged or destroyed from storm events across the Texas coast is predicted to increase by approximately 535% by 2100 (an increase of approximately 98,935 residential or commercial structures). Total economic loss across the Texas coast resulting from coastal storm events is also predicted to significantly increase in the future, increasing by an average of approximately 465% compared to current conditions (or, from approximately $19.3 billion to $74.6 billion). These statistics indicate the need for preventative action in order to lessen the economic blow to Texas as a result of storm surge and sea level rise. Moreover, these values are estimates for Category 2 storms. Larger hurricanes would be expected to show significantly larger damages. Although it is not possible to predict the exact track, travel speed, wind speed or location of impact for a hurricane on the Texas coast, the Hazus results give a general picture of the economic and structural losses that could be incurred by the state as a consequence of such a storm.

SECTION 7. Project Screenings

This section discusses the screening process for new projects considered for inclusion in the project list during the 2019 Resiliency Plan development. Tier 1 projects carried over from the 2017 Resiliency Plan were not re-evaluated in their entirety, but the TAC was given an opportunity to indicate whether the projects are still a priority for the 2019 Resiliency Plan. For these projects, the TAC did not assess the benefit of each project on coastal Issues of Concern. Existing GLO programs were not assessed by the TAC.

Projects added for evaluation after the completion of the 2017 Resiliency Plan came from several sources:

- Tier 2 projects from the 2017 Resiliency Plan, for which additional information had been received;
- New projects from the 2019 literature review (see SECTION 5); and
- Gap projects from TAC members.

Following development of the initial project list, a screening process was used to facilitate further refinement of the types of projects under consideration. The GLO Planning Team completed an initial screening at the conceptual level, using general project descriptions and project goals to determine whether a potential project enhanced coastal resiliency. The screened project list was then taken to the TAC meetings for evaluation (see SECTION 8).

A. Initial Screening

Following the completion of the 2017 Resiliency Plan, the GLO Planning Team compiled a list of over 2100 new projects for consideration since the 2017 Resiliency Plan release. Many of these projects came from the GLO's CGAP database, which included existing, proposed, ongoing, and withdrawn projects. The initial screening filtered the list to yield projects consistent with Resiliency Plan goals. Criteria considered in the initial screening included:

1. **Project Contribution to Coastal Resiliency.** For the purposes of the Plan, resiliency is defined as the "ability of coastal resources and coastal infrastructure to withstand natural or human-induced disturbances and quickly rebound from coastal hazards." Projects that were not consistent with or intended to achieve this definition did not advance to the second screening.

2. **Extent of Project Information Provided.** Projects with highly conceptual descriptions were removed from consideration, as the level of information provided did not allow the GLO Planning Team to adequately assess the purpose, scope and prospective impact of the project.

3. **Presence of Project Redundancy.** The literature review resulted in several duplicate entries for projects that were either precisely the same or had significantly overlapping goals and scopes. In most cases, the projects with the most detailed descriptions took precedence.

4. **Project Goals.** Projects focused exclusively on public infrastructure improvements, such as those identified in the Texas Coastal Infrastructure Study, or storm surge suppression systems, such as those being studied under other state and federal efforts, did not advance to the second screening. The GLO will utilize the resources and outcomes from these various coastal planning efforts in future iterations of the Resiliency Plan.

5. **Project Status.** Projects that were completed or withdrawn were removed from consideration. Projects known to be nearing completion were also removed from consideration.

Using the above-noted criteria, the list of candidate projects was reduced to approximately 230. The full list of projects that remained under consideration after the screening is documented in the Project Evaluation Tables at the end of this Report.

B. Detailed Project Definition

Projects that passed the initial screening were assigned an overall conceptual project type based on the USACE definition of the three primary categories of coastal risk reduction, Natural and Nature-Based Features, Structural Measures, and Nonstructural Measures, as shown in Table 7-1 (USACE, 2013). The U.S. Army Corps of Engineers stresses the importance of using a combination of these three main types of features, as well as understanding the interactions among them.

Nature-Based Features are manmade and "may mimic characteristics of natural features," such as beach and dune restoration, barrier islands, vegetated features, and oyster/coral reef restoration (USACE, 2013). Nature-based features include:

- Habitat Creation and Restoration;
- Wildlife Protection;
- Environmental Restoration;
- Beach Nourishment; and
- Dune Restoration.

Structural Measures are a less dynamic approach to shoreline stabilization and flooding protection. They are designed to mitigate shoreline erosion and other coastal risks associated with wave damage and flooding. Structural measures assessed in the planning process include:

- Shoreline Stabilization;
- Flood Risk Reduction;
- Community Infrastructure; and
- Structure/Debris Removal.

Nonstructural Measures are "complete or partial alternatives to structural measures" and typically involve modifications to public policy, management practices, and regulatory policies (USACE, 2013). They reduce the consequences of flooding, while structural measures will additionally reduce the probability of flooding. Non-structural measures include:

- Studies, Policies, and Programs;
- Public Access and Improvements; and
- Land Acquisitions.

Table 7-1: Initial Distribution of Conceptual Project Types by Region

Region	Projects After Initial Screening	Nature Based Features	Nonstructural Measures	Structural Measures
1	85	59	28	47
2	43	34	11	22
3	50	40	15	31
4	28	23	14	12
Coastwide	18	10	16	5

Some multi-faceted projects pertain to more than one category. For example, many of the proposed habitat restoration projects also include structural measures, such as breakwaters. Once the conceptual project types were assigned, projects were then defined to describe key attributes (e.g., project type, subtype) and spatially located to give a general understanding of project location and extent (Figure 7-1).

The project types were used to further define the projects, allowing for an objective assessment based on an assumed relationship between project types and their effectiveness in addressing IOCs, as later discussed. A break-out of project types by region is shown in Table 7-2.

	Project Type	Project Subtypes
Nature-Based	**Hydrologic Connectivity**	• Freshwater Inflow • Hydrologic Restoration
	Habitat Creation & Restoration	• Estuarine Wetlands • Freshwater Wetlands • Oyster Reef • Barrier Islands • Coastal Uplands • Coastal Prairies • Rookery Islands • Dredge Placement Islands • Seagrasses • Tidal Flats • Fisheries
	Beach Nourishment	• Bay • Gulf
	Dune Restoration	• Dune
	Shoreline Stabilization	• Living Shoreline • Breakwater • Misc. Wave Break • Seawall • Bulkhead • Revetment • Jetty • Groin
	Land Acquisitions	• Acquisitions • Conservation Easements • Fee Simple
Infrastructure-Based	**Structure/Debris Removal**	• Structures on Public Easement • Abandoned Oil and Gas Wells • Abandoned Boats • Dock Pilings • Post Storm Cleanup
	Public Access & Improvements	• ADA Accessibility • Walkovers • Piers, Boat Ramps
	Flood Risk Reduction	• Levees • Flood Wall • Storm Surge Barrier
	Community Infrastructure	• Drainage • Utilities • Roadway/Bridge Repair • Roadway/Bridge Elevation • Critical Facilities • Structure Raising
	Plans, Policies, Programs & Studies	

Figure 7-1: Project Types and Subtypes

Table 7-2 Initial Distribution of Project Types by Region

Region	Nature-Based				
	Habitat Creation & Restoration	Wildlife	Environmental	Beach Nourishment	Dune Restoration
1	47	4	12	9	3
2	24	7	7	3	1
3	29	5	7	3	1
4	19	4	6	1	2
Coastwide	2	4	1	3	3

Region	Structural			Non-Structural		
	Shoreline Stabilization	Flood Risk Reduction	Structure/ Debris Removal	Studies, Policies, & Programs	Public Access & Improvements	Land Acquisition
1	26	2	19	2	16	3
2	14	1	6	4	6	0
3	24	1	10	1	9	2
4	9	0	2	1	4	4
Coastwide	0	0	2	2	17	1

In addition to defining the details of project types and subtypes, the project definition effort included two additional elements. The first entailed refinement and correction of the basic characteristics originally assigned to the projects, as prompted by feedback received from the TAC via regional meetings (see SECTION 8). This allowed many TAC members to provide valuable insights, such as additional project status, potential challenges and knowledge of funding received.

The second element entailed development of additional project attributes to facilitate subsequent technical analysis. These details were added to the initial project definition via quantification of parameters critical to the project's associated type and subtype.

SECTION 8. Technical Advisory Committee Analysis

A key component of the Resiliency Plan development process was the continued involvement of the TAC. This partnership was implemented through a series of regional-in person meetings where feedback on potential projects was solicited. Among other inputs, TAC members provided advice and comments that addressed project definitions, project effectiveness, and ideas on new projects for potential inclusion in the Resiliency Plan.

A. Round 1 TAC Meetings

The first round of outreach meetings to the Technical Advisory Committee (including local officials) were hosted between October and December 2017 (Table 8-1).

Table 8-1: 2019 Resiliency Plan Round 1 TAC Meetings

Region	Location	Date	No. of TAC Participants
1A	Beaumont, Texas	November 8, 2017	34
1B	Texas City, Texas	November 14, 2017	48
2	Victoria, Texas	November 16, 2017	34
3	Corpus Christi, Texas	December 6, 2017	55
4	Port Isabel, Texas	October 12, 2017	45

The goals of the first round of TAC meetings are shown in Figure 8-1.

Figure 8-1: Round 1 TAC Meeting Goals

During this meeting, the GLO Planning Team identified the infrastructure (critical facilities) vulnerabilities in each region to sea level rise and flooding. Each region was subdivided into Study Areas, where new proposed projects and draft regional actions were represented based on each Study Area's primary vulnerabilities (study areas were used for meeting facilitation purposes only and are not carried forward into the final Resiliency Plan). The TAC was then asked to provide feedback on the vulnerabilities noted for each study area both individually and in a small-group format. They were also asked to note any additional projects or planning efforts that could be used to enhance coastal resiliency in Texas. Emphasis was to be given to projects that could incorporate both nature-based solutions in addition to infrastructure elements.

Data was collected in written format, as well as electronically via Google Earth markers. Approximately 600 additional projects and concepts were recorded as part of this exercise.

The Planning Team also discussed the intended enhancements to the Resiliency Plan, as shown in Figure 8-2.

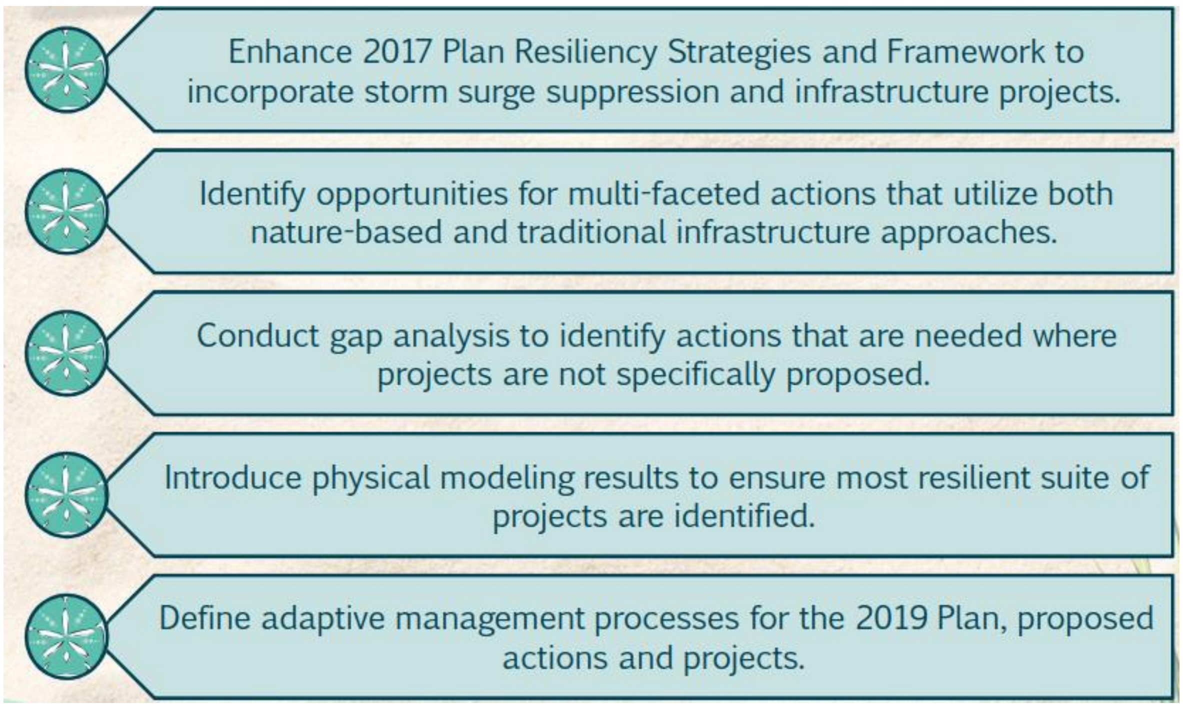


Figure 8-2: 2019 Resiliency Plan Enhancements

An example of the materials provided to the TAC during the Round 1 TAC meetings are included in **Appendix D.**

B. Round 2 TAC Meetings

Following the final collection of projects for each region, TAC members (including local officials) were invited to participate in regional project screening meetings hosted between February and April 2018 (Table 8-2).

Table 8-2: 2019 Resiliency Plan Round 2 TAC Meetings

Region	Location	Date	No. of TAC Participants
1A	Beaumont, Texas	April 17, 2018	32
1B	Galveston, Texas	April 10, 2018	58
2	Victoria, Texas	April 4, 2018	40
3	Corpus Christi, Texas	March 14, 2018	49
4	Port Isabel, Texas	February 28, 2018	38

Each participating TAC member was provided with a workbook containing evaluation sheets for each of the candidate projects in their respective regions (for an example of materials provided, see **Appendix D**).

Members were invited to evaluate each project in terms of: 1) how it addressed each IOC in the subregion in which the project was located; 2) the feasibility of implementation; and 3) whether it should be considered a priority on a yes/no basis. TAC members also provided additional project details and other general feedback, as applicable. TAC member input and project evaluations were recorded in their workbooks and subsequently reviewed by the GLO Planning Team for final project prioritization.

C. Round 3 TAC Meetings

Following the final collection of projects for each region, TAC members (including local officials) were invited to participate in regional meetings to present initial results from the TAC screening and a draft Tier 1 project list per region (Table 8-3).

Table 8-3: 2019 Resiliency Plan Round 3 TAC Meetings

Region	Location	Date	No. of TAC Participants
1A	Beaumont, Texas	October 29, 2018	24
1B	Galveston, Texas	October 31, 2018	60
2	Victoria, Texas	October 4, 2018	41
3	Corpus Christi, Texas	October 25, 2018	72
4	Port Isabel, Texas	October 24, 2018	36

At these meetings, TAC members were provided with draft versions of the project information sheets, included in their final format in Section 5 of the 2019 Resiliency Plan.

D. TAC Project Gap Analysis

TAC members were also given the opportunity to submit additional coastal resiliency projects that had not been previously added to the list of candidates. Seventeen “gap” projects were subsequently received from TAC members. All 17 newly proposed projects were combined into a single workbook distributed via e-mail to the TAC for the same type of analysis conducted at the regional meetings. These project evaluations were also reviewed by the GLO Planning Team for final project prioritization.

SECTION 9. Technical Assessments

Upon completion of the project identification and definition efforts, the GLO Planning Team conducted technical analyses to provide key insights into projects and to groups projects into Strategies (see Table 9-1). This allowed the GLO Planning Team to further understand and document all project dimensions and their project merits in addressing coastal resiliency. These assessments included:

- Infrastructure and Critical Facilities
- Detailed Project Costs
- Characterization of the Texas Coastal Economy
- Economic Benefits Assessment
- Incentives for Ecological Enhancements
- Ecosystem Services
- Sediment Management
- Hurricane Harvey Assessments
- Long-Term Environmental Monitoring

The first two of these assessments provided standardized evaluations to understand the cost and benefit dimensions of individual projects and project types. The physical and risk assessment was key to determining whether proposed projects had the requisite characteristics to achieve desired results in their proposed environments. The feasibility and constructability analysis provided insight into potential issues associated with site-specific engineering and construction challenges. The environmental assessment identified, in detail, the environmental implications of a given proposed project. The sediment management assessment addressed sediment composition, quantity and availability considerations associated with the four coastal regions.

A. Infrastructure and Critical Facilities

The 2017 Resiliency Plan identified coastal projects that address many of the major concerns along the Texas coast with respect to ecological resiliency. The 2019 Resiliency Plan expands upon this work by including projects to help improve the resiliency of Texas's coastal infrastructure.

To initially identify communities' coastal infrastructure needs, the GLO referenced the Texas Coastal Infrastructure Study, a state-led planning process that worked with communities throughout coastal Texas to compile a list of community infrastructure needs in 2015-2016.

Table 9-1 also describes the typical coastal infrastructure projects that will be considered during the planning process. In most cases, capital improvement projects, such as neighborhood street reconstruction or maintenance facility renovations, were not considered unless they could be shown to directly relate to the Resiliency Plan's strategies and goals.

Table 9-1: Coastal Infrastructure Project Identification

Societal Resiliency Strategies	New Project Sources	Typical Projects Considered
Water-based Transit Enhancement	• Port of Houston Authority and U.S. Army Corps of Engineers Houston Ship Channel Mega Study • Calhoun Port Authority and USACE Matagorda Ship Channel Improvement Project • Cataloguing local, state, and federally maintained channels is ongoing	✓ Opportunities for Beneficial Use of Dredged Material ✓ State and locally maintained navigation channels, such as the Texas Gulf Intracoastal Waterway (GIWW)
Land-based Transit Enhancement	• Texas Department of Transportation Project Lists • GLO Texas Coastal Infrastructure Study	✓ Major Evacuation Routes ✓ Coastal Highway Elevation ✓ Coastal Highway Repairs ✓ Causeways
Storm Surge Suppression	• USACE Sabine-to-Galveston Study (Orange, Port Arthur, Freeport systems) • USACE Coastal Texas Study (the Tentatively Selected Plan will be available in early 2018 and will propose improvements for the Houston-Galveston, Matagorda and South Padre Island systems) • Gulf Coast Community Protection and Recovery District (GCCPRD) Storm Surge Suppression Study	✓ Results of ongoing federal, state, and regional studies for large-scale coastal storm risk management systems ✓ Local levees and storm surge suppression systems <u>may</u> be considered
Responsible Development	• Erosion Response Plans	✓ Large-Scale (Regional) Drainage Projects or Studies ✓ Utility Planning ✓ Critical Facility Planning ✓ Setbacks

In addition to compiling new "traditional" infrastructure projects from the sources mentioned, the GLO worked with planners, engineers and local sponsors to determine how ecologically resilient coastal infrastructure projects can be implemented. These projects would combine the best engineering technology with appropriate ecological improvement methods to improve the longevity of projects. Part of this process is expanding the mindset of coastal infrastructure to include an all-encompassing vision that includes "gray" and "green" projects working together in complementary fashion under the current multiple lines of defense concept. This concept provides the linkage between Texas's barrier islands, bays, ecological systems and community infrastructure, as it iterates that all elements work together to mitigate risk, often called multiple lines of defense (Figure 9-1). Historically, these elements have all been thought of individually, but as part of the 2019 Resiliency Plan, the goal is to shift the formerly independent thought process and to begin implementing holistic solutions.

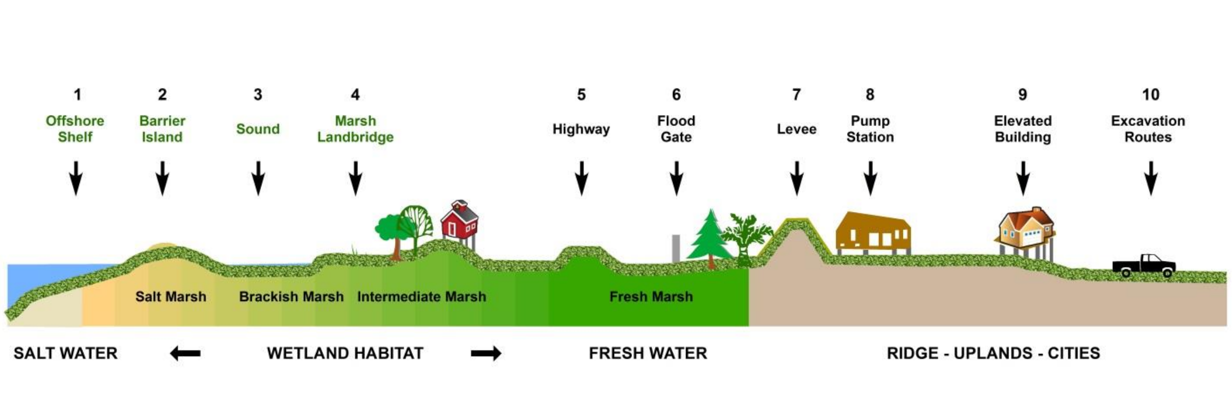


Figure 9-1: Multiple Lines of Defense

In addition to assessing potential areas to incorporate multiple lines of defense, the GLO Planning Team assessed the locations of critical facilities along the coast, and the vulnerability of this infrastructure to sea level rise and coastal flooding (Figure 9-2 and Figure 9-3). The critical facilities shown are those identified in the Texas Coastal Infrastructure Study. This information was provided at a regional level to the Technical Advisory Committee when the TAC was identifying new potential projects.

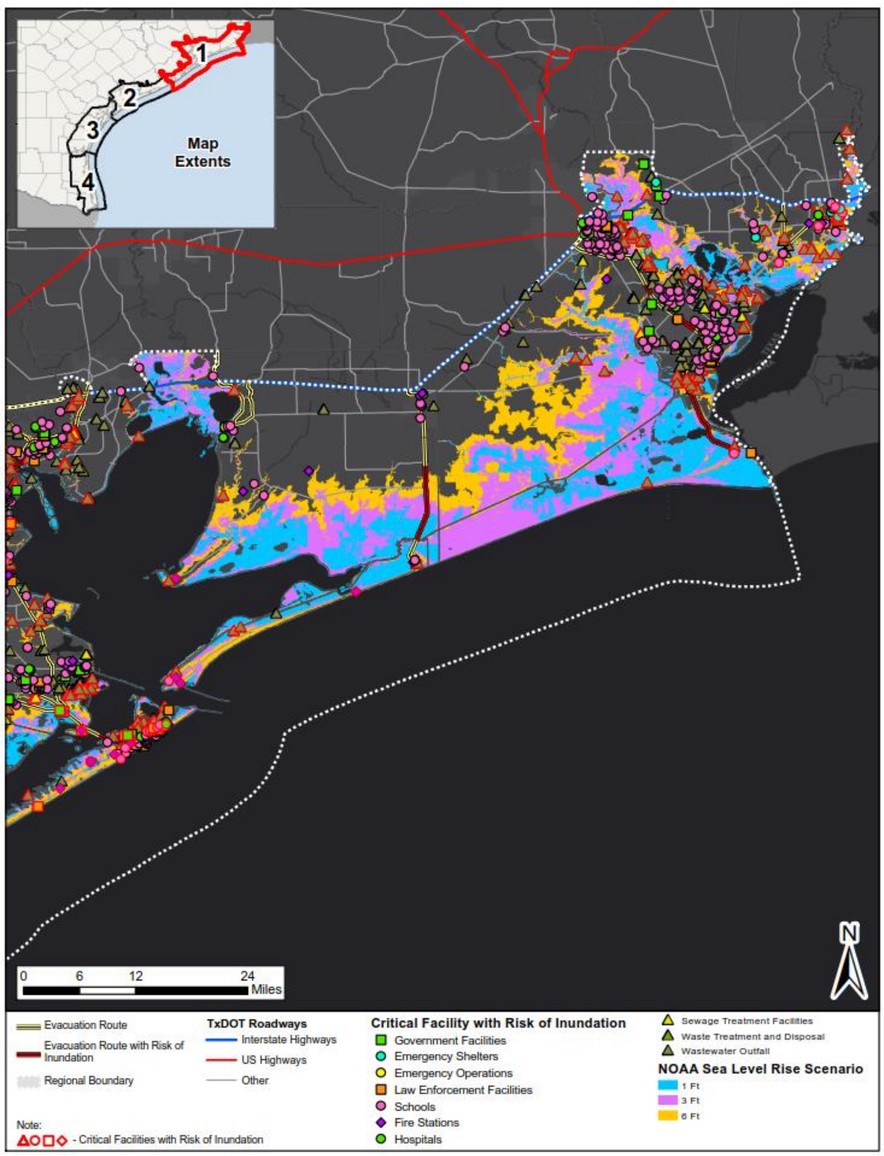


Figure 9-2: Critical Facilities at Risk of Inundation due to Sea Level Rise, Region 1A

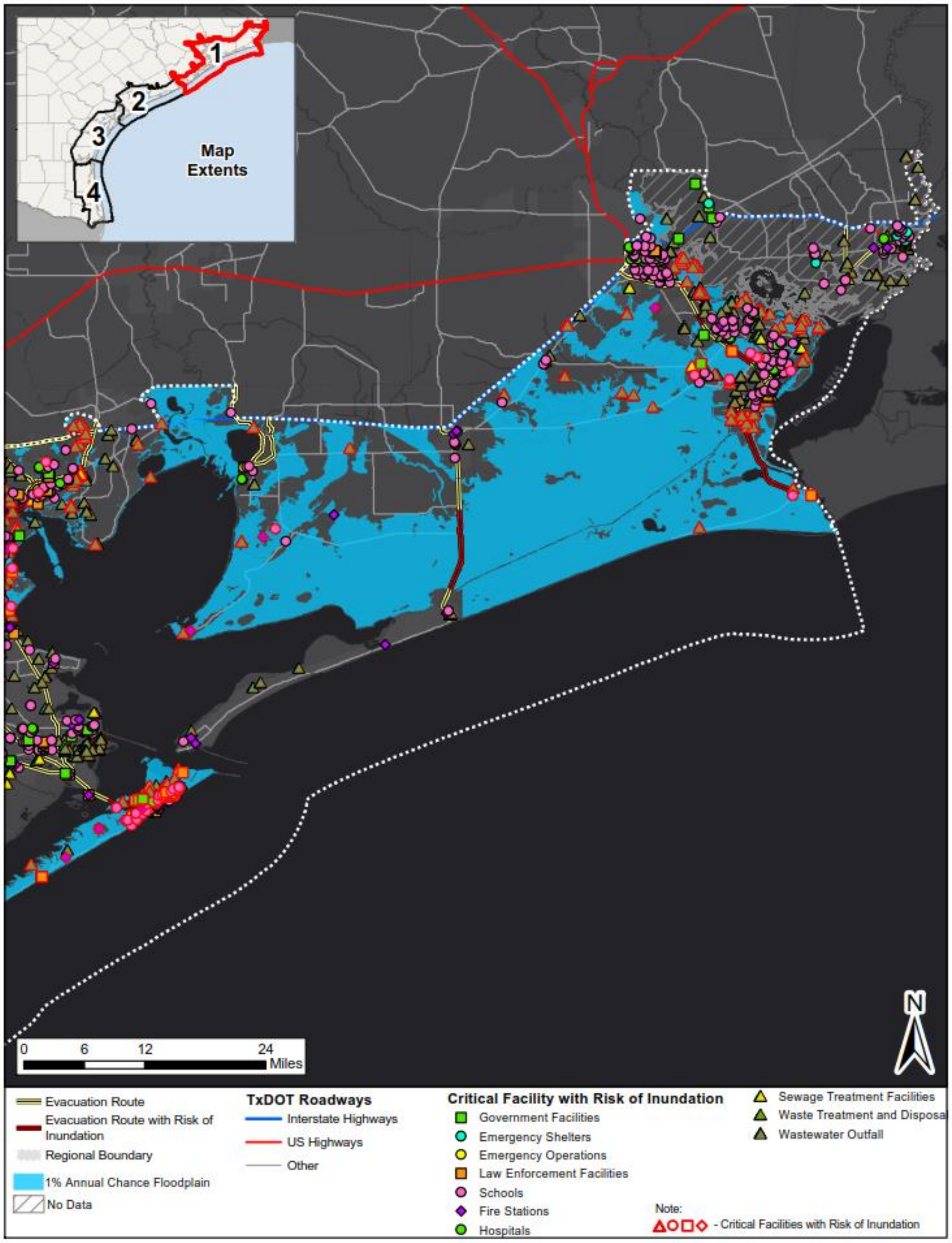


Figure 9-3: Critical Facilities at Risk of Inundation due to Coastal Flooding, Region 1A

B. Detailed Project Costs

Cost estimates for all candidate projects were developed to provide a sense of scale as well as a point of reference for understanding project efficiencies (the relationship between project cost and project results or benefits). The cost assessment methodology provided for comparison of similar projects and included an explicit set of assumptions associated with each project definition. The process also entailed development of standard project templates, by project type or subtype that featured quantified parameters to be developed for each project and were used to compute standardized costs for the proposed projects. Detailed, line item costs were then produced for each project.

All cost estimates were developed at a planning level based on available information and stated assumptions. Any costs developed for a project by one of the project's stakeholders, typically based on more detailed design and refined project specific inputs, would supersede the costs developed as part of the Resiliency Plan. The estimates included the following cost and related items:

- **Engineering and Design (E&D) Fee:** It was assumed that these fees would be approximately five to ten percent of the total construction cost of a given project. This is based on a review of past projects and current design and construction practices.
- **Construction Cost and Management:** This category includes the overall cost of construction, as well as any fees for professional services rendered during construction to monitor contractor compliance with contract requirements, schedules and costs.
- **Mobilization and Demobilization Costs:** These fees cover contractor costs associated with movement of equipment and personnel at project start-up and closure. This was assumed to be up to ten percent of the construction cost.
- **Annual Operation and Maintenance (O&M) Costs:** These costs include fees incurred for the administration, supervision, operation, maintenance, and preservation of the projects being constructed. It was estimated based on monitoring frequency, maintenance frequency, and operation duration.
- **Project Activities and Primary Project Materials:** Templates for each project type were developed to include principal project features for the corresponding project type. Design elevations and dimensions were based on project-specific information obtained from publicly available sources or set to a standard set of parameters for the applicable project template. The estimated quantities apply to both the project activities (e.g., amount of soil material requiring excavation) as well as the project materials (e.g., amount of stone needed for construction)
- **Contingencies:** A 5 to 20 percent contingency was used to develop final estimated construction costs for projects and was based on current practice for coastal projects. "Contingency" is the allowance for costs expected to be part of a project total, taking into consideration such factors as deviations in anticipated quantities and labor requirements, among others.
    - The amount of contingency required for each project is related to the expected feasibility of completing the project (5% - High Feasibility, 10% - Medium-High Feasibility, 15% - Medium-Low Feasibility, 20% - Low feasibility), or in some cases, the amount of project data available.
    - The expected feasibility for the amount of project contingency was determined for each project based on the TAC's assessment of the project feasibility on a scale of 0 to 4. For the projects evaluated in 2019, a project was considered highly feasibility if the project received a TAC feasibility score of 3.14 to 4; medium-high feasibility if the project received a TAC feasibility score of 2.9 to 3.14; medium-low feasibility if the project received a TAC feasibility score of 2.54 to 2.9; and low feasibility score if the project received a TAC feasibility score of 0 to 2.54.

In addition to cost items, the detailed project costs include data and details used to assess project benefits:

- **Impact Area:** Determines the approximate populated area the completed project will impact. The area options are large scale (occurs in multiple locations along the coast), metropolitan (50,000+ people), micropolitan (10,000 to 50,000 people), and rural (<10,000 people).

- **Sector:** Identifies the primary industry (as defined by USACE) related to the project. The sectors include emergency management, environmental, flood risk, hydropower, navigation, recreation, regulatory, and water storage.
- **Site Visitors:** Estimates the number of visitors to the site per day (local/non-local), boaters, and multi-day/overnight users.
- **Equipment:** Estimates the number and types of construction equipment required for completing construction. These numbers are based off of typical construction equipment noted for each project activity, based on relevant construction experience.
- **Crew Size:** Estimates the size of the crew necessary based on construction activities. In most cases, typical crew sizes were developed based on relevant construction experience and applied to project conditions. In some instances, these typical crew sizes were modified to ensure feasibility.
- **Special Considerations:** The primary special consideration is related to whether a particular project is expected to beneficially use dredged materials (BUDM), and allows for a BUDM supplier to be identified, if possible. Other special considerations may be noted in the "Assumptions & Notes" section.

The detailed costs were computed for each proposed priority project by assuming a standard design template for the project. The standard design templates (or, typical sections) for the projects assume a consistent cross-section for a variety of project types based on typical coastal construction practices for the state of Texas. Once the project type was determined, an applicable cross-section is applied over the total length of the project. This results in an estimated quantity of construction materials needed (for instance, cubic yards of sand). Then, a unit cost for the material specific to the region in which the project is being constructed is used to compute a total cost for the project. The standard project templates for conceptual designs are included in **Appendix E**.

The templates help create a standardized method for computing costs that allow the estimates to be directly compared to one another, serving as high-level planning assumptions to produce one standard final design template suitable for each type of project (e.g., beach nourishment, breakwater construction) at any given location along the coast. The project-specific design itself should be assessed for local relative sea level trends, wave conditions, ecological factors, during each project's engineering and design phase to refine these planning level design templates. The GLO recommends that a 50-year life expectancy be assumed for each project during final design.

The full results of the cost assessment are presented in **Appendix E**.

C. Economic Characterization of the Texas Coast

The State of Texas through the General Land Office (GLO) is assessing coastal vulnerability along its 367-mile coastline. Past experiences with the consequences of Hurricane's Rita and Ike along with continuing shoreline erosion and loss of natural coastal habitat have inspired the GLO to seek ways in which the State of Texas can protect, preserve, and restore valuable assets that are necessary to the safety and prosperity of Texas families.

Several efforts are underway, funded through the GLO, which focus on different aspects of coastal vulnerability. Storm surge and coastal flooding are being investigated by the Gulf Coast Community Protection and Recovery District (GCCPRD) through a grant by the GLO and by the U.S. Army Corps of Engineers (USACE) through GLO's cost-share of a hurricane protection feasibility study. The GCCPRD study has investigated large-scale structural means of protecting the built environment. The USACE study is looking at a variety of structural, nonstructural, and ecosystem measures that will protect the Texas coast and its diverse assets. Other work has been accomplished by the GLO that investigated coastal infrastructure needs and resiliency. By way of reference, these studies are included in the Texas Coastal Resiliency Master Plan.

This report complements the referenced actions by addressing the needs of the natural environment that are vital to the people and economy of Texas. This report builds upon what has been accomplished with other efforts. The alternatives developed in the Resiliency Plan have a foundation in the loss and degradation of the natural environment and the GLO's desire to preserve and protect the Texas coast's rich assets. While perhaps smaller in scale than the previously mentioned efforts, these actions are vital to the sustainability of the Texas coast's local and regional economies in which they are located.

Study Area

The National Oceanic and Atmospheric Administration's (NOAA) Office of Coastal Management defines a county a Coastal Shoreline County if it is directly adjacent to the open ocean, major estuaries, or the Great Lakes. These counties are considered to be most directly affected by issues pertaining to the coast. This report adopts this perspective and defines its study area as the coastal shoreline counties (coastal counties) of Texas shown in Table 9-2.

Scope of Economic Report

This report begins with a characterization of the Texas coast, portraying the population who lives within the State's 18 coastal counties and presenting an overview of the counties' local and regional economies. A discussion of current and future coastal vulnerabilities follows that lays the foundation upon which the study's resiliency strategies are based.

I. Population and Growth Projections

The Texas coastline is a strong economic locus of our state. The coastline offers low-cost water transportation and abundant natural resources for commercial harvest and recreational enjoyment. Increasingly as more employment opportunities locate along the coast, more of our State's population moves there for jobs. As a result, more people and economic assets are exposed to the climatic and geophysical processes that threaten coastal low-lying areas.

Texas is experiencing the same growth pattern as that of the nation overall with urban populations concentrating along its 367-mile coastline. Texas's 18 coastal counties, shown in Table 9-2, make up less than 6 percent of the State's land area but contain 24 percent of the State's population. Texas' coastal counties had a population density of 411 persons/square mile in 2010 compared to the State's overall density of 97 persons/square mile, four times greater than that of the state as a whole. The population living within Texas' coastal counties is expected to increase from 6.1 million, in 2010, to 7 million in 2020 and to over 10 million by 2050 (Texas Demographer 2018). Ten of the eighteen counties along the Texas coast fall within major Metropolitan Statistical Areas as designated by the U.S. Bureau of the Census. Recent population growth within Texas' coastal counties is displayed in Table 9-3, following county aggregations into regions as developed by the GLO in previous work, shown in Table 9-2.

Table 9-2: Coastal Regions Designations

Texas Coastal Region Designations	Texas Coastal Counties within Region
1a	Orange, Jefferson
1b	Harris, Galveston, Chambers, Brazoria
2	Matagorda, Jackson, Victoria, Calhoun
3	Refugio, Aransas, San Patricio, Nueces, Kleberg
4	Kenedy, Willacy, Cameron

Table 9-3: Texas Coastal Population Growth, 2010-2017

Region	County	Population		Percent Change	Average Annual Percent Change	Percent of State Increase
		2017	2010	2010-2017	2010-2017	2010-2017
1a	Orange*	83,909	81,993	2.34%	0.33%	0.11%
1a	Jefferson*	254,574	252,495	0.82%	0.12%	0.12%
All 1a		338,483	334,488	1.19%	0.17%	0.23%
1b	Chambers*	39,283	35,406	10.95%	1.50%	0.23%
1b	Harris*	4,525,519	4,108,909	10.14%	1.39%	24.35%
1b	Galveston*	321,184	292,574	9.78%	1.34%	1.67%
1b	Brazoria*	345,995	314,452	10.03%	1.37%	1.84%
All 1b		5,231,981	4,751,341	10.12%	1.39%	28.09%
2	Matagorda	36,744	36,721	0.06%	0.01%	0.00%
2	Jackson	14,756	14,070	4.88%	0.68%	0.04%
2	Victoria	91,518	86,849	5.38%	0.75%	0.27%
2	Calhoun	21,821	21,336	2.27%	0.32%	0.03%
All 2		164,839	158,976	3.69%	0.52%	0.34%
3	Refugio	7,293	7,357	-0.87%	-0.12%	0.00%
3	Aransas*	24,832	23,204	7.02%	0.97%	0.10%
3	San Patricio*	66,867	64,502	3.67%	0.52%	0.14%
3	Nueces*	358,484	340,320	5.34%	0.75%	1.06%
3	Kleberg	31,540	32,095	-1.73%	-0.25%	-0.03%
All 3		489,016	467,478	4.61%	0.65%	1.26%
4	Kenedy	564	418	34.93%	4.37%	0.01%
4	Willacy	21,839	22,202	-1.63%	-0.24%	-0.02%
4	Cameron*	420,201	407,672	3.07%	0.43%	0.73%
All 4		442,604	430,292	2.86%	0.40%	0.72%

All Coastal Counties		6,666,923	6,142,575	8.54%	1.18%	30.64%
Texas		27,419,612	25,245,717	6.80%	1.19%	100.00%

*Metropolitan Area counties as designated by the U.S. Bureau of the Census
Source: U.S. Bureau of the Census

Texas' coastal counties added over 520,000 persons over the seven-year period 2010-2017 for an overall increase of 8.5 percent. Region 1b, which comprises four of the counties that make up the Houston-Sugar Land-Baytown Metropolitan Area, dominated growth within the coastal counties overall, capturing over 75 percent of coastal county growth between 2010-2017. Region 1a showed the least growth among the coastal regions. One third of Texas' population growth between 2010 and 2017 occurred in coastal counties.

Expectation for future population growth is developed by the Texas State Data Center. For long-term planning purposes, the Texas State Demographer recommends adopting a mid-range growth projection scenario with net migration that is one-half the rate that was experienced in the post-2000 decade. Table 9-4 shows the projections of growth for the State of Texas, the coastal counties and coastal regions. The State is expected to increase its population by over 20 million persons between 2010 and 2050. Of that number, over 10 million will live in Texas' coastal counties. Region 1b is expected to capture 20 percent of State's population growth between 2010-2050 and over 90 percent of that growth along the Texas coast with an additional 4.5 million people (Texas Demographer 2018).

The forecast for future growth in coastal regions is shown in Figure 9-4 which summarizes expectations for growth in Region 1b to be faster than other coastal regions and the State overall. By 2050, Region 1b is projected to grow its population by almost 95 percent over its 2010 level. Texas overall is expected to increase its total population by over 88 percent, over the same period.

Table 9-4: Population Growth Projections, Texas Coast, 2010-2050

Region	County	2010	2020	2030	2040	2050	Average Annual Growth Rate, 2010-2050	Population Change, 2010-2050	Percent of State Increase, 2010-2050
1a	Orange	81,837	86,155	89,102	89,238	87,825	0.18%	5,988	0.03%
1a	Jefferson	252,273	258,670	261,238	259,280	255,423	0.03%	3,150	0.01%
All 1a		334,110	344,825	350,340	348,518	343,248	0.07%	9,138	0.04%
1b	Chambers	35,096	42,302	52,515	63,921	77,273	1.99%	42,177	0.19%
1b	Harris	4,092,459	4,978,446	5,922,906	6,892,477	7,900,994	1.66%	3,808,535	17.16%
1b	Galveston	291,309	355,178	426,951	500,599	578,719	1.73%	287,410	1.29%
1b	Brazoria	313,166	375,842	452,393	540,232	629,936	1.76%	316,770	1.43%
All 1b		4,732,030	5,751,768	6,854,765	7,997,229	9,186,922	1.67%	4,454,892	20.07%
2	Matagorda	36,702	37,063	36,451	35,037	33,253	-0.25%	-3,449	-0.02%
2	Jackson	14,075	15,899	17,853	20,102	22,862	1.22%	8,787	0.04%
2	Victoria	86,793	97,892	109,309	118,715	126,847	0.95%	40,054	0.18%
2	Calhoun	21,381	22,840	23,740	23,951	23,912	0.28%	2,531	0.01%
All 2		158,951	173,694	187,353	197,805	206,874	0.66%	47,923	0.22%
3	Refugio	7,383	7,573	7,631	7,561	7,559	0.06%	176	0.00%
3	Aransas	23,158	27,699	33,118	38,832	46,198	1.74%	23,040	0.10%
3	San Patricio	64,804	71,325	78,229	82,894	86,280	0.72%	21,476	0.10%
3	Nueces	340,223	383,707	429,459	470,363	510,636	1.02%	170,413	0.77%
3	Kleberg	32,061	30,987	30,482	29,514	28,144	-0.33%	-3,917	-0.02%
All 3		467,629	521,291	578,919	629,164	678,817	0.94%	211,188	0.95%
4	Kenedy	416	476	514	536	546	0.68%	130	0.00%
4	Willacy	22,134	22,134	21,641	20,578	19,226	-0.35%	-2,908	-0.01%
4	Cameron	406,220	427,879	438,124	431,906	413,004	0.04%	6,784	0.03%
All 4		428,770	450,489	460,279	453,020	432,776	0.02%	4,006	0.02%
All Coastal Counties		6,121,490	7,242,067	8,431,656	9,625,736	10,848,637	1.44%	4,727,147	21.30%
Texas		25,145,561	29,677,772	34,894,429	40,686,490	47,342,417	1.59%	22,196,856	

Source: Texas Demographer 2018

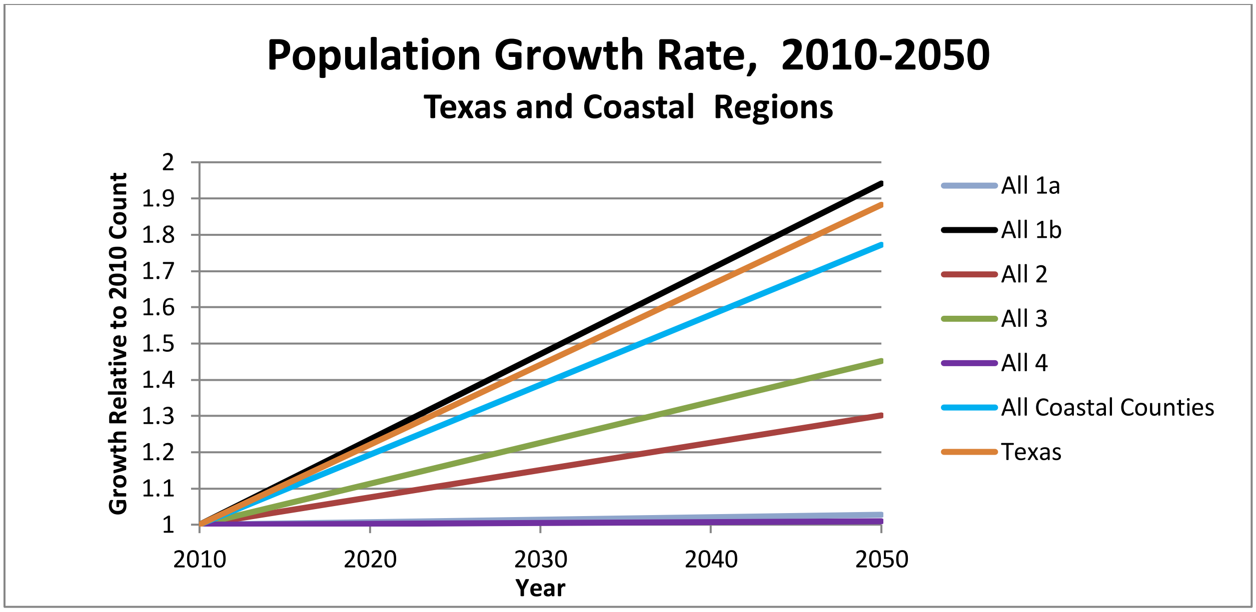


Figure 9-4: Population Growth Rate, 2010-2050

Source: Texas Demographer 2018

II. Built Environment

Population growth is spurred by employment opportunities and locational amenities. Population growth brings with it residential development and associated commercial and industrial development. These actions transform the natural environment to one that supports human activity. All of the area and physical structures that have been created by people for use by people constitute the "built environment." One estimate of the value of the built environment is the monetary value of real and personal property. This value is the basis for property tax assessments and is established by county appraisal districts consistently in every Texas County. Real property consists of all lands and all appurtenances to lands, such as buildings, crops, or mineral rights. Texas Tax Code Section 23.01 requires taxable property to be appraised at market value as of January 1 of the tax year. Except as provided by the Texas Constitution, all real and tangible personal property is taxed in proportion to its value, which is determined by law. The Texas Constitution provides certain exceptions to this rule, such as the use of productivity values for agricultural and timber land, which is appraised, based on productivity value rather than market value. This method tends to be lower than market value. Therefore, total market value of real property provides a conservative estimate of the value of a county's economic assets but is presented here in lieu of more credible data. Table 9-5 displays the market value of real property for 2017 for Texas' coastal counties and regions. On a per square mile basis, the market value of real property in Texas coastal counties is over 4 times the value of an average Texas square mile overall (Texas Comptroller of Public Accounts, 2017).

Growth estimates for the built environment is projected based on the close association of population growth. By applying the population average annual growth rate for these counties to 2050, an estimate of real property market value growth to 2050 was calculated. In 2017, over $700 billion of real property was located in Texas' 18 coastal counties, comprising 24 percent of the State's total real property market value. By 2050, the real property market value within the coastal counties is expected to approach $1,215 billion. Currently, coastal region 1b dominates the coastal regions with 82 percent of the market value of built assets along the Texas coast.

Table 9-5: Estimate of the Value of the Built Environment, Texas Coastal Counties, 2017

Region	County	Total Market Value 2017	Percent of State Total 2017	Average Annual Pop Growth Rate, 2010-2050	Projected Market Value, 2050	Land Area Sq. Mi.	Value per Sq. Mi. 2017
1a	Orange	$7,077,747,719	0.23%	0.18%	$7,502,336,789	334	$21,190,861.43
1a	Jefferson	$30,000,687,244	0.98%	0.03%	$30,309,398,515	876	$34,247,360
All 1a		$37,078,434,963	1.22%	0.07%	$37,811,735,305	1,210	$30,643,335
1b	Chambers	$14,646,874,482	0.48%	1.99%	$28,088,615,632	597	$24,534,128
1b	Harris	$519,113,202,704	17.03%	1.66%	$893,228,199,131	1,704	$304,643,898
1b	Galveston	$34,247,890,766	1.12%	1.73%	$60,336,171,081	378	$90,602,886
1b	Brazoria	$41,000,984,653	1.35%	1.76%	$72,979,316,356	1,358	$30,192,183
All 1b		$609,008,952,605	19.98%	1.67%	$1,054,632,302,200	4,037	$150,856,813
2	Matagorda	$6,854,013,732	0.22%	-0.25%	$6,318,098,305	1,100	$6,230,922
2	Jackson	$3,000,232,602	0.10%	1.22%	$4,476,661,172	829	$3,619,098
2	Victoria	$8,727,869,705	0.29%	0.95%	$11,936,157,534	882	$9,895,544
2	Calhoun	$4,153,537,342	0.14%	0.28%	$4,555,154,663	507	$8,192,381
All 2		$22,735,653,381	0.75%	0.66%	$27,286,071,674	3,319	$6,850,152
3	Refugio	$1,581,661,210	0.05%	0.06%	$1,612,703,142	770	$2,054,105
3	Aransas	$3,486,448,827	0.11%	1.74%	$6,163,381,468	252	$13,835,114
3	San Patricio	$10,782,261,587	0.35%	0.72%	$13,654,136,197	694	$15,536,400
3	Nueces	$34,654,546,470	1.14%	1.02%	$48,444,794,866	839	$41,304,585
3	Kleberg	$2,240,000,702	0.07%	-0.33%	$2,011,686,863	881	$2,542,566
All 3		$52,744,918,796	1.73%	0.94%	$71,886,702,537	3,436	$15,350,675
4	Kenedy	$1,826,686,933	0.06%	0.68%	$2,286,104,374	1,458	$1,252,872
4	Willacy	$1,734,081,044	0.06%	-0.35%	$1,543,843,745	591	$2,934,147
4	Cameron	$19,305,871,195	0.63%	0.04%	$19,571,476,608	891	$21,667,644
All 4		$22,866,639,172	0.75%	0.02%	$23,401,424,727	2,940	$7,777,768
All Coastal Counties		$744,434,598,917	24.42%	1.44%	$1,215,018,236,442	14,941	$49,824,951
Texas		$3,048,353,444,159		1.59%	$5,137,671,419,773	261,233	$11,669,098

Source: Texas Comptroller of Public Accounts, 2017

III. Coastal Economy

Gross Domestic Product

A measure of Texas' financial wealth and well-being lies in its productivity as reflected in its Real Gross Domestic Product (GDP). The GDP for private industry in the State of Texas was $1.5 trillion (chained 2012 dollars) in 2017, ranking second in the nation only behind California. GDP by state is the measure of the market value of all final goods and services produced within a state in a particular period of time. In concept, an industry's GDP by state, referred to as its "value added", is equivalent to its gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus its intermediate inputs (consumption of goods and services purchased from other U.S. industries or imported). GDP by state is the state counterpart of the Nation's GDP, the Bureau's featured and most comprehensive measure of U.S. economic activity (Bureau of Economic Analysis, 2016).

Table 9-6 presents the number of businesses, employment, wages, and GDP by industrial sector. In 2017, the largest contributor to Texas' financial wealth was manufacturing. This industry accounted for almost 14 percent of Texas' GDP. The second largest industry contributing to GDP was mining, quarrying, and oil and gas extraction with nearly 13 percent of the GDP. Employment was highest within health care and social assistance, followed by retail trade, and accommodation and food service, respectively.

Table 9-6: Establishments, Employment, Wages, and GDP by Industry in Texas, 2017

NAICS** Sector	Annual Establishments	Annual Average Employment	Total Annual Wages	Annual Wages per Employee	Real GDP in millions, chained 2012$	Percent of Total Real GDP	Rank by Real GDP
NAICS 11 Agriculture, forestry, fishing and hunting	10,219	60,309	$2,177,009,042	$36,098	$12,104	0.80%	17
NAICS 21 Mining, quarrying, and oil and gas extraction	9,361	220,801	$28,018,493,517	$126,895	$196,826	12.99%	2
NAICS 22 Utilities	1,925	50,278	$5,609,118,347	$111,562	$25,420	1.68%	15
NAICS 23 Construction	49,310	711,119	$44,956,090,806	$63,219	$69,836	4.61%	9
NAICS 31-33 Manufacturing	24,275	851,513	$64,555,923,615	$75,813	$204,470	13.50%	1
NAICS 42 Wholesale trade	46,481	587,929	$47,001,896,763	$79,945	$127,965	8.45%	5
NAICS 44-45 Retail trade	77,524	1,325,762	$41,885,579,817	$31,594	$90,690	5.99%	7
NAICS 48-49 Transportation and warehousing	19,912	468,912	$27,916,387,519	$59,534	$57,196	3.78%	11
NAICS 51 Information	9,521	201,873	$17,036,900,030	$84,394	$67,953	4.49%	10
NAICS 52 Finance and insurance	40,252	526,388	$46,283,228,929	$87,926	$74,539	4.92%	8
NAICS 53 Real estate and rental and leasing	31,027	213,940	$13,122,250,267	$61,336	$144,491	9.54%	4

NAICS 54 Professional and technical services	89,201	743,806	$67,850,310,207	$91,220	$181,803	12.00%	3
NAICS 55 Management of companies and enterprises	3,201	128,109	$16,900,427,858	$131,922	$22,057	1.46%	16
NAICS 56 Administrative and waste services	36,840	794,950	$34,441,069,117	$43,325	$50,352	3.32%	12
NAICS 61 Educational services	7,485	164,167	$7,745,637,878	$47,181	$10,867	0.72%	18
NAICS 62 Health care and social assistance	80,150	1,443,320	$67,961,151,873	$47,087	$97,907	6.46%	6
NAICS 71 Arts, entertainment, and recreation	7,554	138,977	$4,825,346,349	$34,720	$10,600	0.70%	19
NAICS 72 Accommodati on and food services	53,190	1,178,785	$23,156,129,630	$19,644	$40,484	2.67%	13
NAICS 81 Other services, except public administration	56,060	328,026	$12,412,882,665	$37,841	$29,077	1.92%	14
NAICS 99 Unclassified	6,911	12,414	$540,261,682	$43,520		0.00%	20
Total	**660,399**	**10,151,378**	**$574,396,095,911**	**$56,583**	**$1,514,636**	**100.00%**	

*The public government sector is not included.
**NAICS: North American Industrial Classification System
Sources: Bureau of Economic Analysis, 2017 & Bureau of Labor Statistics, 2017.

Personal Income

Local area personal income statistics provide a framework for analyzing current conditions in local economies as a measure of wealth held by the local population. Personal income is the income received by, or on behalf of, all persons from all sources: from participation as laborers in production; from owning a home or unincorporated business; from the ownership of financial assets; and from government and business in the form of transfer receipts. It includes income from domestic sources as well as from the rest of the world. Personal income is the income that is available to persons for consumption expenditures, taxes, interest payments, transfer payments to governments and the rest of the world, or for saving.

Per capita personal income is calculated as the total personal income of the residents of a given area divided by the resident population of the area. Personal income is measured before the deduction of personal income taxes and other personal taxes and is reported in current dollars (no adjustment is made for price changes).

Table 9-7 presents 2017 personal income and per capita income for the coastal counties, coastal regions and the State as a whole. Altogether, the coastal counties contain 24 percent of the State's population and 25 percent of the State's total personal income. However, the distribution of income is skewed along the Texas coast. With the exception of Region 1b, which is part of the Houston Metropolitan Statistical Area, compared to the overall State, coastal regions fare below in terms of per capita personal income. The Region 1b population commands almost 85 percent of all the personal income within the coastal counties and has over one-fifth of all the personal income in the State.

Table 9-7: Personal Income and Per Capita Income, Coastal Counties, 2017

Region	County	Population 2017	Personal Income 2017, in thousands	Per Capita Income 2017	Percent of State Total	
					Population	Personal Income
1a	Orange	85,047	$3,692,033	$43,412	0.30%	0.28%
1a	Jefferson	256,299	$10,851,311	$42,338	0.91%	0.81%
All 1a		341,346	$14,543,344	$42,606	1.21%	1.08%
1b	Chambers	41,441	$2,147,981	$51,832	0.15%	0.16%
1b	Harris	4,652,980	$247,482,118	$53,188	16.44%	18.46%
1b	Galveston	335,036	$16,443,373	$49,079	1.18%	1.23%
1b	Brazoria	362,457	$16,645,867	$45,925	1.28%	1.24%
All 1b		5,391,914	$282,719,339	$52,434	19.05%	21.09%
2	Matagorda	36,840	$1,504,079	$40,827	0.13%	0.11%
2	Jackson	14,805	$591,922	$39,981	0.05%	0.04%
2	Victoria	92,084	$3,912,142	$42,484	0.33%	0.29%
2	Calhoun	21,744	$795,537	$36,587	0.08%	0.06%
All 2		165,473	$4,707,679	$28,450	0.58%	0.35%
3	Refugio	7,224	$299,764	$41,496	0.03%	0.02%
3	Aransas	25,572	$1,146,138	$44,820	0.09%	0.09%
3	San Patricio	67,215	$2,880,303	$42,852	0.24%	0.21%
3	Nueces	361,221	$15,125,406	$41,873	1.28%	1.13%
3	Kleberg	31,088	$1,154,083	$37,123	0.11%	0.09%
All 3		492,320	$20,605,694	$41,854	1.74%	1.54%
4	Kenedy	417	$17,221	$41,297	0.00%	0.00%
4	Willacy	21,584	$648,538	$30,047	0.08%	0.05%
4	Cameron	423,725	$11,754,457	$27,741	1.50%	0.88%
All 4		445,726	12,420,216	$27,865	1.57%	0.93%
All Coastal Counties		6,836,779	$334,996,272	$48,999	24.15%	24.99%
Texas		28,304,596	$1,340,568,414	$47,362		

Source: Bureau of Economic Analysis, 2017

Employment, Businesses and Wages

As of 2017, Texas possessed 8.3 percent of the total U.S. employment with 10.1 million persons working in the labor force. Texas has a strong export economy based in the oil and gas industry for not only oil and gas extraction but also product manufacturing. Over one-third of the nation's employment in oil and gas extraction is located in Texas. Texas also has a diversified employment base and has a higher employment percentage in the construction, wholesale trade, transportation and warehousing, and real estate industries, compared to the overall U.S.   (Bureau of Labor Statistics, 2017)

Table 9-8 displays the total employment, establishment count, and total wages for the coastal counties for 2017. Over one-quarter of the State's employment is located within the 18 coastal counties along with nearly 24 percent of all business establishments. Harris County in Region 1b dominates the coastal counties with employment and business establishments.

Wages are one component of personal income. Cumulatively, the total wages across the coastal counties is higher than the State wages, capturing almost 25 percent of all wages in the State. Consequently, the annual average wages per employee is 13 percent higher along the coast with Jefferson, Harris, Brazoria, Matagorda, Kenedy, Calhoun, and Chambers Counties all having higher wages per employee than the overall State average.

Table 9-8: Annual Average Employment, Business Establishments, and Wages Coastal Counties, 2017

Region	Coastal County	Total Employment			Business Establishment Count			Total Wages			Pay		
		Annual Average	Percent of State	Percent of Coastal County	Annual Average	Percent of State	Percent of Coastal County	Annual Average	Percent of State	Percent of Coastal County	Annual Average ^1	Percent of State	Percent of Coastal County
1a	Jefferson County, Texas	105,173	1.04%	4.00%	5,709	0.86%	3.68%	$6,044,454,706	1.05%	3.57%	$57,472	101.57%	6.47%
1a	Orange County, Texas	17,874	0.18%	0.68%	1,317	0.20%	0.85%	$976,003,898	0.17%	0.58%	$54,605	96.50%	6.15%
All 1a		123,047			7,026			$7,020,458,604			$57,055		
1b	Harris County, Texas	1,997,358	19.68%	75.93%	114,580	17.35%	73.88%	$139,390,000,000	24.27%	82.29%	$69,787	123.34%	7.86%
1b	Galveston County, Texas	81,428	0.80%	3.10%	6,029	0.91%	3.89%	$3,603,276,830	0.63%	2.13%	$44,251	78.21%	4.98%
1b	Chambers County, Texas	11,793	0.12%	0.45%	656	0.10%	0.42%	$753,932,916	0.13%	0.45%	$63,931	112.99%	7.20%
1b	Brazoria County, Texas	87,622	0.86%	3.33%	5,608	0.85%	3.62%	$5,176,374,378	0.90%	3.06%	$59,076	104.41%	6.65%
All 1b		2,178,201			126,873			$148,923,584,124			$68,370		
2	Matagorda County, Texas	8,361	0.08%	0.32%	770	0.12%	0.50%	$488,981,915	0.09%	0.29%	$58,484	103.36%	6.59%
2	Jackson County, Texas	4,667	0.05%	0.18%	384	0.06%	0.25%	$203,690,241	0.04%	0.12%	$43,645	77.13%	4.92%
2	Victoria County, Texas	31,955	0.31%	1.21%	2,406	0.36%	1.55%	$1,438,382,108	0.25%	0.85%	$45,013	79.55%	5.07%

Region	Coastal County	Total Employment			Business Establishment Count			Total Wages			Pay		
		Annual Average	Percent of State	Percent of Coastal County	Annual Average	Percent of State	Percent of Coastal County	Annual Average	Percent of State	Percent of Coastal County	Annual Average ^1	Percent of State	Percent of Coastal County
2	Calhoun County, Texas	9,464	0.09%	0.36%	547	0.08%	0.35%	$638,251,910	0.11%	0.38%	$67,440	119.19%	7.60%
All 2		54,447			4,107			$2,769,306,174			$50,862		
3	Refugio County, Texas	1,679	0.02%	0.06%	166	0.03%	0.11%	$60,313,224	0.01%	0.04%	$35,922	63.49%	4.05%
3	Aransas County, Texas	4,706	0.05%	0.18%	614	0.09%	0.40%	$167,141,463	0.03%	0.10%	$35,517	62.77%	4.00%
3	San Patricio County, Texas	15,128	0.15%	0.58%	1,039	0.16%	0.67%	$756,778,681	0.13%	0.45%	$50,025	88.41%	5.64%
3	Nueces County, Texas	134,592	1.33%	5.12%	8,087	1.22%	5.21%	$6,222,470,847	1.08%	3.67%	$46,232	81.71%	5.21%
3	Kleberg County, Texas	6,982	0.07%	0.27%	551	0.08%	0.36%	$237,898,470	0.04%	0.14%	$34,073	60.22%	3.84%
All 3		163,087			10,457			$7,444,602,685			$45,648		
4	Kenedy County, Texas	481	0.00%	0.02%	26	0.00%	0.02%	$29,729,774	0.01%	0.02%	$61,808	109.23%	6.96%
4	Willacy County, Texas	2,269	0.02%	0.09%	264	0.04%	0.17%	$71,954,546	0.01%	0.04%	$31,712	56.05%	3.57%
4	Cameron County, Texas	109,151	1.08%	4.15%	6,332			$3,137,296,014	0.55%	1.85%	$28,743	50.80%	3.24%
All 4		111,901			6,622			$3,238,980,334			$28,945		
Coastal Counties		2,630,683	25.91%	100.00%	155,085	23.48%	100.00%	$169,396,931,921	29.49%	100.00%	$64,393	1568.90%	100.00%
Texas Statewide		10,151,376			660,399			$574,396,095,911			$56,583		

^1: Total Wages divided by Total Employment
Source: Bureau of Labor Statistics, 2017

Location Quotients and Industry Concentrations

The employment distribution within industrial sectors for each coastal county was compared against employment within industrial sectors Statewide. This comparison resulted in location-quotient calculations that indicate where the county's industrial focus lies based on employment. Any county location quotient over 1.0 indicates that proportionately more employment is found in that industrial sector than at the State level and that county's industrial sector supports an export economy. Location quotients that are very high (>10) indicate a heavy concentration of employment in that industry within the county. In general, diversified economies are more resilient ones, being able to better withstand market fluctuations that can adversely affect one industry. Local economies that are dominated by very few industries have difficulty maintaining stability when those industries suffer downturns. Table 9-9 displays the location quotients for each county by coastal region and industrial subsector.

Region 1a. As shown in Table 9-9, Region 1a has an economy dominated by manufacturing, especially petroleum products in Jefferson County and chemicals in Orange County. Support services in construction and specialty trades also contribute to a strong manufacturing-based economy for Region 1a.

Region 1b. The diverse economy of an urban Harris County dominates Region 1b with export economies in a wide range of industrial sectors. Additional significant employment sectors are oil and gas field machinery and equipment manufacturing; geophysical surveying and mapping services; crude petroleum and natural gas extraction; and pipeline transportation of oil and gas. Galveston County has strong economies for employment in navigational services to shipping; marine cargo handling; seafood processing; petroleum refining; and cruise ship and tourism industries. Chambers County's employment is concentrated in the fishing and hunting industries, chemical manufacturing, pipeline construction, and transportation of crude oil. Brazoria County's economy is concentrated in petrochemical manufacturing and heavy construction activities, more specifically, oil and gas pipeline and industrial building construction.

Region 2. Victoria County reflects the diversified economy of its urban center Victoria with export employment across many sectors that support the regional demand for human services such as hospitals, food services, and mobility. Cattle ranching and farming; construction equipment merchant wholesalers; and heavy machinery rental and leasing are high employment sectors in Victoria County. Region 2's Matagorda County has very high employment in rice and tree farming; shellfish fishing and seafood processing; and pipeline transportation of natural gas. Calhoun County's employment is almost totally concentrated in chemical manufacturing. Other significant sectors include heavy construction, and cotton farming and ranching.

Region 3. San Patricio County, in Region 3, has very high employment in industrial building construction activities; oil and gas pipeline construction and operations; water transportation; and cotton farming and ginning. Nueces County's employment reflects its urban center Corpus Christi with a diverse economy supporting many service needs. Nueces County also possesses a very high concentration of employment in petroleum refineries, pipeline transportation of oil and gas and support activities; and scenic and sightseeing transportation. Refugio has a high concentration of employment in farming, ranching, and agricultural support services; crude petroleum and natural gas extraction and support services; and private home services. Kleberg County has a high percentage of employment in fishing, heavy machinery rental, and leasing and commercial machinery repair and maintenance.

<u>Region 4</u>. Kenedy County's employment is totally concentrated in ranching while Willacy County's employment is very high for farming and agriculture support activities. Employment in Cameron County reflects its urban center of Brownsville with a wide variety of employment across many sectors that support human consumption and needs. Cameron County also has a high percentage of employment in farming and shellfish fishing.

Table 9-9: Location Quotients for the Texas Coastal Counties

Region	1a		1b				2				3					4		
Industry	Jefferson County, Texas	Orange County, Texas	Harris County, Texas	Galveston County, Texas	Chambers County, Texas	Brazoria County, Texas	Matagorda County, Texas	Jackson County, Texas	Victoria County, Texas	Calhoun County, Texas	Refugio County, Texas	Aransas County, Texas	San Patricio County, Texas	Nueces County, Texas	Kleberg County, Texas	Kenedy County, Texas	Willacy County, Texas	Cameron County, Texas
Base Industry: Total, all industries	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NAICS 111 Crop production	0.11	-	0.06	0.05	0.28	0.5	7.12	2.87	0.19	0.72	1.97	-	2.15	0.42	0	-	11.45	0.54
NAICS 112 Animal production and aquaculture	0.2	0.62	0.1	0.15	0.9	0	5.37	4.44	1.43	3.24	7.85	6.26	0	0	0	41.65	7.53	0.13
NAICS 113 Forestry and logging	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAICS 114 Fishing, hunting and trapping	0	0	0.2	0	18.76	0	17.72	0	-	0	-	-	0	0	27.17	-	0	8.27
NAICS 115 Agriculture and forestry support activities	0	0	0.08	0	0.57	0.28	2.48	2.67	0.09	0	2.39	-	3.17	0.22	0.43	-	13.53	0.55
NAICS 211 Oil and gas extraction	0	1.09	15.18	2.17	0	0	2.87	2.07	0	0	0	0	0	2.3	0	-	0	-
NAICS 212 Mining, except oil and gas	0	0	0.27	-	0	0	-	-	0	-	-	-	0	2.35	0	-	-	0
NAICS 213 Support activities for mining	1.35	0	6.4	2.67	3.56	1.48	9.95	29.5	22.03	0	0	0	6.39	6.98	5.73	0	0	0
NAICS 221 Utilities	1.87	1.45	1.6	0.86	2.17	0.37	0	0	2.9	0	0	0	1.66	1.3	1.11	0	0	0.57
NAICS 236 Construction of buildings	4.48	2.05	1.6	1.62	3.21	5.92	1.55	3.22	1.33	0.73	0	1.03	8.12	5.03	0.41	-	0	0.3
NAICS 237 Heavy and civil engineering construction	4.08	7.02	2.05	0.67	13.78	4.3	0.64	6.52	1.02	4.49	0	0.97	19.64	2.28	1.97	-	0	0.56
NAICS 238 Specialty trade contractors	0.51	0	1.25	1.13	0.41	1.28	0.41	1.89	1.1	5.51	2.62	1.45	1.15	1.08	0.42	-	0.5	0.44
NAICS 311 Food manufacturing	-	0	0.34	0.32	0.99	0.26	0.62	-	0.26	0	0	0	0	0.67	0.16	-	0	0.8
NAICS 312 Beverage and tobacco product manufacturing	1.24	1.2	0.72	0.37	0	0.07	-	0	0	0	-	0	-	0.68	-	-	-	0.25
NAICS 313 Textile mills	0.34	0.07	0.08	0	-	0	-	-	-	-	-	-	-	-	-	-	-	0.27
NAICS 314 Textile product mills	0	-	0.54	0.34	0	0	0	-	0.55	-	-	0.86	-	0.36	0	-	-	0.7
NAICS 315 Apparel manufacturing	-	-	0.22	-	-	-	-	-	-	-	-	-	0	0.05	0	-	-	0
NAICS 316 Leather and allied product manufacturing	0.76	0	0.26	0	0	-	-	-	-	-	-	-	-	0	0	-	0	-
NAICS 321 Wood product manufacturing	-	0	0.42	0.35	-	0.17	0	-	-	-	-	0	-	0.12	-	-	-	0
NAICS 322 Paper manufacturing	-	0	0.22	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0.52
NAICS 323 Printing and related support activities	0.3	0.53	0.56	0.17	0	0.35	0	0	0.28	0	0	0	0.07	0.2	0	-	-	0.18
NAICS 324 Petroleum and coal products manufacturing	0.25	0.13	3.68	30.87	0	0	-	-	-	0	0	-	0	20.88	-	-	-	0
NAICS 325 Chemical manufacturing	1	1.63	1.88	2.11	16.3	12.84	0	-	3.27	43.48	-	0	3.74	0.68	0	-	0	0.28
NAICS 326 Plastics and rubber products manufacturing	0.71	0.19	0.67	0	-	0.24	-	0	1.43	-	-	0	-	0	-	-	-	0.27
NAICS 327 Nonmetallic mineral product manufacturing	0.22	0.1	0.61	0.31	0.86	0.8	0	-	1.04	-	-	-	0	0.42	0	-	-	0.68
NAICS 331 Primary metal manufacturing	1.24	1.1	0.49	0	10.07	0.09	-	-	0	0	-	-	0	0	-	-	0	0
NAICS 332 Fabricated metal product manufacturing	0.83	0.34	1.77	0.62	2.05	1.32	0.5	0.05	0.54	0	-	0.4	0.14	0.61	0	-	-	0.43
NAICS 333 Machinery manufacturing	2.69	0.65	2.08	0.17	0.35	0.73	-	-	1.09	0	0	0	0.75	0.37	0.75	-	-	0.49

NAICS 334 Computer and electronic product manufacturing	1.21	1.72	0.72	0.17	-	0.61	-	0	0	-	-	-	-	0.23	0	-	-	0.19
NAICS 335 Electrical equipment and appliance mfg.	0.9	1.41	0.76	0	-	0.91	-	0	-	-	-	-	-	0	-	-	-	1.16
NAICS 336 Transportation equipment manufacturing	1.02	1.42	0.16	0.09	-	0.13	0.29	-	0	0.64	-	-	0.71	0.09	-	-	-	0.6
NAICS 337 Furniture and related product manufacturing	0.37	0.07	0.3	0.11	-	0.02	-	-	0.12	-	-	-	0	0.05	0	-	-	0.16
NAICS 339 Miscellaneous manufacturing	53.24	-	0.6	0.12	-	0.11	-	0	0.33	-	-	-	-	0.41	0	-	-	0.07
NAICS 423 Merchant wholesalers, durable goods	6.87	16.11	1.67	0.46	1.49	0.87	0.27	0	1.52	0.18	0	0.56	0.33	0.97	0.05	-	0	0.77
NAICS 424 Merchant wholesalers, nondurable goods	0	0	1.17	0.6	0	0.48	0.55	1.3	1.39	0.1	0	0.1	0.3	0.88	0	-	0.3	0.51
NAICS 425 Electronic markets and agents and brokers	0.47	-	1.13	0.23	0	0.23	0	0	0.17	0	-	0.7	-	0.2	0	-	-	0.24
NAICS 441 Motor vehicle and parts dealers	0.67	0	1	1.31	0.44	1.14	0.82	0.7	1.74	1.62	0	1.96	1.5	1.2	1.52	-	0.78	1.29
NAICS 442 Furniture and home furnishings stores	1.89	3.21	1.09	0.61	0	0.6	0.64	0	1.19	0	-	1.26	0	0.83	0	-	0	1.24
NAICS 443 Electronics and appliance stores	1.65	0	1.16	0.58	0	1.03	0.66	0.3	1.06	0	0	0	0	0.94	0.72	-	-	1
NAICS 444 Building material and garden supply stores	0	0	0.74	1.17	0.84	1.47	0.94	0.75	1.77	0.97	0	0	1.73	1.09	1.99	-	0	1.03
NAICS 445 Food and beverage stores	0.23	0	0.99	1.29	0.61	1.19	1.81	0.82	0.95	0.76	1.53	1.68	0	0.91	1.06	0	0	0.92
NAICS 446 Health and personal care stores	0.29	1.54	0.77	1.06	0.27	1.02	1.12	-	1.08	0.36	0	0.98	0.74	1.03	0.98	-	0	0.92
NAICS 447 Gasoline stations	1.54	0	0.71	1.09	2.36	1.55	1.4	5.68	2.14	1.34	6.19	3.13	2.03	1.47	1.91	-	3.5	1.61
NAICS 448 Clothing and clothing accessories stores	12.16	6.74	1.05	0.99	0.19	0.98	0.53	0	0.94	0	0	0.47	0.03	0.96	0.25	-	0	1.03
NAICS 451 Sports, hobby, music instrument, book stores	-	-	0.9	1.46	-	0.79	0	0	1.58	0	-	1.04	1.53	1.3	0.6	-	0	1.02
NAICS 452 General merchandise stores	3.31	1.16	0.8	1.36	0	1.69	1.65	0	1.54	1.2	0	2.29	1.62	1.03	1.56	-	0	1.53
NAICS 453 Miscellaneous store retailers	0	-	0.76	0.86	0.34	0.77	0.32	0	1.32	0	-	0.42	0.27	0.79	0.54	-	-	0.66
NAICS 454 Nonstore retailers	0.76	-	0.27	0.16	0.54	0.46	0	0	0.21	0	0	0.82	0	0.14	0	-	0	0.44
NAICS 481 Air transportation	0.42	0.87	2.63	0.3	-	0	0	-	0	0	-	0	-	0.22	-	-	-	0.21
NAICS 482 Rail transportation	0.32	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAICS 483 Water transportation	0.35	0	3.86	4.54	-	0.27	0	-	-	0	-	1.94	6.65	0.44	-	-	-	-
NAICS 484 Truck transportation	0.97	0	0.93	0.22	1.18	1.01	0.36	0.34	1.52	0.41	0	0	0.61	0.8	0.53	-	0.74	1.14
NAICS 485 Transit and ground passenger transportation	0.61	0.17	0.43	0.27	-	0.13	-	-	0.31	0	0	-	0	0.33	0	-	-	0.29
NAICS 486 Pipeline transportation	0	0	13.3	0	77.21	4.18	32.79	10.54	17.54	-	12.26	-	7.27	6.54	-	-	-	0
NAICS 487 Scenic and sightseeing transportation	0	0	0.11	5.42	-	0	-	-	-	-	-	3.72	1.34	4.13	-	-	-	3.06
NAICS 488 Support activities for transportation	-	-	2.3	3.47	0	1.5	0.19	0	0.62	0.78	0	0	0.62	1.81	0.47	-	0	1.8
NAICS 491 Postal service	0.74	0.87	0	-	-	0	0	-	0	-	-	-	-	-	-	-	-	0
NAICS 492 Couriers and messengers	0.32	0	0.74	0	-	0.28	0	-	1.02	0	-	-	0	0.6	-	-	-	0.6
NAICS 493 Warehousing and storage	0.36	0.45	0.74	0.19	0	0.59	0	-	0.59	0	-	-	-	0.27	0	0	0	0.59

NAICS 511 Publishing industries, except Internet	-	0	0.5	0.33	0	0.19	0	0	0	0	0	0.52	0	0.24	0	-	0	0
NAICS 512 Motion picture and sound recording industries	0.93	0.43	0.45	0.29	-	0.28	0	0	0	0	0	0	0	0.55	0	-	-	0
NAICS 515 Broadcasting, except Internet	1.57	0	0.57	0	-	0	0	-	1.19	0	-	-	0	1.23	-	-	-	0.54
NAICS02 516 Internet publishing and broadcasting	0.34	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAICS 517 Telecommunications	0.7	0.47	0.95	0.34	0	0.5	0.29	1.79	0.8	0.27	-	0.48	1.09	0.68	0.87	-	0	0.6
NAICS 518 Data processing, hosting and related services	0.41	0.23	0.61	0	-	0.05	0	-	0	0	-	-	-	0.12	-	-	0	0
NAICS 519 Other information services	0.71	0.3	0.14	0.23	0	0	0	-	0	-	-	0	0	0.25	-	-	-	-
NAICS 521 Monetary authorities - central bank	2.07	1.14	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NAICS 522 Credit intermediation and related activities	0.37	0.14	0.82	0.93	0.36	0.71	0.78	0.78	1.1	0.81	0.57	0.62	0.6	0.86	1.13	-	0.7	0.69
NAICS 523 Securities, commodity contracts,	1.4	0.59	1.21	0	0.22	0	0.2	0.75	0.55	0	0	0	0	0	0.15	0	0	0
NAICS 524 Insurance carriers and related activities	1.06	-	0.68	1.42	0.08	0.29	0.17	0.21	0.33	0.1	0	0.74	0.32	0.45	0.18	-	0	0.66
NAICS 525 Funds, trusts, and other financial vehicles	0.73	0.76	0	0	-	0	-	-	-	0	-	0	0	0	-	-	-	0
NAICS 531 Real estate	0.39	0.58	1.32	0.92	0.23	0.82	0.44	0	0.64	0.22	0	0	0.48	0.74	0.48	-	0	0.79
NAICS 532 Rental and leasing services	0.11	0	1.72	0	2.12	0	1.77	0	2.51	1.89	0	0	0	2.39	0.9	-	0	0
NAICS 533 Lessors of nonfinancial intangible assets	0.95	2.3	1.02	0	-	0	-	-	-	-	-	-	0	-	-	-	-	0
NAICS 541 Professional and technical services	0.97	0.58	1.27	0.49	0	0.59	0	0.24	0.39	0.81	1.18	0.73	0.4	0.65	0	0	0.13	0.28
NAICS 551 Management of companies and enterprises	0.89	0.44	1.04	0.11	0	0.11	0	0	0.2	0.16	0	-	0.11	0.34	0	-	-	0.14
NAICS 561 Administrative and support services	1.02	1.79	1.22	0.64	0.6	0.66	0	0.18	0.53	0	0	0.64	0.37	0.65	0.41	0	1.26	0.99
NAICS 562 Waste management and remediation	1.13	0.66	1.29	4.84	2.62	0.96	0	0	0.77	0	-	0.66	0.89	2.05	-	0	-	0.91
NAICS 611 Educational services	0.33	0.14	0.92	0.34	0.04	0.27	-	0	0.3	0.08	0	0	0.15	0.25	0	-	-	0.58
NAICS 621 Ambulatory health care services	0	-	1.05	0.75	0.3	1.06	1.04	0.2	1.3	0.59	0.12	1.02	0.55	1.87	1.19	0	1.27	3.05
NAICS 622 Hospitals	-	-	0.93	0.38	0	0.22	0	-	1.01	0	-	0	0	1.21	0	-	-	0.81
NAICS 623 Nursing and residential care facilities	1.14	0	0.4	1.08	0	0.75	0.94	1.41	1.31	0	0	1.46	0	0.77	0.8	-	0	1.12
NAICS 624 Social assistance	0.51	0.4	0.59	0.7	0.41	0.69	0	0	0.66	0.33	0	0.44	0.43	0.71	0.6	-	0	2.64
NAICS 711 Performing arts and spectator sports	0.52	0	0.76	0.51	0	0	0	-	0.15	0	-	0	-	0.51	0	-	0	0.13
NAICS 712 Museums, historical sites, zoos, and parks	0.4	0.28	1	8.11	0	0	0	-	0.53	-	-	0	-	1.96	-	-	-	1.1
NAICS 713 Amusements, gambling, and recreation	0.55	0.55	0.57	0.93	0	0.69	0.57	0	0.66	0	-	1.5	0.38	0.62	0	0	0	0.72
NAICS 721 Accommodation	1.02	1.17	0.67	1.26	0.48	0.39	1.03	0	0.61	0.97	0	3.04	1.22	1.2	0.55	0	0.67	0.88
NAICS 722 Food services and drinking places	2.16	1.4	1.02	1.62	0.79	1.21	1.07	0.59	1.16	0.81	0	2.08	1.19	1.33	1.42	-	1.2	1.12
NAICS 811 Repair and maintenance	0.88	0.71	1.26	1.09	2.62	1.6	2.64	0.8	1.45	0.37	0.37	1.57	0.92	1.07	1.02	0	0	0.42
NAICS 812 Personal and laundry services	0.44	0.18	1	1.02	0.34	1.05	0.61	0.41	1.05	0.31	0	0.71	0.37	1.01	0.8	-	0.78	0.49

NAICS 813 Membership associations and organizations	0.57	0.27	0.46	0.53	0	0.58	0.56	0.22	0.74	0.1	0	0.93	0.3	0.56	0.46	-	0.6	0.61
NAICS 814 Private households	0.31	0.92	1.52	0.63	0	0.67	0.78	1.81	1.54	0.6	16.41	0.69	0.7	0.8	0.43	0	0	0.59
NAICS 999 Unclassified	-	-	0.59	0.93	0.94	0.51	0.06	0.9	0.61	0.79	0	1.59	0.41	0.36	0.34	1.16	0	0.69

-Highlighted cells indicate very high concentrations of employment

Source: Bureau of Labor Statistics, 2017

Texas Maritime Transportation System

Access to water transport and to deep water opened the State to trade with the rest of the world. The Texas Department of Transportation Maritime Division promotes the development and intermodal connectivity of Texas ports, waterways and marine infrastructure and operations. Texas's Maritime Transportation System (MTS) shown in Figure 9-5, consists of waterways, ports, and intermodal landside connectors. Together, the components of the MTS facilitate the movement of goods and people over water. In Texas, 11 commercial ports are served by channels with a draft of more than 30 feet (deep-draft ports). There are six other ports that handle commercial cargoes with channel depths less than a 30-foot draft (shallow-draft ports). The remaining shallow-draft ports are used for commercial fishing and recreational purposes and do not handle commercial cargoes. Texas's ports are connected by an extensive shallow-draft channel called the Gulf Intracoastal Waterway in Texas (GIWW), an integral component of the state's vast petrochemical and manufacturing supply chains (TxDOT, 2015).

Figure 9-5 Texas Maritime Transportation System
Source: Texas Department of Transportation, 2016

Texas ports play a critical role in the state's transportation system and are a key part of the state's economy.

- Texas Gulf Coast ports handle more than 550 million tons of foreign and domestic cargo each year – 23 percent of all U.S. port tonnage (USACE, 2018).
- Six Texas ports rank in the top 50 of all U.S. ports in terms of annual 2016 tonnage: Houston (2nd), Beaumont (5th), Corpus Christi (6th), Port Arthur (17th), Texas City (18th), and Freeport (31st); (USACE, 2018).
- The tons of cargo moving via Texas ports generate 112,100 jobs directly related to marine cargo activities (Texas Ports Association, 2019).
- Texas ports generate over $270 billion in economic activity and $2.4 billion in state and local taxes per year (Texas Ports Association, 2019).
- Texas port activities represent approximately 25% of the total State Gross Domestic Product (Texas Ports Association, 2019).
- The use of Texas waterways is forecasted to continue to increase – fueled by the expansion of the Panama Canal, the surge in the state's population, and increasing worldwide waterborne trade.

Table 9-10 displays select ports within Texas listed by tonnage moved. The Port of Houston (Region 1b) is second in the nation in terms of port activity only to the Port of South Louisiana (Lower Mississippi River between Baton Rouge and New Orleans). In terms of tonnage, almost one-quarter of all the United States' foreign trade moves through Texas ports.

Table 9-11 presents commodity movements along the State's waterways based upon tonnage. Crude petroleum and petroleum products make up over 70 percent of all commodity movements on Texas waterways as of 2017. Crude petroleum and petroleum products comprise 71 percent of commodities destined for Texas ports. Petroleum products and chemicals comprise three-fourths of the tonnage shipped from Texas ports. Waterway traffic within the State is dominated by crude petroleum and petroleum products, making up over three-quarters of all commodities moved within the State's waterway system. Importing goods into Texas ports is critical to the state's economy and provides the necessary inputs for value-added manufacturing activities that generate wealth for the state.

Table 9-12 presents the value of commodities moved through Texas ports. Texas ports moved $105 billion of imports and $121 billion in exports in 2017. This volume makes up nearly 10 percent of the value of our nation's imports and over 20 percent of our nation's exports. The Port of Houston ranks first in the nation in value of exports and sixth in the nation in value of imports. China is the top trading partner for imports, based upon a variety of different import commodities. The value of crude oil imports is the largest for a single commodity.

Table 9-10: 2017 Commodity Tonnage Moved at Select Ports in Texas

PORT_NAME	TOTAL	DOMESTIC	FOREIGN	IMPORTS	EXPORTS
	Tonnage in 1,000s of Short Tons				
Houston, TX	260,071	86,860	173,211	72,386	100,825
Beaumont, TX	89,437	35,744	53,694	27,534	26,159
Corpus Christi, TX	87,323	27,074	60,248	22,225	38,023
Texas City, TX	37,751	15,582	22,169	10,979	11,190
Port Arthur, TX	39,203	9,855	29,348	10,084	19,265
Freeport, TX	24,484	5,129	19,355	9,171	10,184
Matagorda Port Lv Pt Com, TX	4,279	2,554	1,726	506	1,220
Galveston, TX	7,836	4,028	3,808	1,551	2,257
Brownsville, TX	7,763	3,445	4,319	3,425	894
Victoria, TX	4,337	4,337	-	-	-
Total Tonnage, Texas Ports	524,583	156,692	367,891	157,861	210,030
All Tonnage, All U.S. Ports	2,385,121	873,059	1,512,062	765,711	746,105
Texas Tonnage as Percent of U.S.	22%	18%	24%	21%	28%

Source: USACE, 2018

Table 9-11: Commodity Movements to and from Texas on Texas Waterways, 2017

COMMODITY	ORIGIN Shipping		DESTINATION Receiving		INTRASTATE		TOTAL	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Chemical Fertilizers	516,204	0%	1,248,641	1%	148,972	0%	1,913,817	0%
Chemicals excluding Fertilizers	36,664,813	14%	11,499,347	6%	15,548,564	21%	63,712,724	12%
Coal, Lignite, and Coal Coke	333,790	0%	1,400	0%	163,521	0%	498,711	0%
Crude Petroleum	52,886,568	20%	95,686,363	51%	7,664,845	11%	156,237,776	30%
Food and Food Products	14,230,408	5%	3,095,449	2%	122,570	0%	17,448,427	3%
Iron Ore, Iron, and Steel Waste and Scrap	1,405,236	1%	2,378,218	1%	62,236	0%	3,845,690	1%
Lumber, Logs, Wood Chips, and Pulp	448,391	0%	1,316,465	1%	-	0%	1,764,856	0%
Manufactured Goods	3,122,886	1%	5,450,926	3%	31,847	0%	8,605,659	2%
Non-Ferrous Ores and Scrap	248,892	0%	232,830	0%	-	0%	481,722	0%
Petroleum Products	146,934,230	55%	36,450,960	20%	47,508,136	65%	230,893,326	44%
Primary Metal Products	2,169,995	1%	12,140,985	7%	273,258	0%	14,584,238	3%
Primary Non-Metal Products	515,354	0%	4,482,621	2%	-	0%	4,997,975	1%
Sand, Gravel, Shells, Clay, Salt, and Slag	1,349,073	1%	6,872,056	4%	1,241,492	2%	9,462,621	2%
Unknown and NEC Products	5,071,556	2%	5,061,201	3%	2,987	0%	10,135,744	2%
Total	265,897,396	100%	185,917,462	100%	72,768,428	100%	524,583,286	100%
Foreign in 1,000s	210,030	79%	157,861	85%				
Domestic in 1,000s	55,867	21%	28,056	18%				

Source: USACE, 2018

Table 9-12: Value of Commodity Imports and Exports, Port Rank, Trade Countries, and Top Trade Commodities, 2017

2017 TOTAL	**TOTAL VESSEL VALUE[^1] in $ billions**		**U.S. Port Rank by Value**		**TOP TRADE COUNTRIES**		**TOP TRADE COMMODITIES**	
PORT_NAME	**IMPORTS**	**EXPORTS**	**IMPORTS**	**EXPORTS**	**IMPORTS**	**EXPORTS**	**IMPORTS**	**EXPORTS**
Houston, TX	$59.9	$71.8	6	1	China	Mexico	Crude Oil from Petroleum and Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Beaumont, TX	$2.1	$11.2	49	14	Venezuela	China	Crude Oil from Petroleum and Bituminous Minerals	Crude Oil from Petroleum and Bituminous Minerals
Corpus Christi, TX	$6.9	$15.8	28	11	Venezuela	Mexico	Crude Oil from Petroleum and Bituminous Minerals	Crude Oil from Petroleum and Bituminous Minerals
Texas City, TX	$3.4	$5.1	37	26	Saudi Arabia	Mexico	Crude Oil from Petroleum and Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Port Arthur, TX	$11.1	$5.7	20	24	Saudi Arabia	Mexico	Crude Oil from Petroleum and Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Freeport, TX	$3.3	$5.5	38	25	Venezuela	China	Crude Oil from Petroleum and Bituminous Minerals	Propane, liquefied
Port Lavaca, TX	$0.3	$0.7	78	53	Trinidad and Tobago	South Korea	Anhydrous Ammonia	Acrylonitrile
Sabine, TX	$0.0	$0.8	175	49	Bahamas	Mexico	Equip/pts Incl Boats Purchsd Fr O Repair Pts, Etc.	Natural Gas, Liquefied
Galveston, TX	$3.1	$1.6	41	43	Germany	Brazil	Pass Veh Spk-ng Int Com Rcpr P Eng > 1500 Nov 3m cc	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Brownsville, TX	$7.3	$0.4	67	62	Mexico	Mexico	Parts of Seats (ex Medical, Barber, Dental Etc)	Lt Oils, Preps Gt=70% Petroleum/bitum Nt Biodiesel
Orange, TX	$0.0	$0.0	144	162	Mexico	Netherlands	Imports of Articles Exported & Returned, No Change	Packing or Wrapping Machinery, Nesoi
Total Value, Texas Ports	$105.7	$121.6						
All Value, All U.S. Ports	$1,076.0	$526.2			China	Canada	Crude Oil from Petroleum and Bituminous Minerals	Civilian Aircraft, Engines, and Parts
Texas Tonnage Value as Percent of U.S.	9.8%	23.1%						

^1 Vessel Value ($US) is the value of trade through vessel ports (seaborne trade)
Source: U.S. Census Bureau, n.d.

Gulf Intracoastal Waterway in Texas

The GIWW is the portion of the Intracoastal Waterway located along the Gulf Coast of the United States. It is a navigable inland waterway running approximately 1,050 mi (1,690 km) from Carrabelle, Florida, to Brownsville, Texas. In Texas, the GIWW is 406 miles long. The waterway provides a channel with a controlling depth of 12 feet, designed primarily for barge transportation. One of the initial functions of the GIWW was to provide protected inland transportation of goods and troops during World War II. It has since evolved into a multipurpose waterway used by recreational and commercial interests. Recreational uses include fishing, skiing, sightseeing and traveling protected water transportation routes along the coast. Commercial uses include the movement of domestic and international cargo, harvesting fish and shellfish, and servicing the Gulf and coastal oil and gas industry.

The GIWW is used to link Texas ports together which increases the efficiency of deep draft transportation. It further links Texas to the U.S. inland navigation system. The GIWW is used to transport large quantities of liquid bulk, including crude oil, petroleum products, and chemicals between Texas ports and to ports throughout the South and Midwest. The GIWW is the nation's third busiest inland waterway, with the Texas portion handling two-thirds of its traffic (TxDOT, 2013).

Motorized towboats push one or more non-motorized barges along the waterway and comprise a barge fleet or tow. The tow moves along the waterway passing under bridges and through locks and floodgates to their destination. Because the bottom of the GIWW is soft sand and silt, very few groundings occur. A barge fleet can carry the equivalent of 16 railcars or 70 trucks and has the least environmental impact per ton and transports commodities with the greatest safety and least hazard to the general public. Efficient use of the GIWW alleviates highway congestion in coastal Texas and rail bottlenecks in metropolitan Houston. The Texas GIWW Master Plan developed several infographics to display these environmental and safety advantages.

Table 9-13, Figure 9-6 and Figure 9-7 display the efficiencies of GIWW transportation in Texas as determined by this Master Plan (Kruse et al., 2014).

Figure 9-6: Ton-Miles Traveled per Gallon of Fuel

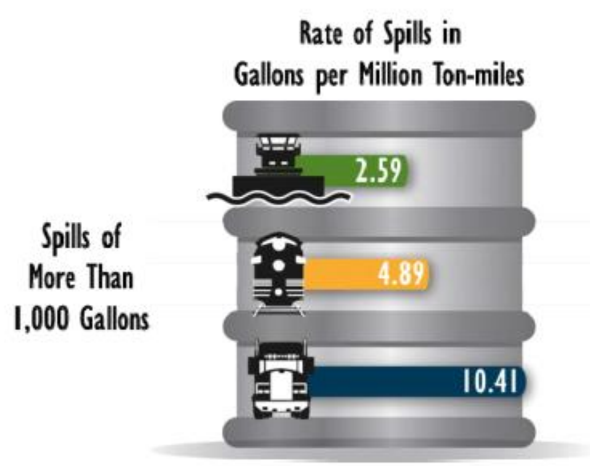


Figure 9-7: Rate of Spills in Gallons per Million Ton-Miles

Table 9-13: Summary of Emissions (Grams per Ton-Mile), 2009

Emissions (grams/ton-mile)					
Mode	Hydrocarbons (HC) or Volatile Organic Compounds (VOC) for Truck	Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Particulate Matter (PM-10)	Carbon Dioxide (CO_2)*
Inland Towing	0.014123	0.0432	0.27435	0.007955	16.41
Railroad	0.018201	0.0556	0.3536	0.010251	21.14
Truck	0.10	0.37	1.45	0.06	171.83

Note: Source: TTI (32).
** CO_2 emissions for railroads were calculated on a system-wide basis.*

The GIWW is also used to efficiently transport oversize equipment to industrial facilities. Large components are typically transported by barge to industrial facilities such as refineries, chemical plants, mineral processors, and paper mills, and then wheeled the final short distance to their permanent location. These components, whether imported by ship from overseas, or fabricated domestically, would need to be disassembled for transport by rail or truck, if possible. This ability to transport equipment by barge is one reason most industrial facilities are located adjacent to waterways. Within Texas, many petrochemical facilities were constructed and continue to be upgraded with equipment transported by barge.

Offshore petroleum exploration and production is facilitated by the GIWW, as major components of offshore structures are transported by barge to fabrication facilities in Brownsville, Ingleside, and Galveston. These fabrication facilities compete worldwide, largely with fabrication facilities in East Asia and Europe, and employ thousands of Texans in shipyards. As such, an increase in the transportation cost from switching transportation modes could impact the economic viability of these facilities. As an example, the Keppel-Amfels shipyard at the Port of Brownsville has fabricated jack-up rigs for Gulf of Mexico offshore petroleum exploration with large components shipped by barge from Vicksburg to Brownsville.

The GIWW provides more versatility for shipping liquid bulk than pipelines. Barges can be efficiently cleaned to transport most liquid bulk commodities, including petrochemicals, in quantities of 1 million gallons. Although pipelines can transport multiple types of liquid bulk, switching between different commodities is more complicated and much larger quantities are needed to justify shipping a particular chemical by pipeline.

Table 9-14 presents tonnage movements on the GIWW in Texas in 2017. Most of this cargo moves on the segment from the Sabine River to Galveston Bay and most of the cargo on the GIWW is petroleum and chemical-related products.

The National Waterways Foundation funded the study, "Inland Navigation of the United States, An Evaluation of Economics Impacts and the Potential Effects of Infrastructure Investment," prepared by the University of Kentucky and the University of Tennessee, November 2014. This study investigated the regional and national impacts of losing the inland navigation system using the Regional Economic Models, Inc. proprietary software. The segment of the nation that was predicted to be impacted most significantly was the Gulf Intracoastal Waterway system. Moving the chemical petroleum products that tend to dominate industrial production within this region is relatively expensive compared with other industries. Also, the availability of alternative transportation of any kind is very limited for many chemical producers and refiners, as many may not have sufficient rail or truck loading facilities to compensate for a loss of barge transportation. Most coastal refineries have traditionally been supplied by imported crude petroleum and for this reason are not supplied by pipeline nor do they have rail service. Therefore, many chemical facilities rely primarily upon the GIWW to ship inputs and outputs. And finally, the vitality of the overall regional economy is very closely tied to these industries. Therefore, the strength of the State's petroleum and petrochemical refining economy is closely aligned to the availability of water-based transportation efficiencies provided by the GIWW in Texas.

Table 9-15 presents businesses, employment and income from the marine transportation industry within the 18-coastal counties. Within the State, over $2 billion in wages is earned by 32,500 workers in the industry per year. Region 1b dominates the industry with 64 percent of the employment and 55 percent of the wages earned from marine transportation.

Table 9-14: Tonnage Moved on the Gulf Intracoastal Waterway, Texas Segments, 2017

	Inbound Receiving		Outbound Shipping		Local		Through		Grand Total
TX GIWW SEGMENT	Upbound	Downbound	Upbound	Downbound	Upbound	Downbound	Upbound	Downbound	
Sabine River to Galveston	1,872	2,697	916	2,203	21	138	28,366	28,743	64,955
Galveston to Corpus Christi	86	352	506	95			13,777	8,940	23,760
Corpus Christi to Mexican border		124	11				344	1,552	2,030
Total	1957	3172	1436	2298	21	138	36,318	34103	79,444

In 1,000 Tons; Upbound: north or east; Downbound: south or west

Source: USACE, 2018

Table 9-15: Marine Transportation Industries, Annual Average Employment, Business Establishments, and Wages in Coastal Counties, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	36	694	$25,239,341	$36,368
1a	Orange County	6	134	5972868	44573.64
All 1a		42	828	$31,212,209	$37,696
1b	Harris County	370	19,282	$1,044,235,465	$54,156
1b	Galveston County	48	1,293	$60,772,287	$47,001
1b	Chambers County	D	D	D	d
1b	Brazoria County	25	187	$5,747,093	$30,733
All 1b		443	20,762	$1,110,754,845	$53,499
2	Matagorda County	D	D	D	d
2	Jackson County	D	D	D	d
2	Victoria County	6	175	7578488	$43,305
2	Calhoun County	6	30	2046512	$68,217
All 2		12	205	$9,625,000	$46,951
3	Refugio County	N/A	N/A	N/A	N/A
3	Aransas County	D	D	D	D
3	San Patricio County	D	D	D	D
3	Nueces County	39	468	$23,278,101	$49,740
3	Kleberg County	D	D	D	D
All 3		39	468	$23,278,101	$49,740
4	Kenedy County	N/A	N/A	N/A	N/A
4	Willacy County	D	D	D	D
4	Cameron County	46	461	$18,357,558	$39,821
All 4		46	461	$18,357,558	$39,821
Coastal Counties		582	22,724	$1,193,227,713	$52,510
Coastal Counties % of State		79.62%	69.89%	58.53%	
Texas Statewide		731	32,512	$2,038,565,891	$62,702

*NAICS codes: 4831, 4832, 4883.

Source: National Ocean Economics Program (NOEP), 2015

Economic Impact of the U.S. Military in Texas

Texas is home to 15 active duty military installations and ranks second only to California in number of active duty and reserve members of the military with 173,328 personnel as of September 2018. Another 47,000 civilians work for the military in Texas. In total 220,000 U.S. military personnel across all branches of service are stationed in Texas as shown in Table 9-16 ("Military Active-Duty Personnel," 2018).

Table 9-16: Active Military Personnel in Texas, September 2018

Branch of Service	Active Duty	Reserves	Government Civilians	Total
Army	71,457	17,928	24,611	113,996
Navy	6,262	5,112	1,363	12,737
Marine Corps	2,065	3,309	32	5,406
Air Force	38,060	5,925	16,212	60,197
Coast Guard	1,738	330	--	2,068
Air National Guard	--	3,333	--	3,333
Army Guard	--	17,809	--	17,809
Defense Dept.	--	--	4,470	4,470
Total	**119,582**	**53,746**	**46,688**	**220,016**

Source: Defense Manpower Data Center: Active Duty Master Personnel File, Reserve Components Common Personnel Data System and U.S. Office of Personnel Management

In 2017, the Texas Comptroller of Public Accounts estimated the contribution of U.S. Department of Defense installations to the Texas' economy as shown in Table 9-17. In total over 600,000 persons are employed in military installation earning nearly $40 billion in personal income. The U.S. military presence in Texas generates $101.6 billion in economic output to the State and contributes $62.3 billion to the State's GDP.

Table 9-17: Economic Impact of Military Installations in Texas and in Texas' Coastal Regions, 2017

	Statewide Total	Coastal Region 1	Coastal Region 3
Total Employment	626,690	7,878	37,277
Output to the Texas Economy (in Billions)	$101.60	$1.20	$5.40
GDP (in Billions)	$62.30	$0.72	$3.36
Disposal Personal Income (in Billions)	$39.80	$0.65	$2.30

Source: Texas Comptroller of Public Accounts, 2017

Four Department of Defense installations are located within Texas' coastal counties:

1. Ellington Field Joint Reserve Base (EF JRB) in Harris County (Region 1);

Ellington Airport is a joint use civil and military airport that supports multiple tenants including the Texas Air and Army National Guard, hence the name Ellington Field Joint Reserve Base. EF JRB is notable for having troop presences from all five of the U.S. Armed Forces: Army, Navy, Marines, Air Force and Coast Guard. The major units at Ellington are tasked with reconnaissance and Air Sovereignty alert missions and with providing support for natural disasters among many other missions supporting Texas. The 147th Reconnaissance Wing is under the Texas Air National Guard. Additional units at EF JRB include the United

States Coast Guard Houston, Naval Operations Support Center Houston and the 1st Battalion, 23rd Marines.

Personnel: 1,473

2. Naval Air Station (NAS), Kingsville, in Kleberg County (Region 3);

The primary mission of NAS Kingsville is to provide facilities and support for Training Air Wing Two in training undergraduate jet/strike pilots for the U.S. Navy and U.S. Marine Corps. NAS Kingsville trains 50% of the Navy and Marine Corps' jet/strike pilots each year.

Personnel: 1,587

3. Naval Air Station, Corpus Christi, in Nueces County (Region 3);

NAS Corpus Christi is primarily focused on pilot training. Training Air Wing Four is comprised of four individual units: two primary training squadrons and two squadrons that provide advanced multi-engine training to Navy, Marine, Coast Guard and foreign pilots. Training Air Wing Four provides over 600 new, highly qualified aviators every year. The Chief of Naval Air Training is headquartered at NAS Corpus Christi and oversees all aviation training for the U.S. Navy.

Personnel: 9,773

4. Corpus Christi Army Depot in Nueces County (Region 3).

Corpus Christi Army Depot is the industry leader in repair and overhaul for helicopters, engines, and components for Army aviation assets. Corpus Christi Army Depot is the largest rotary wing repair facility in the world and supports multiple government agencies in addition to the Department of Defense.

Personnel: 3,269

The economic contribution of these installations is displayed by region and is included in the statewide total in Table 9-17. Within Texas' coastal counties, the U.S. military presence employs over 40,000 persons generating $2.95 billion in personal income. The economic contribution of these facilities to the state is $6.6 billion and the contribution to the state's GDP is estimated at $4.1 billion (Texas Comptroller of Public Accounts, 2017).

The Coast Guard is ubiquitous along the Texas Gulf Coast with more than 2,000 personnel stationed at operational facilities from Port Arthur to South Padre Island. The Coast Guard is both a federal law enforcement agency and a military force. In times of peace, the Coast Guard operates as part of the Department of Homeland Security enforcing the nation's laws at sea, protecting the marine environment, guarding the nation's coastline and ports, and performing vital lifesaving missions. In times of war, or at the direction of the President, the Coast Guard serves as part of the Navy Department, defending the nation against terrorism and foreign threats (U.S. Coast Guard, 2017); (Smith 2016).

Coastal Commerce
Access to low-cost water transportation and access to open bay and Gulf waters support economic diversity and prosperity along the Texas coast. Activities that rely upon coastal features, resources, and amenities include waterborne commerce, commercial and recreational fishing, tourism including ecotourism, petroleum exploration and refining, and petroleum and chemical product manufacturing.

Ocean Economy
The National Ocean Economics Program and National Oceanic and Atmospheric Administration (NOAA), Economics: National Ocean Watch (ENOW), have designated major industrial sectors as "Ocean" sectors, signifying that those industries are completely dependent upon their proximity to water and shoreline amenities and resources (Colgan, 2007). These sectors are ship building and marine passenger and freight transportation. The NOEP also identified other industrial sectors that are not solely dependent upon their near shore location but, because of their proximity to water and near shore amenities, are included in the Ocean economy. These include marine construction, tourism and recreation, offshore minerals, and living resources sectors. The "Ocean" industrial sectors developed by NOEP and NOAA are listed in Table 9-18 with their associated industries.

Table 9-18: Industrial Sectors in the Ocean Economy

Sector	Industry	Sector	Industry
Living Resources	Fish Hatcheries and Aquaculture	**Ship and Boat Building**	Boat Building and Repair
	Fishing		Ship Building and Repair
	Seafood Processing	**Tourism and Recreation**	-
	Seafood Markets		Boat Dealers
Marine Construction	Marine Related Construction		Eating and Drinking Places
Marine Transportation	Deep Sea Freight		Hotels and Lodging
	Marine Passenger Transportation		Marinas
	Marine Transportation Services		Recreational Vehicle Parks and Campsites
	Search and Navigation Equipment		Scenic Water Tours
	Warehousing ^1		Sporting Goods
Mineral Resources	Limestone, Sand, and Gravel		Amusement and Recreation Services
	Oil and Gas Exploration and Production		Zoos and Aquaria

^1 Location specific; Source: Colgan, 2007

Building upon the work of NOEP and NOAA, Ocean Economy sectors were modified to better reflect the economic contributions of additional industrial sectors that derive benefit from proximity to the amenities and opportunities found along the Texas coast. Inland navigation was included because of the presence of the GIWW. Also, because the energy industry is so active in Texas and especially along the coast, these industrial sectors were included as Ocean sectors.

Table 9-19 displays the sector, industry, and associated North American Industry Classification System (NAICS) codes of Texas' ocean economy. Table 9-20 presents the contribution of different industries to the coastal economy. The petroleum industry in Harris County provides a large employment base with high wages that significantly increase the average annual wage per employee for the Texas Coastal Region.

Table 9-19: Texas Ocean Economy Industrial Sectors

Sector	Industry	NAICS Sector
Living Resources	Fish Hatcheries and Aquaculture	1125
	Fishing	1141
	Seafood Processing	311710
	Seafood Markets	445220
Marine Construction	Marine Related Construction	237990
Marine Transportation	Deep Sea and Coastal Transportation	4831
	Inland Water Transportation	4832
	Support Activities for Water Transport	4883
Ship and Boat Building	Ship Building and Repair	336611
	Boat Building and Repair	336612
Leisure and Hospitality	Arts, Entertainment, and Recreation	71
	Accommodations and Food Services	72
Mineral Exploration and Extraction	Crude Petroleum Extraction	211111
	Natural Gas Liquid Extraction	211112
	Construction Sand and Gravel Mining	212321
	Industrial Sand Mining	212322
	Drilling Oil and Gas Wells	213111
	Support Activities for Oil and Gas Operations	213112
	Geophysical Surveying and Mapping Services	541360
Petroleum Refining and Chemical Manufacturing	Petroleum and Coal Products Manufacturing	3241
	Chemical Manufacturing	325
	Plastics and Rubber Products Manufacturing	326
Oil and Gas Pipeline Construction	Oil and Gas Pipeline and Related Structures Construction	237120
Pipeline Transportation	Pipeline Transportation	486

Table 9-20: Ocean Economy - Annual Average Employment, Business Establishments, and Wages in Texas Coastal Counties, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	197	4,261	$163,074,612	$38,271
1a	Orange County	26	514	$28,471,899	$55,393
All 1a		223	4,775	$191,546,511	$40,114
1b	Harris County	2,824	122,106	$17,478,967,054	$143,146
1b	Galveston County	572	14,840	$393,525,194	$26,518
1b	Chambers County	70	1,176	$59,693,798	$50,760
1b	Brazoria County	155	3,356	$228,441,860	$68,070
All 1b		3,621	141,478	$18,160,627,906	$128,364
2	Matagorda County	124	1,487	$40,463,178	$27,211
2	Jackson County	61	742	$30,581,395	$41,215
2	Victoria County	145	3,371	$241,124,031	$71,529
2	Calhoun County	97	1,285	$47,594,961	$37,039
All 2		427	6,885	$359,763,565	$52,253
3	Refugio County	48	638	$27,542,636	$43,170
3	Aransas County	118	1,539	$42,493,217	$27,611
3	San Patricio County	143	4,304	$191,079,457	$44,396
3	Nueces County	811	19,282	$730,675,388	$37,894
3	Kleberg County	86	1,212	$17,169,574	$14,166
All 3		1,206	26,975	$1,008,960,272	$37,404
4	Kenedy County	D	D	D	D
4	Willacy County	31	388	$8,914,729	$22,976
4	Cameron County	395	8,495	$200,429,264	$23,594
All 4		426	8,883	$209,343,993	$23,567
Coastal Counties		5,903	188,996	$19,930,242,247	$105,453
Coastal Counties % of State		96.93%	95.49%	96.03%	
Texas Statewide		6,090	197,931	$20,753,424,419	$104,852

*NAICS codes in Table 10

D = Disclosure issues prevent this data from being presented

Source: National Ocean Economics Program, 2015

The Energy Industry

When looking at the driving factors that comprise the Texas economy, the energy industry is the major contributor to State wealth and activity. Industrial sectors based in energy include not only resource exploration and recovery; but also, transportation of materials; product manufacturing; and construction of pipelines, refineries, ships, offshore platforms and barges.

Mineral Resources Extraction

Mineral resource extraction industries include those listed in Table 9-19 of the industrial sectors in the Ocean Economy: limestone, sand, and gravel mining and oil and gas exploration and production. The oil and gas extraction industry in Texas accounts for 57 percent of the nation's value added for that industrial sector. Support activities for mining in Texas accounts for half of the nation's value added from that sector.

Table 9-21 presents these industries as they are represented on the Texas Gulf coast. Texas' coastal counties account for 90 percent of the businesses, 92 percent of the employment, and 96 percent of the wages for the mineral extraction industries in Texas as a whole.

Table 9-21: Mineral Resource Extraction - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	39	206	$20,270,349	$98,400
1a	Orange County	10	24	$2,819,767	$117,490
All 1a		49	230	$23,090,116	$100,392
1b	Harris County	1,859	89,134	$15,873,899,225	$178,090
1b	Galveston County	56	552	$44,926,357	$81,388
1b	Chambers County	23	243	$12,855,620	$52,904
1b	Brazoria County	--	--	--	
All 1b		1,938	89,929	$15,931,681,202	$177,158
2	Matagorda County	--	--	--	
2	Jackson County	33	53	$2,595,930	$48,980
2	Victoria County	--	--	--	
2	Calhoun County	--	--	--	
All 2		33	53	$2,595,930	$48,980
3	Refugio County	30	406	$24,494,186	$60,331
3	Aransas County	16	311	$19,569,767	$62,925
3	San Patricio County	47	139	$14,657,946	$105,453

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
3	Nueces County	211	3,884	$338,681,202	$87,199
3	Kleberg County	--	--	--	
All 3		304	4,740	$397,403,101	$83,840
4	Kenedy County	--	--	--	
4	Willacy County	--	--	--	
4	Cameron County	10	43	$1,812,016	$42,140
All 4		10	43	$1,812,016	$42,140
Coastal Counties		2,334	94,995	$16,356,582,365	$172,184
Coastal Counties % of State		90%	92%	96%	
Texas Statewide		2,592	103,554	$17,056,498,062	$164,711

*NAICS codes: 212321, 212322, 211111, 211112, 213111,213112, and 541360.
Source: National Ocean Economics Program, 2015

Petroleum Refining, Petrochemical, Chemical, and Plastics Manufacturing

While the petroleum refining and petrochemical manufacturing industries are not directly linked to the Ocean economy as defined by the National Ocean Economics Program (NOEP, 2007), the nation's concentration of these industries is near or on the coast. Texas' petrochemical facilities are clustered near deep water harbors at the Sabine/Neches River, the Houston Galveston Bay Region, Freeport, and the Corpus Christi Bay and at the shallow-draft Victoria Channel. The proximity to open water for deep-draft shipping and low-cost water transportation along the coast and the GIWW supports these industries in Texas. Historically, the bulk of petroleum needed for national consumption has been imported from foreign sources. With foreign imports, coastal ports were the more efficient location for development of refining and manufacturing facilities of crude petroleum. Also, offshore oil and natural gas exploration and recovery has been supported by the proximity of refining facilities proximate to the shore.

Petroleum product, chemical, and plastics manufacturing supports a strong economy on the Texas coast. Table 9-22 provides establishments, employment and wages for the following industrial sectors: petroleum and coal products (including petroleum refineries); chemical manufacturing (including petrochemicals); and plastics and rubber manufacturing. Coastal counties account for 25 percent of the businesses and 41 percent of the employment in these high-paying industrial sectors in Texas.

Table 9-22: Petroleum Product, Chemical, and Plastics Manufacturing - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	65	9,832	$1,303,162,369	$132,543

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Orange County	13	2,153	$241,308,830	$112,080
All 1a		78	11,985	$1,544,471,199	$128,867
1b	Harris County	636	37,302	$4,464,823,629	$119,694
1b	Galveston County	31	4,032	$534,037,874	$132,450
1b	Chambers County	10	1,414	$158,676,253	$112,218
1b	Brazoria County	61	8,044	$1,083,335,864	$134,676
All 1b		738	50,792	$6,240,873,620	$122,871
2	Matagorda County	2	0	0	0
2	Jackson County	3	0	0	0
2	Victoria County	14	1175	$108,239,179	$92,118
2	Calhoun County	9	2,453	$255,262,872	$104,062
All 2		28	3,628	$363,502,051	$100,194
3	Refugio County	0	0	0	0
3	Aransas County	2	0	0	0
3	San Patricio County	12	389	$52,031,309	$133,757
3	Nueces County	26	3,392	$404,784,241	$119,335
3	Kleberg County	2	0	0	0
All 3		42	3,781	$456,815,550	$120,819
4	Kenedy County	D	D	D	0
4	Willacy County	1	0	0	0
4	Cameron County	13	315	$16,726,880	$53,101
All 4		14	315	$16,726,880	$53,101
Coastal Counties		900	70,501	$8,622,389,300	$122,302
Coastal Counties % of State		24.97%	41.55%	57.77%	
Texas Statewide		3,605	169,666	$14,926,476,022	$87,976

*NAICS codes: 3241, 325, and 326

D = Disclosure issues prevent this data from being presented

Source: National Ocean Economics Program, 2015

Oil and Gas Pipeline Construction (NAICS 237120)

The oil and gas industries in Texas are evident in a variety of industrial sectors. Oil and gas pipeline construction includes construction of oil refineries and petrochemical plants, construction of storage tanks for oil and natural gas and construction of gathering and distribution pipelines. As Table 9-23 shows, about 70 percent of the State's employment in this sector is located in coastal counties.

Table 9-23: Oil and Gas Pipeline Construction - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	17	3,164	$268,359,467	$84,817
1a	Orange County	4	1027	$72,724,736	$70,813
All 1a		21	4,191	$341,084,203	$81,385
1b	Harris County	128	12,991	$1,293,637,745	$99,580
1b	Galveston County	6	0	$0	$0
1b	Chambers County	9	741	$48,251,978	$65,117
1b	Brazoria County	26	3,207	$239,296,816	$74,617
All 1b		169	16,939	$1,581,186,539	$93,346
2	Matagorda County	2	0	$0	$0
2	Jackson County	2	0	$0	$0
2	Victoria County	6	100	$5,599,209	$55,992
2	Calhoun County	4	0	$0	$0
All 2		14	100	$5,599,209	$55,992
3	Refugio County	1	0	$0	$0
3	Aransas County	1	0	$0	$0
3	San Patricio County	8	203	$7,669,333	$37,780
3	Nueces County	11	1,517	$151,982,569	$100,186
3	Kleberg County	1	0	$0	$0
All 3		22	1,720	$159,651,902	$92,821
4	Kenedy County	D	D	D	D
4	Willacy County	D	D	D	D
4	Cameron County	3	0	$0	$0

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
All 4		3	0	$0	$0
Coastal Counties		229	22,950	$2,087,521,853	$90,960
Coastal Counties % of State		39.28%	70.19%	75.32%	
Texas Statewide		583	32,698	$2,771,535,962	$84,762

*NAICS code 237120
D = Disclosure issues prevent this data from being presented
Source: Bureau of Labor Statistics, 2015

Pipeline Transportation

Transportation of petroleum, natural gas, and products by pipeline supports the energy and manufacturing industries and contributes to the coastal economy. Table 9-24 shows that two-thirds of the employment in this support service is located along the Texas coast where products are moved to and from ports and manufacturing plants.

Table 9-24: Pipeline Transportation Industry - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	14	540	$52,996,459	$98,142
1a	Orange County	3	0	0	0
All 1a		17	540	$52,996,459	$98,142
1b	Harris County	137	9,729	$1,708,016,499	$175,559
1b	Galveston County	5	0	0	0
1b	Chambers County	9	373	$30,964,797	$83,016
1b	Brazoria County	11	141	$14,035,333	$99,541
All 1b		162	10,243	$1,753,016,629	$171,143
2	Matagorda County	8	141	$9,933,613	$70,451
2	Jackson County	4	21	$3,085,847	$146,945
2	Victoria County	9	139	$12,199,908	$87,769
2	Calhoun County	D	D	D	D
All 2		21	301	$25,219,368	$83,785

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
3	Refugio County	3	11	$911,617	$82,874
3	Aransas County	D	D	D	D
3	San Patricio County	4	39	$3,788,233	$97,134
3	Nueces County	17	349	$37,597,744	$107,730
3	Kleberg County	D	D	D	D
All 3		24	399	$42,297,594	$106,009
4	Kenedy County	D	D	D	D
4	Willacy County	D	D	D	D
4	Cameron County	D	D	D	D
All 4		0	0	$0	0
Coastal Counties		224	11,483	$1,873,530,050	$163,157
Coastal Counties % of State		36.96%	74.90%	78.48%	
Texas Statewide		606	15,331	$2,387,292,993	$155,717

*NAICS code 486

D = Disclosure issues prevent this data from being presented

Source: Bureau of Labor Statistics, 2015

Ship Building and Repairs

As part of the Ocean Economy, the ship building, parts, and repairs industries support offshore mineral exploration and extraction activities as well as commercial fishing and waterborne transportation along the GIWW and the open waters of the Gulf. Construction and repair of barges, ships, commercial fishing boats, towboats and offshore oil and gas floating platforms are integral enterprises of the Texas coastal economy and are part of this industrial sector. Table 9-25 shows the contribution of ship building and repairs to the economy of the Texas coast.

Table 9-25: Ship and Boat Building Industry - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	6	567	$31,779,070	$56,048
1a	Orange County	D	D	D	D
All 1a		6	567	$31,779,070	$56,048
1b	Harris County	D	D	D	D
1b	Galveston County	D	D	D	D
1b	Chambers County	D	D	D	D
1b	Brazoria County	D	D	D	D
All 1b		0	0	$0	$0
2	Matagorda County	D	D	D	D
2	Jackson County	N/A	N/A	N/A	N/A
2	Victoria County	D	D	D	D
2	Calhoun County	D	D	D	D
All 2		0	0	$0	$0
3	Refugio County	N/A	N/A	N/A	N/A
3	Aransas County	D	D	D	D
3	San Patricio County	D	D	D	D
3	Nueces County	D	D	D	D
3	Kleberg County	N/A	N/A	N/A	N/A
All 3		0	0	$0	$0
4	Kenedy County	N/A	N/A	N/A	N/A
4	Willacy County	N/A	N/A	N/A	N/A
4	Cameron County	D	D	D	D
All 4		0	0	$0	$0
Coastal Counties		6	567	$31,779,070	$56,048
Coastal Counties % of State		6.25%	12.08%	11.30%	
Texas Statewide		99	5,097	$303,245,907	$59,490

*NAICS code: 336611 and 336612
D = Disclosure issues prevent this data from being presented
Source: National Ocean Economics Program, 2015

Marine Construction

The Bureau of Labor Statistics includes marine construction within the sector code 237990 which includes other heavy and civil engineer construction. Marine construction includes construction of breakwaters, bulkheads, channels and canals, harbors, jetties, and other marine structures. Because marine construction is not differentiated among many other forms of heavy construction, the contribution of the industry to the ocean economy may be overstated for the coastal counties. Nearly two-thirds of the State's employment in heavy construction is found in the 18-coastal county area, as shown in Table 9-26.

Table 9-26: Marine Construction Industry - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	10	142	11,118,217	78,297
1a	Orange County	--	--	--	--
All 1a		10	142	$11,118,217	$78,297
1b	Harris County	85	3,305	255,513,566	77,311
1b	Galveston County	11	202	10,019,380	49,601
1b	Chambers County	--	--	--	--
1b	Brazoria County	--	--	--	--
All 1b		96	3,507	$265,532,946	$75,715
2	Matagorda County	--	--	--	--
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	6	570	35,491,279	62,265
All 2		6	570	$35,491,279	$62,265
3	Refugio County	--	--	--	--
3	Aransas County	--	--	--	--
3	San Patricio County	--	--	--	--
3	Nueces County	--	--	--	--
3	Kleberg County	--	--	--	--
All 3		0	0	$0	$0
4	Kenedy County	--	--	--	--
4	Willacy County	--	--	--	--
4	Cameron County	--	--	--	--
All 4		0	0	$0	$0
Coastal Counties		112	4,219	$312,142,442	$73,985
Coastal Counties % of State		76.19%	63.63%	67.93%	
Texas Statewide		147	6,631	$459,487,403	$69,294

*NAICS code: 237990

Source: National Ocean Economics Program, 2015

Commercial Fishing

The marsh systems and coastal bays along Texas's coastline and the adjacent Gulf waters provide a bounty of aquatic resources and an abundance of fishing opportunities. Commercial fishing is an important component of the coastal economy but is highly vulnerable to the health of the ecosystems that provide harvestable resources.

Overall, in 2015, Texas commercial fishermen landed 80.4 million pounds of seafood valued at $173 million. The leading 10 species landed by weight and value are shown in Table 9-27 (NMFS, 2015). The shrimp harvest ranked highest in both weight and value, comprising 86 percent of the total landed weight and 83 percent of the landed value. Texas routinely accounts for about a quarter of the red snapper harvested in the Gulf and a third of the Gulf's shrimp landings based on pounds. In fact, about one quarter of all domestic shrimp landed in the United States comes from Texas (U.S. Gulf of Mexico Fisheries Information, 2016).

Table 9-27: 2015 Top Commercial Fish Species Landed by Weight and Value, Texas

Rank	Ranked by Volume		Rank	Ranked by Value	
	Species	Pounds Caught		Species	Value
1	Shrimp	69,475,000	1	Shrimp	$144,000,000
2	Blue crab	3,924,000	2	Red snapper	$9,387,000
3	Red snapper	2,152,000	3	Oysters	$8,232,000
4	Black drum	1,813,000	4	Blue crab	$5,133,000
5	Oysters	1,583,000	5	Black drum	$2,003,000
6	Groupers	355,000	6	Groupers	$1,483,000
7	Vermillion snapper	307,000	7	Vermillion snapper	$920,000
8	Atlantic croaker	90,000	8	Atlantic croaker	$746,000
9	Flounders	51,000	9	Flounders	$187,000
10	Tunas	1,000	10	Tunas	$3,000
ALL LANDED SPECIES		**80,356,000**	**TOTAL VALUE**		**$173,000,000**

Source: National Marine Fisheries Service, 2015.

The leading Texas ports in 2015 for commercial fisheries landings are presented in Table 9-28. The ports of Galveston and Brownsville-Port Isabel ranked highest in weight and value of commercial fishery harvests.

Table 9-28: Top Texas Ports for Commercial Fishery Landings, 2015

Rank	Port	Weight in pounds	Rank	Port	Landed Value
1	Brownsville-Port Isabel, TX	24,700,000	1	Brownsville-Port Isabel, TX	$55,100,000
2	Galveston, TX	16,399,999	2	Galveston, TX	$42,400,000
3	Palacios, TX	15,400,000	3	Palacios, TX	$31,200,000
4	Port Arthur, TX	13,600,000	4	Port Arthur, TX	$26,900,000

Source: National Ocean Economics Program, 2015

The commercial fisheries industry supports not only the commercial harvesters but also seafood processors, seafood distributors, grocers, and restaurants. NOAA's National Marine Fisheries Service

(NMFS) Seafood Industry Input/ Output Model estimates economic impacts for fishery products as they work their way through the entire economy from harvesting to the final users. The impact of the commercial fisheries is shown in Table 9-29 and are confined to the domestic harvest and the indirect effects to the processing, wholesale, and retail sectors. The estimates for a specific state measure only the impacts that occurred within that state from the seafood industry activities in that state. For the commercial harvester's sector, the harvesting activity is attributed to the state where the fish were landed. Economic contributions from interstate commerce and imported harvests are not reflected in the statistics presented in Table 9-29. The most current estimates of the commercial fisheries contribution to the Texas' economy are for the year 2015 when a total of 80.4 million pounds of fish were landed in Texas valued at $173 million. The economic contribution of the commercial fishery industry to the Texas coastal counties is shown in Table 9-30.

Table 9-29: Economic Impacts to Texas from Domestic Commercial Fishery Landings, 2015

Category	Impact
Employment, jobs	14,571
Income	$351,189,000
Sales	$966,117,000
Value Added (GDP contribution)	$429,440,000
Landed Fisheries Volume, 2015	80,356,000
Landed Fisheries Value, 2015	$173,419,000

Includes direct, indirect, and induced effects.
Sources: National Ocean Economics Program, 2015

Table 9-30: Commercial Fishing Industry - Annual Average Employment, Business Establishments, and Wages, 2015

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	20	28	$628,000	$22,429
1a	Orange County	--	--	--	--
All 1a		20	28	$628,000	$22,429
1b	Harris County	41	130	$3,681,000	$28,315
1b	Galveston County	14	265	$6,417,000	$24,215
1b	Chambers County	--	--	--	--
1b	Brazoria County	--	--	--	--
All 1b		55	395	$10,098,000	$25,565
2	Matagorda County	28	7	$358,000	$51,143
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	--	--	--	--
All 2		28	7	$358,000	$51,143
3	Refugio County	--	--	--	--
3	Aransas County	--	--	--	--
3	San Patricio County	--	--	--	--
3	Nueces County				
3	Kleberg County	--	--	--	--
All 3		0	0	$0	--
4	Kenedy County	--	--	--	--
4	Willacy County	--	--	--	--
4	Cameron County	54	57	$1,384,000	$24,281
All 4		54	57	$1,384,000	$24,281
Coastal Counties		157	487	$12,468,000	$25,602
Coastal Counties % of State		59%	20%	14%	
Texas Statewide		267	2,488	$91,387,000	$36,731

*NAICS code: 31170, 1125, 1141, 445220
Source: Bureau of Labor Statistics, 2015

Recreation and Tourism/Leisure and Hospitality

Recreational activities and tourism are important industrial sectors to the coastal economy and include sightseeing, beach-going, wildlife watching, fishing, boating, and other forms of recreation and leisure time activities. Tourism and recreation, part of the leisure and hospitality industrial sectors, employ 48,160 coastal residents across a variety of enterprises, from hotel and restaurant services to boat dealers and offshore fishing guides (NOEP, 2015).

Table 9-31 displays the combination of leisure and hospitality industrial sectors to the local and regional economies in 2015. 16.7% of total employment in Region 3 is in the leisure and hospitality industrial sectors, much of this is driven by Aransas County, which has 26.2% of total employment within the leisure and hospitality industry.

Table 9-31: Recreation and Tourism Representation in Coastal Counties, 2015

Region	Coastal County	Leisure and Hospitality Establishments	Percent of Coastal Counties' Establishments in Sector	Leisure and Hospitality Sector Employment	Leisure and Hospitality Sector Employment as a Percent of Total Employment	Percent of Coastal Counties' Employment in Sector	Leisure and Hospitality Sector Wages	Percent of All Coastal Counties' Wages in Sector
1a	Jefferson County, Texas	516	3.7%	11,438	10.7%	3.7%	$197,822,282	3.0%
1a	Orange County, Texas	142	1.0%	2,466	13.1%	0.8%	$36,278,078	0.5%
All 1a		658	4.7%	13,904	11.0%	4.4%	$234,100,360	3.5%
1b	Harris County, Texas	9,416	67.6%	220,128	10.9%	70.3%	$5,068,193,707	76.3%
1b	Galveston County, Texas	727	5.2%	17,436	22.6%	5.6%	$318,072,679	4.8%
1b	Chambers County, Texas	72	0.5%	1,076	10.0%	0.3%	$16,732,037	0.3%
1b	Brazoria County, Texas	557	4.0%	11,220	13.1%	3.6%	$186,063,878	2.8%
All 1b		10,772	77.3%	249,860	11.4%	79.8%	$5,589,062,301	84.2%
2	Matagorda County, Texas	92	0.7%	1,149	13.2%	0.4%	$17,833,993	0.3%
2	Jackson County, Texas	26	0.2%	313	6.9%	0.1%	$4,297,625	0.1%
2	Victoria County, Texas	235	1.7%	4,359	12.4%	1.4%	$72,773,112	1.1%
2	Calhoun County, Texas	73	0.5%	744	6.7%	0.2%	$11,747,893	0.2%
All 2		426	3.1%	6,565	11.0%	2.1%	$106,652,623	1.6%
3	Refugio County, Texas	19	0.1%	248	14.6%	0.1%	$3,361,163	0.1%
3	Aransas County, Texas	113	0.8%	1,386	26.2%	0.4%	$23,254,966	0.4%
3	San Patricio County, Texas	117	0.8%	2,179	14.7%	0.7%	$34,016,119	0.5%
3	Nueces County, Texas	969	7.0%	22,307	16.4%	7.1%	$395,062,098	6.0%

3	Kleberg County, Texas	81	0.6%	1,469	18.5%	0.5%	$21,710,330	0.3%
All 3		1,299	9.3%	27,589	16.7%	8.8%	$477,404,676	7.2%
4	Kenedy County, Texas	6	0.0%	33	5.8%	0.0%	$1,081,318	0.0%
4	Willacy County, Texas	32	0.2%	380	15.7%	0.1%	$4,910,222	0.1%
4	Cameron County, Texas	734	5.3%	14,584	13.8%	4.7%	$225,774,089	3.4%
All 4		772	5.5%	14,997	13.8%	4.8%	$231,765,629	3.5%
Coastal Counties		13,927	100.0%	312,915	11.8%	100.0%	$6,638,985,589	100.0%
Texas Statewide		56,351		1,241,135	12.6%		$250,978,002,765	

*NAICS Super Sector 70, includes NAICS 71, Entertainment, Arts and Recreation and NAICS 72, Accommodation and Food Services

Source: Bureau of Labor Statistics, 2015

Marine Recreational Boating and Fishing

NOAA Fisheries Service estimates annual marine recreational fishing trip expenditures and durable equipment expenditures for Texas. Marine recreational expenditures are categorized into the following expenditure types: for-hire trips, private boat trips, shore trips and durable equipment expenditures related to marine recreational fishing, which include expenditures on fishing tackle and gear, fishing related equipment, boats, vehicles, and second homes. The U.S. Fish and Wildlife Service estimates annual saltwater anglers, trips and days of fishing for Texas. Table 9-32 presents marine recreational fishing expenditures and saltwater fishing pressure for Texas for 2015. In 2015, fisherman made 1.1 million fishing trips. Recreational expenditures for marine fishing averaged $374 per trip in 2015. The most popular types of saltwater fish caught in Texas waters are redfish, flounder and seatrout.

Table 9-32: Annual Marine Recreational Angler Trip & Durable Equipment Expenditures, Texas

2015	Total
Durable Equipment	$1,710,165,000
For-Hire Boat	$57,976,000
Private Boat	$158,247,000
Shore Fishing	$173,452,000
Total Trip Expenditures	$389,675,000
Trips	1,043,000
Average Expenditure per Trip	$374

Source: Fisheries Economics of the United States, 2015

Marine recreational fishing impacts to the Texas economy are presented in Table 32. Marine recreational fishing supported over 15,000 jobs in 2015 and provided $726 million in income to full and part-time workers. Over $1 billion in value added was contributed to the GDP of the state.

Table 9-33: Economic Impacts to Texas from Marine Recreational Fishing, 2015

2015	Employment	Income	Sales	Value Added (GDP Contribution)
Durable Equipment	10,439	$525,555	$1,304,644	$850,396
For-Hire Boats	787	$39,656	$108,647	$61,107
Private Boat	1,861	$75,009	$249,714	$136,251
Shore Fishing	2,281	$85,859	$274,748	$154,546
Total	**15,368**	**$726,079**	**$1,937,753**	**$1,202,300**

Includes direct, indirect, and induced effects.
Sources: National Marine Fisheries Service, 2015

Ecotourism

Ecotourism is defined as "environmentally responsible travel to natural areas, in order to enjoy and appreciate nature" (The Nature Conservancy, 2017). Texas' environmental diversity has made Texas an important destination for ecotourism. Wildlife watching is a close approximation of the concept of ecotourism and is an economic activity reported by the U.S. government. Wildlife watching's continued popularity gives evidence to the importance that people attach to diverse, accessible and robust fish and wildlife populations (U.S. Fish and Wildlife Service, 2014). The U.S. Fish and Wildlife Service estimated the total employment impact of wildlife watching within the state to be over 146,000 jobs in 2011, contributing $13.8 billion to the Texas economy (as shown in Table 9-33) in terms of direct, indirect and induced effects. This impact accounted for 1 percent of the State's GDP for 2011 (Bureau of Economic Analysis, 2017. *Real GDP by State: Texas, 2011*).

Texas' ten ecological regions, shown in Figure 9-8, and the environmental diversity unique to those regions have made Texas an important destination for ecotourism. Two ecological regions are located within the study area, the Gulf Prairies and Marshes and the South Texas Plains. Texas is also within the North American Central Flyway for bird migrations which traverses the Texas Gulf Coast (Texas Parks and Wildlife, 2016).

Birding and other forms of ecotourism and outdoor recreation are popular and are becoming increasingly widespread. Numerous festivals along the Texas Coast celebrate semiannual bird migrations along the Central Flyway. Many of North America's migratory birds rely on the Central Flyway's diverse marsh and wetland habitats for their spring and fall journeys (Audubon, 2016). Texas is the number one bird-watching state/province in North America, and the Rio Grande Valley, (Region 4) is often considered the number two bird-watching destination in North America (Mathis, Matisoff, 2004).

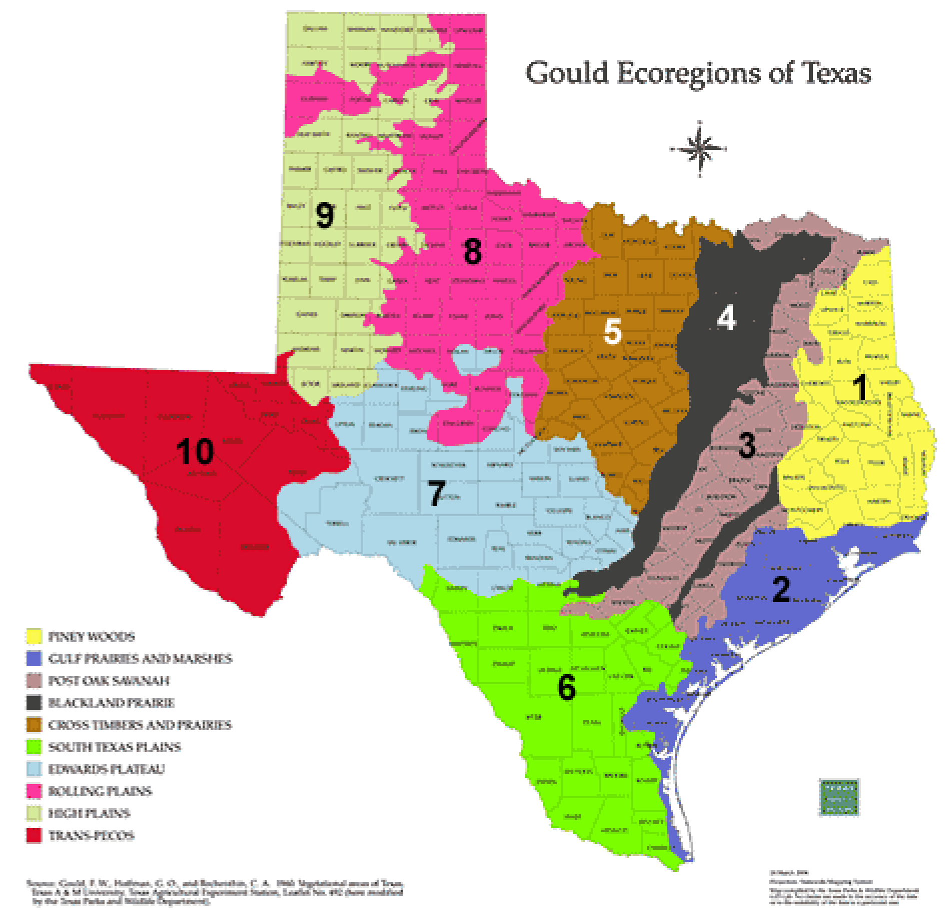


Figure 9-8: Ecological Regions of Texas

Wildlife watching in general is estimated to have generated $1.4 billion in expenditures in Texas in 2011. Activities involved with wildlife watching include observing, photographing and feeding wildlife. Because these recreational activities can overlap one another and can include a variety of wildlife, estimates of bird watching are included in the wildlife watching statistics. Among the 1 million estimated wildlife watchers in Texas, almost 90 percent are also bird watchers. Table 9-35 presents expenditures by Texans and non-residents in this recreational activity. Table 9-36 presents estimated number of participants, trips, and days of participation in wildlife watching. Over the year, each wildlife-watching participant spent 11 days in this activity and spent an average of $247 per day.

The U.S. Fish and Wildlife Service (USFWS) updated the National Survey of Fishing, Hunting and Wildlife Associated Recreation based upon 2016 data, as planned. The USFWS will no longer release Survey data by state, so 2011 will remain the most current data for Texas specific data regarding wildlife watching. The national data and regional data that include Texas show an increase in wildlife watching and an increase in expenditures for wildlife watching between 2011 and 2016.

Table 9-34: Economic Impact of Wildlife Watching to the U.S. and Texas Economies, 2011

Economic Impacts	U.S. Total	Texas
Total Employment	1,379,282	146,024
Output to the Texas Economy (in Billions)	$142.10	$13.80
Retail Sales (in Billions)	$54.90	$1.80
Salaries and Wages (in Billions)	$53.00	$5.10
State, Local, and Federal Revenue (in Billions)	$21.10	$2.10

Source: U.S. Fish and Wildlife Service, 2014

Table 9-35: Trip and Expenditures in Texas for Wildlife Watching, 2011

Expenditure Item	Expenditures in thousands	Spenders in thousands	Average Expenditure per Spender	Average Expenditure per Participant
Food and Lodging	$253,566	755	$336	$247
Transportation	$196,652	971	$203	$189
Other trip costs	$27,862	310	$90	$27
Equipment	$919,970	3,321	$277	$207
Total	$1,398,050	3,580	$391	$316
Texas Residents				
Food and Lodging	$141,049	635	$222	$157
Transportation	$125,490	855	$147	$136
Other trip costs	--	--	--	--
Equipment	$900,082	3,217	$280	$212
Total	$1,178,565	3,376	$349	$277
Non-Residents				
Food and Lodging	$112,517	120	$938	$883
Transportation	$71,162	116	$613	$559
Other trip costs	$15,918	112	$142	$125
Equipment	$19,888	104	$191	--

Expenditure Item	Expenditures in thousands	Spenders in thousands	Average Expenditure per Spender	Average Expenditure per Participant
Total	$219,485	204	$1,076	$1,613

Source: U.S. Department of the Interior, 2011

Table 9-36: Participation, Trips, and Days of Participation in Away-From-Home Wildlife Watching, 2011

Category	Total	Texas Residents	Non-Residents
Participants in 1,000s	1,026	899	127
Trips in 1,000s	12,401	12,097	304
Days in 1,000s	11,840	10,441	1,399
Average Days per Trip	0.95	0.86	4.60
Average Days per Participant	11.54	11.61	11.02

Source: U.S. Department of the Interior, 2011

The Texas Parks and Wildlife Department has developed the Great Texas Wildlife Trails that allow Texans and other ecotourists the opportunity to explore the variety of wildlife across the state. The Great Texas Coastal Birding Trail is a state-designated system of trails, bird sanctuaries, and nature preserves along the entire length of the Texas Gulf Coast. As the state of Texas hosts more bird species than any other state in the U.S. the trail system offers some of the most unusual opportunities for bird-watching in the world. The "trail" is actually 43 separate hiking and driving trails that include 308 birding sites. The sites themselves feature a variety of viewing opportunities with boardwalks, observation decks, and other amenities. The trails boast more than 450 bird species. Apart from bird watching, the trail system includes many nature preserves which feature a wide variety of wildlife. In addition, the various sites cover many types of natural terrain and flora including forests, marshes, and beaches. This trail network was the first of its kind in the U.S. though many states have since followed. The trail system remains the nation's largest.

One of the most well-known locations along the trail system is the Aransas National Wildlife Refuge, which is the winter home to the whooping crane, one of the most rare, highly endangered and intensively monitored bird species in North America. The Aransas-Wood Buffalo population which breeds in northern Canada and winters in Texas, is the only remaining wild, self-sustaining migratory population of whooping cranes in the world. The popularity of these wildlife watching activities is reflected in the business activity in Region 3, as shown in Table 9-36 which is home to the Aransas Wildlife Refuge and numerous other popular outdoor recreational opportunities.

Cruise Ship Industry

Galveston County and Galveston Island, in particular, have become popular tourist destinations, not only because of the Island's beaches and its historic and recreational attractions, but also for its cruise ship industry. Proximity to open, deep water has buoyed this growing industry on the Island. The Port of Galveston is ranked as the nation's fourth-largest cruise market based on embarkations, with 255 cruise ship calls and more than 933,000 embarkations in 2017. Cruise activity generated $60.8 million in passenger on-shore spending and another $19.3 million in services in 2017 (Galveston Island Convention & Visitors Bureau, 2017).

D. Economic Benefits Assessment

Introduction

The analysis of the proposed projects in the 2019 Texas Coastal Resiliency Master Plan included the estimation of the economic impact of project construction. In the interest of consistency with the ongoing Coastal Texas Study, the project team coordinated with the U.S. Army Corps of Engineers (USACE) for this assessment. The USACE uses RECONS (Regional ECONomic System) to measure the economic impact or contribution of direct expenditures by the government on civil works. Economic impact (contribution) analysis estimates the change (impact) or existence (contribution) in economic activity (economic output, labor income, value added, and employment) associated with new or already occurring economic activity in an economy. RECONS estimates economic impacts or contribution of these activities to the economy by utilizing input-output modeling techniques to calculate the multiplier effects that government expenditures or industry revenues create through backward linkages to the industries, businesses, and households supplying the goods, services and labor.

Model Overview

The USACE developed RECONS to automate calculations and generate estimates of jobs and other economic measures, such as income and sales, associated with government program spending. This is done by extracting multipliers and other economic measures from IMPLAN regional economic models that were built specifically for USACE's project locations. IMPLAN is a widely-accepted commercial economic impact analysis software. IMPLAN derives its data, ratios, and multipliers from the U.S. Department of Commerce Bureau of Economic Analysis Regional Economic Accounts; U.S. Department of Labor, Bureau of Labor Statics Census on Employment and Wages; U.S. Census Bureau County Business Patterns; and the Leontief inversion of the IMPLAN data matrices (i.e., the input-output methodology).

IMPLAN multipliers are stored in a database and the tool matches various spending profiles to the matching industry sectors by location to produce economic impact estimates. RECONS contains IMPLAN multipliers for more than 1,200 impact areas. The multipliers within these models were created with Regional Purchase Coefficients based on the trade flow dataset included in IMPLAN Version 3. A unique model ID was assigned to each impact area.

RECONS, like IMPLAN, uses sales, economic output, or revenues as the basis on which the ratios or multipliers are estimated. Although the government has “costs” or “expenditures” on projects, these are revenues or sales to the various industries receiving this spending. The direct project expenditures are expected to generate additional economic activity that can be measured in jobs, income, sales and gross regional product in the region, the State, and the Nation. Once the work activities and operational revenues and expenses have been allocated to spending profiles with specific IMPLAN industries, RECONS applies IMPLAN’s ratios and multipliers to the direct output or local capture to estimate the direct and secondary effects for all of the RECONS results measures.

Impact Measures

The results of the RECONS impact analysis provide information on the impact measures and types of effects. Impact measures include: direct effects, including output, employment, labor income, and value added; the secondary (multiplier) effects for these output measures; as well as the total economic effects (the sum of the direct and the secondary effects).

These impact measures or economic indicators include:

Economic Output: In RECONS, annual sales or revenues are equivalent to annual economic output or the value of production by industry. Output can be measured either by total value of purchases by intermediate and final consumers or by intermediate outlays plus value added.

Employment: A job is the annual average of monthly jobs in that industry. (This is the same definition used by Quarterly Census of Employment and Wages, Bureau of Labor Statistics, and Bureau of Economic Analysis nationally). A job can be full-time, part-time or overtime, and includes proprietors (i.e., self-employed persons).

Labor Income: Labor income represents all forms of annual employment earnings; it is the sum of employee compensation and proprietor (self-employed) income.

Value Added or Gross Regional Product (GRP): Value added consists of employee compensation, proprietary income, other property type income (which includes industry profits), and indirect business taxes. Value-added is an estimate of the gross regional or state product.

RECONS provides the impact measures above for direct and secondary (i.e., multiplier) effects. The secondary effects include both indirect and induced effects. The types of effects are defined as follows:

Direct Effect: In the impact area in which a project or economic activity is located, direct output (i.e., sales or revenues) effect represents that proportion of the spending or sales in each industry that flows to material and service providers in the impact area. For employment, labor income, and Gross Regional Product measures, the direct effect represents the jobs, labor income and gross regional product associated with the directly affected industry.

Indirect Effect: The indirect effects include the backward-linked industry suppliers for goods and services that support the directly affected industries, supporting indirect jobs, labor income, value added and economic output. For example, if construction activity is the direct effect, indirect business supporting construction would include architectural and engineering, lumber suppliers, trucking, steel manufacturers, among others; these are considered backward-linked industries supporting the construction activity.

Induced Effect: The induced effect occurs from household expenditures or consumer spending associated with the direct and indirect workers spending their earnings within the impact area, supporting induced economic output, jobs, labor income and gross regional product.

Project Analysis

The primary inputs for RECONS were the construction cost estimate and construction timeline that were developed for each project.

RECONS uses two industry codes for Construction Activities for Ecosystem and Habitat Restoration or Improvements projects: 1) Planting and Forestry Activities; and 2) Heavy Construction Activities. The default percentage split is that 25% of the total construction cost is Planting and the other 75% is Heavy Construction. With the detailed cost estimate, this percentage could be modified for each project. Many proposed projects do not have Planting aspects, so the entire construction cost was allocated to Heavy Construction.

RECONS, like IMPLAN, estimates its output measures in annual averages and assumes expenditures occur over the course of one year. Therefore, projects that have construction timelines longer than one year were adjusted accordingly.

Most of the proposed projects were located within a USACE RECONS project region. For the small number of projects not located in a RECONS project region, the national generic micropolitan or rural model was used, in conjunction with the Texas state model.

Full RECONS results are included in **Appendix F**.

I. Ecosystem Services

The purpose of this memorandum is to build upon the previous effort during Phase 1 and further refine the economic valuations at the Resiliency Strategy level for the Texas coast. Refinements include reviewing the Phase 1 ecosystem services for possible updates based on existing literature, while considering regional or sub-regional characteristics that could change how the ecosystem services are represented at different locations along the coast.

The Texas coast is divided into four regions based on major bay systems and habitats. The first region, Sabine Pass to Galveston Bay extends from the mouth of Sabine River at the Texas-Louisiana border to the west side of Galveston Bay. The second region, Matagorda Bay includes the entire Matagorda Bay system from the Brazoria-Matagorda County line to the eastern edge of San Antonio Bay. The third region, Corpus Christi Bay extends from the San Antonio Bay to Baffin Bay. The fourth region, Padre Island stretches from the southern edge of Baffin Bay to the Texas-Mexico border.

The U.S. Army Corps of Engineers (USACE) defines three primary categories of coastal risk reduction: structural measures (such as levees and floodwalls), nonstructural measures (such as buy-outs and raising structures), and natural and nature-based features. Nature-based features are manmade and may mimic characteristics of natural features, such as habitat creation and restoration, environmental, beach nourishment, and dune restoration. Ecosystem services related to existence, creation, and restoration of the following habitat types were considered: oyster reefs, coastal wetlands, bottomland forests, mangroves, coastal prairies, beaches and dunes, and seagrass.

The ecosystem services can be categorized as provisioning, regulating, supporting, and cultural services. Provisioning services may include food, raw materials, and medicinal resources that can be used by people. Regulating services are services provided by ecosystems that act as regulators, such as by moderating air quality, water quality, extreme events, erosion prevention, and biological control. Supporting services can also be described as the habitats that provide for flora and fauna to survive, such as food water, and shelter. Supporting services may also include the maintenance of genetic diversity. Cultural services can include the recreational value of the ecosystem, aesthetics, tourism, and the spiritual experience provided by the ecosystem.

The value of ecosystem services provided by habitats along the Texas coast is specific to the location and type of habitat and is highly context specific. This can make valuation difficult when comparing across different environmental conditions. The following sections provide estimated values for the Texas coast according to habitat type and conditions. These estimates are conservative values intended as high-level estimates and are not meant to represent the full value of ecosystem services for the Texas coast. It is expected that there is a high level of uncertainty associated with these estimates and it is recommended to conduct an uncertainty analysis when applying these values. Because the values estimated are not precise, all values are rounded to the nearest ten or hundred.

A benefits transfer approach was employed using meta-analyses on a national or global scale except when studies specific to the Texas coast or the Gulf Coast were available. Although there are a limited number of ecosystem services studies conducted in Texas and neighboring states with similar habitats, the average values from these studies were used when possible to estimate the value of ecosystem services for the Texas coast. The estimated benefits transferred from other studies were adapted to the Texas coast and adjusted for inflation to 2018 dollars. Although some habitats may be difficult to distinguish, it is important to designate each acre (or fraction of an acre) as a specific habitat type to prevent double-counting benefits.

Oyster Reefs

In addition to the traditional provisioning services from oyster harvests, oyster reefs provide regulating, supporting, and cultural services. Regulating services include nutrient control and shoreline erosion control. Supporting services include fishery habitat and estuarine protection. Cultural services include recreation, historical significance, and non-use values.

Provisioning

Prior to Hurricane Ike, over half of the public oyster reefs in Texas were found in Galveston Bay, accounting for 80 percent or more of Texas' annual commercial oyster harvest (NOAA, 2007). Using the 2000 values from the Texas Parks and Wildlife Department, the estimated statewide average annual value is 243.2 pounds of oyster meat per harvestable acre (Robinson, 2014). The average value is used because a full range of estimates were not available. Using the National Marine Fisheries Service Annual Commercial Landing Statistics database, eastern oyster landings in Texas were valued at $5.48 per pound of meat on average in 2016. The market value of oyster harvests can be calculated by subtracting the costs of harvesting from the commercial dockside value. The maximum ratio of revenue to cost from the 18-year period for dredging observed in Wieland's study was 1.5 (2008). Applying the same cost ratio and inflating values to 2018 dollars results in an estimated net value of about $500 per acre or $1,100 per hectare per year for provisioning services.

The true value of oyster harvest is likely much higher than what is reported as commercial harvest value because there is additional value made through the resale of oysters that can be added to the initial dock value. However, it is difficult to assess the full value due to the tremendous variability of harvest from reef to reef, bay to bay, and season to season. Different reefs and bays may have an average value per pound of meat, per acre of oyster reef, or per bag of whole oysters that is reported different depending on the season, location, or current market price. Additionally, there is a chance of transactions occurring from recreational and subsistence harvesting that is not reported.

Regulating

Regulating services include nutrient control and shoreline erosion control. Oyster reefs can improve water quality by removing chlorophyll, reducing turbidity, denitrification, increasing benthic algal or pseudofecal production, and bacterial biomass removal. As oysters grow, both nitrogen and carbon are assimilated into their tissue and shell. When oysters are harvested, there is a removal of nitrogen and carbon from the water column. However, oysters also release carbon dioxide and other greenhouse gases, such as methane from gut bacteria. Considerable uncertainty remains whether oyster reefs are sources or sinks of atmospheric carbon dioxide (Fodrie et al., 2017). As a result, carbon sequestration and greenhouse gases from oyster reefs were not monetized.

Nutrient Control

Nutrient pollution form excess nitrogen in the waterways leads to harmful algae blooms and increases the amount of organic carbon within a water body which depletes the oxygen level (eutrophication) and lead to dead zones. Harmful algae blooms can impact tourism, recreation, commercial fishing, property values, and human health (EPA, 2015). Oysters can process nitrogen compounds into harmless nitrogen gas. Considering three studies conducted in Mission Aransas, Texas, Mobile Bay, Alabama, and North

Carolina, the rate of nitrogen removal from oyster reefs ranges from 17 to 915 pounds of nitrogen per acre, per year; on average it is estimated that oyster reefs can remove 276 pounds of nitrogen per acre, per year (Beseres Pollack et al., 2013 and Kroeger, 2012).

Nitrogen removal is monetized using the marginal price for nitrogen mitigation estimated by Ribaudo et al. (2005). The study utilized the U.S. Agricultural Sector Mathematical Programming model to explore the potential for nitrogen credit trading in the Mississippi Basin. Fertilizer management by farmers was the least expensive option for nitrogen management and is used as a shadow price to value nitrogen removal. The marginal cost ranges from $59 to $273 per pound of nitrogen removed in 2018 dollars. This is supported by the more recent Van Houtven et al. study (2012) that valued agricultural and urban stormwater best management practices between $100 and $300 per pound of nitrogen removal. Nutrient control from oyster reefs along the Texas coast can be valued between $1,000 and $274,500 per acre per year or $2,500 to $678,300 per hectare per year. Using the average value of $166 per pound of nitrogen removed, oyster reefs can be valued at $45,800 per acre per year or $113,200 per hectare per year for regulating services.

Erosion Control

In tidal and subtidal environments, oyster reefs stabilize sediments and deflect wave energy, providing natural protection against shoreline erosion and loss of shoreline (Henderson, 2003). Decreasing coastal property values has been attributed to loss of shoreline and shoreline erosion. In areas where engineered systems would traditionally be built, the value of the oyster reef is equivalent to the value of those systems for the erosion protection services. However, if the oyster reef is located in an area where erosion is not a concern, then the erosion protection value of the oyster reef may be evaluated as very low or zero because the services are not needed and are not marketable (Grabowski, 2012).

In locations where property owners would otherwise use engineered systems, the cost of bulkheads and rock revetments ranges from $600 to $840 per linear meter. Assuming that 5 square meters (m^2) is required to protect 1 meter of shoreline and that oyster reefs have an average width of 5 meters, the erosion value of oyster reef ranges from $1.2 million to $1.7 million per hectare (present value). To estimate the annual flow of benefits, it is assumed that these engineered systems have a 20-year life span. Using a 3 percent discount rate, the annual value ranges from $81,000 to $113,400 per hectare or $32,800 to $45,900 per acre. Using the average cost of bulkheads and rock revetments as a proxy for the erosion protection services from oyster reefs results in an average annual value for erosion control of $39,000 per acre per year or $93,500 per hectare per year (Grabowski, 2012).

Supporting

Oyster reefs provide non-market ecosystem services, such as creating a diverse habitat for juvenile fish and mobile crustaceans and refuge from predators. This provision for forage species can enhance production of economically important fishery stocks (Coen et al., 1999; Breitburg et al., 2000; Harding and Mann, 2001; Peterson et al., 2003; Tolley and Volety, 2005). A study by Zimmerman et al. found several economically valuable species such as grass shrimp, blue crab, stone crab, and several game fish species while assessing an oyster reef habitat in West Bay, Galveston, Texas (1989). However, the landscape setting of the oyster reef impacts the provision of its ecosystem services. For example, oyster reefs located on mud flats can boost the abundance of juvenile fish, whereas oyster reefs at the edge of salt marsh and seagrass habitat can have no effect on juvenile fish (Grabowski et al., 2005).

The additional production of fish and crab from five studies conducted along the Gulf Coast (including West Bay, Texas) range from 1,531.6 to 2,640.8 pounds of production per year (Kroeger, 2012; Peterson, 2003; Plunket, 2004; Scyphers, 2011; Stunz, 2010). Using the National Marine Fisheries Service Annual

Commercial Landing Statistics database, the average value of landings for all species combined was calculated to be $2.54 per pound in 2016, inflated to $2.64 in 2018 dollars. The value of supporting services from oyster reefs is estimated to range from $4,000 to $7,000 per acre per year or $10,000 to $17,200 per hectare per year. The average value of supporting services is estimated to be $5,500 per acre per year or $13,600 per hectare per year.

Cultural Services

Cultural services include recreational and non-use cultural values.

Recreation

Oyster reefs can enhance recreational fishing and diving by attracting fish, increasing both the number of fish and biodiversity of the area. A survey of recreational anglers fishing over oyster reefs off the coast of Louisiana found that anglers were willing to pay an average of $18 per person per year to maintain the right to fish over oyster reefs (Henderson and O'Neil, 2003). Based on the 2000 Census, the median household income in Louisiana was 32,566 and the median household income in Texas was 39,927. The willingness to pay value was adjusted to reflect the higher income level in Texas, resulting in an average value of $22 per person per year for recreational fishing. To apply this value, the estimated number of recreational anglers for a particular oyster reef would be multiplied by $22 to obtain the annual recreational value.

Cultural Value

People may value the presence of oyster reefs even if they have not or will not directly benefit from the reefs. Non-use values may include the bequest value, option value, or existence value. Hicks found that a 10-year, 1,000-acre oyster reef restoration project in the Chesapeake Bay had a non-use value of at least $115 million to the Chesapeake population (2004). Because cultural/non-use services found in existing literature may overlap with other monetized services, cultural/non-use services were not monetized.

Application of Monetized Values for Oyster Reefs

While the values estimated are good proxies, the full value of oyster reefs is likely underestimated. Table 9-37 displays the monetized values for oyster reefs and a description of when they are applicable. Unless the oyster reef is severely degraded, the provisioning value and nutrient control value should apply. Erosion protection services from oyster reefs only apply to locations where property owners would otherwise use engineered systems.

Supporting services are only applicable for oyster reefs located on mud flats, not oyster reefs at the edge of salt marsh and seagrass habitat, which can have no effect on juvenile fish.

The recreational value of oyster reefs can be applied by multiplying the value of $22 per person per year by the number of estimated annual recreational fishermen.

Table 9-37: Oyster Reef Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare	Description
Provisioning	$500	$1,100	Applies to healthy oyster reefs
Nutrient Control	$45,800	$113,200	Applies to healthy oyster reefs
Erosion Control	$39,000	$96,500	Applies to locations where property owners would otherwise use engineered systems

Supporting Services	$5,500	$13,600	Applies to oyster reefs located on mud flats, not oyster reefs at the edge of salt marsh and seagrass habitat
Recreational	N/A	N/A	$22 per person recreating per year

Note: All values rounded to the nearest hundred.

Coastal Wetlands

Coastal wetlands can also be referred to as coastal marshes or tidal wetlands. Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. The prolonged presence of water creates conditions that favor the growth of specially adapted plants and promote the development of characteristic wetland soils. Tidal wetlands are found along the Gulf coasts and are closely linked to estuaries where sea water mixes with fresh water to form an environment of varying salinities (EPA, 2018).

Provisioning from coastal wetlands includes the market value from the production of brown shrimp, white shrimp, and blue crabs. Coastal wetlands regulating services include storm protection, water quality, and carbon sequestration. Supporting services are limited to the value of the habitat. Cultural services include recreation, biodiversity, and aesthetics.

Provisioning

Many studies have shown a link between shrimp growth, survival, and reproduction and availability of coastal wetland habitat (Engle, 2001). Shrimp larvae depend on marshland for habitat before growing large enough to move into open water. Minello et al. (2008) examined the differences between crustacean growth and survival in coastal wetlands versus the open ocean in Galveston Bay and found that the marshes could support 3, 2.2, and 4.2 times the standing crop number in open water for brown shrimp, white shrimp, and blue crabs respectively. The standing crop refers to the weight of these organisms in an area at a given time. Production values were estimated to be 128 kg/ha for brown shrimp, 109 kg/ha for white shrimp, and 170 kg/ha for blue crabs (Minello et al., 2008).

Using the National Marine Fisheries Service Annual Commercial Landing Statistics database, the average value of landings in Texas for each species in 2016 was inflated to 2018 dollars and then multiplied by the production value for each species. The value of provisioning services from coastal wetlands for brown shrimp, white shrimp, and blue crabs is estimated to be $4,500 per acre per year or $11,100 per hectare per year.

Regulating

Coastal wetlands regulating services include storm protection, water filtration, nutrient control, and carbon sequestration.

Storm Protection

Coastal wetlands can provide a buffer between hurricane storm surge and coastal infrastructure by dissipating wave energy and attenuating storm surge. Costanza et al. (2008) estimated that the average value of hurricane storm hazard risk reduction in Texas is $6,700 per acre per year or $16,600 per hectare per year (inflated to 2018 dollars). This value applies to coastal wetlands that are near infrastructure at risk for flood damage from potential hurricanes.

Water Filtration

Wetlands filter the water runoff from the land and reduce sediment and chemicals before the runoff enters the open water. The water filtration value for coastal wetlands is based on the meta-analysis performed by Woodward and Wui (2001) and a study by Wilson (2008) and is the national value supported by the Federal Emergency Management Agency for assessing wetland benefits. The water filtration services provided by coastal wetlands are valued at $800 per acre per year or $2,000 per hectare per year (in 2018 dollars).

Nutrient Control

Wetlands are effective for removing nitrogen by the process of nitrification and denitrification. Phosphorus is removed by the process of adsorption to the ions of metals. The value for nutrient control services from coastal wetlands is based on the Jenkins et al. (2010) study conducted in the Mississippi Alluvial Valley and is the national value supported by the Federal Emergency Management Agency for assessing wetland benefits. The nutrient control services provided by coastal wetlands are valued at $600 per acre per year or $1,500 per hectare per year (in 2018 dollars).

Carbon Sequestration

Coastal wetlands can sequester carbon in living biomass, in non-living biomass, and underneath marsh sediment. Carbon sequestration in salt marshes varies considerably and is primarily dependent on sedimentation rates and flooding frequency (Chmura et al., 2003). Low marsh is characterized by marsh that is subject to regular flooding by the tide (at least once a day), whereas high marsh is only irregularly flooded by tides and may go for extended periods without flooding. The average yearly net carbon sequestration for dominated low marsh was calculated to be 60,240 kg C per hectare per year and 57,020 kg C per hectare per year for dominated high marsh for sites in Louisiana that are very similar to the Texas coast (Feagin et al., 2010).

These rates were converted to pounds of carbon dioxide per hectare per year and then monetized using the 2018 value for the social cost of carbon developed by the Federal Interagency Working Group on Social Cost of Carbon. The value for carbon sequestration ranges from $4,500 to $4,700 per acre per year or $11,100 to $11,700 per hectare per year. Because the low marsh and high marsh sequestration rates are very close, the average value was used to estimate the carbon sequestration value from coastal wetlands. The average carbon sequestration value is $4,600 per acre per year or $$11,400 per hectare per year.

<u>Supporting</u>

More than one-third of the threatened and endangered species in the United States live only in wetlands and nearly half use wetlands at some point in their lives (EPA, 2018). Many other plants and animals depend on wetlands for food, shelter, and breeding grounds.

Habitat

The habitat value for coastal wetlands is based on the meta-analysis performed by Woodward and Wui (2001) and is the national value supported by the Federal Emergency Management Agency for assessing wetland benefits. The water quality services provided by coastal wetlands are valued at $200 per acre per year or $500 per hectare per year (in 2018 dollars).

Biodiversity

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs (EPA, 2018). The biodiversity value for coastal wetlands is based on the meta-analysis performed by Schuyt and Brander (2004) and is the national value supported by the Federal Emergency Management Agency for assessing wetland benefits. This value does not overlap with the supporting services value for habitat. The biodiversity services provided by coastal wetlands are valued at $100 per acre per year or $300 per hectare per year (in 2018 dollars).

Cultural Services

Cultural services include recreation and aesthetics.

Recreation

The Texas Gulf Coast provides habitat for over 100 species of water birds (Hale et al., 2014). Bird watching tourism was valued in three coastal sites in South Texas by Mathis and Matishoff (2004) to be $1,600 per acre per year or $4,000 per hectare per year (updated to 2018 dollars). Adams et al. found that on average birdwatchers spend 2.5 times more than hunters in Texas (1997). Using this ratio, the value of coastal wetlands for hunters was estimated to be $600 per acre per year or $1,600 per hectare per year. The total value of bird watching and hunting is estimated to be $2,200 per acre per year or $5,600 per hectare per year.

Aesthetics

Wetlands can be visually rich environments due to their ecological interest and diversity. The aesthetic value for coastal wetlands is based on a hedonic study performed by Doss and Taff (1996) and is the national value supported by the Federal Emergency Management Agency for assessing wetland benefits. The aesthetic value of coastal wetlands is valued at $1,900 per acre per year or $4,800 per hectare per year (in 2018 dollars).

Application of Monetized Values for Coastal Wetlands

The values monetized for coastal wetlands apply to healthy coastal wetlands with the exception of storm protection services, which only applies to coastal wetlands near infrastructure at risk for flood damage. The coastal wetland value per acre per year is $14,900 or $37,200 per hectare per year without storm protection services. With storm protection services, the coastal wetland value increases to $21,600 per acre per year or $53,800 per hectare per year. Table 9-38 displays a summary of the monetized values for coastal wetlands and a description of the monetized value. While the average values estimated are good proxies, the full value of wetlands is likely underestimated.

Table 9-38: Coastal Wetlands Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare	Description
Provisioning	$4,500	$11,100	Applies to healthy wetlands
Storm Protection	$6,700	$16,600	Applies to coastal wetlands near infrastructure at risk for flood damage
Water Filtration	$800	$2,000	Applies to healthy wetlands
Nutrient Control	$600	$1,500	Applies to healthy wetlands
Carbon Sequestration	$4,600	$11,400	Applies to healthy wetlands
Habitat	$200	$500	Applies to healthy wetlands
Recreational	$2,200	$5,600	Applies to healthy wetlands
Biodiversity	$100	$300	Applies to healthy wetlands
Aesthetics	$1,900	$4,800	Applies to healthy wetlands

Note: All values rounded to the nearest hundred.

Coastal Bottomland Forests

Bottomland forests of the Texas coast provide provisioning, regulating, supporting, and cultural services. Provisioning services include harvesting timber; however, a general value was not quantified for the Texas coast. Regulating services include storm protection and water supply, nutrient control, and carbon sequestration. Supporting functions of the bottomland forests are provided by valuable habitat for migrant birds, waterfowl, and other wildlife. The habitat created by the bottomland forests also provides cultural and recreational services, although these services were not monetized.

Regulating

Bottomland forest regulating services include water quality improvements and impacts on the water supply from the inundation of floodwaters over the natural landscape, nutrient control, and carbon sequestration.

Storm Protection and Water Supply

Bottomland hardwoods serve a critical role in the watershed by storing floodwater, which reduces the risk and severity of flooding to downstream communities (EPA 2018). Flood damage protection and impacts on the water supply from bottomland forests were estimated by Moore et al. in Georgia to be $9,500 per acre per year or $23,400 per hectare per year for urban and sub-urban bottomland forests and $5,400 per acre per year or $13,200 per hectare per year for rural bottomland forests, in 2018 dollars (2011).

Nutrient Control

Excessive nutrient accumulation from anthropogenic sources can be mitigated through natural denitrification and nutrient uptake processes provided by bottomland forests. The rates of denitrification and retention rates vary depending on elevation of the bottomland forest, age, and the concentration of nutrient pollution. A study conducted in the Mississippi Alluvial Valley reported that low elevation forested wetlands displayed denitrification rates 10 times higher than high elevation forested sites (Jenkins et al, 2009). Jenkins et al. found that as a wetland bottomland forest grows the contribution of denitrification to the total removal volume of nitrate from the system increases from only 10 percent in the early years to nearly 50 percent after 90 years because of the change of growth rates of vegetation and soil sedimentation and deposition rates (2009). Systems exposed to higher concentrations of nutrient pollution will exhibit higher denitrification and retention rates than those subjected to lower loads (Hale et al., 2014).

The similarities between the denitrification rates and nutrient retention of a forested riparian zone compared to a bottomland forest suggest that the ecosystem designation as a “riparian forest,” a “bottomland forest,” or a “forested wetland” will generally refer to very similar habitat types that exhibit similar functionalities for water quality improvement through denitrification and excess nutrient retention (Hale et al. 2014). Considering four studies conducted along the Gulf Coast, on average it is estimated that bottomland forests can remove 36 pounds of nitrogen per acre per year (75.6 percent removal/retention), ranging from 27.6 to 46 pounds of nitrogen per acre per year (Lowrance et al., 1997; Mitsch, 1999; Lowrance, 1984; Jenkins et al., 2009).

Using the average value of $166 per pound of nitrogen removed from the Ribaudo et al. study (2005), bottomland forests can be valued at $6,000 per acre per year or $14,800 per hectare per year for nitrogen removal services.

Carbon Sequestration

The Texas coastal bottomland forests store large masses of carbon in the high volumes of wetland grasses, understory vegetation, large hardwood trees, and organic laden soils and also sequester carbon at high rates through natural vegetation growth, soil formation, and biogeochemical processes within the soils and waters (Hale et al., 2014). Hale et al. (2014) estimated that the Texas bottomland forests sequester an average of 1.8 tons of carbon per acre per year based on a review of seven studies of similar forest types in Louisiana and the Mississippi Alluvial Valley (values ranged from 0.9 to 2.4 tons of carbon per acre per year). The average value for carbon per acre per year was converted to 981 pounds of carbon dioxide per acre per year and then monetized using the 2018 value for the social cost of carbon developed by the Federal Interagency Working Group on Social Cost of Carbon. The average annual value of carbon per acre is $300 or $800 per hectare.

Supporting

Coastal bottomland forests provide living space for wild plants and animals, both resident and migratory, game and non-game species. The value of the bottomland forest habitat varies depending on the rare species abundance in the area. Rare species abundance refers to the importance of a particular parcel in providing habitat for key species. Low rare species abundance includes areas with zero to five rare, threatened, or endangered species; medium rare species abundance includes areas with six to 11 species; and, high rare species abundance includes areas with more than 11 species.

The average habitat value of Texas bottomland forests with middle or high rare species abundance was estimated by Moore et al. to be $300 per acre per year or $700 per hectare per year, in 2018 dollars (2011). Texas bottomland forests with low rare species abundance were valued at $30 per acre per year or $80 per hectare per year, in 2018 dollars.

Cultural Services

The bottomland forests of the Central Texas Coast are a vital refuge for migratory birds as they complete their journey over the Gulf of Mexico (Faulkner, 2004). The U.S. Fish and Wildlife Service observed 237 species of birds (over 29 million individuals) utilizing the bottomland forests during their annual migration (U.S. Fish and Wildlife Service, 1997). The nature-tourism industry is a powerful economic driver that can capitalize easily on the promotion of prime bird habitat provided by the bottomland forests of the central Texas coast (Hale et al., 2014). The habitat created by bottomland forests provides cultural and recreational services, although these services were not monetized.

Application of Monetized Values for Coastal Bottomland Forests

Although provisioning and cultural services may also apply to the value of coastal bottomland forests, these services were not monetized for the Texas coast. The regulating services pertaining to nutrient control and carbon sequestration would apply to all Texas coastal bottomland forests assessed. The value for water regulation and supply services vary depending on whether the coastal bottomland forests are located in an urban/sub-urban area or rural area. The supporting services for coastal bottomland forests differ depending on the abundance of rare species.

Table 9-39 displays a summary of the monetized values for coastal bottomland forests and a description of the monetized value. While the average values estimated are good proxies, the full value of coastal bottomland forests is likely underestimated.

Table 9-39: Coastal Bottomland Forests Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare	Description
Storm Protection and Water Supply	$9,500	$23,400	Applies to bottomland forests in urban and sub-urban areas
	$5,400	$13,200	Applies to bottomland forests in rural areas
Nutrient Control	$6,000	$14,800	Applies to healthy bottomland forests
Carbon Sequestration	$300	$800	Applies to healthy bottomland forests
Habitat	$300	$700	Applies to bottomland forests with middle or high rare species abundance
	$30	$80	Applies to bottomland forests with low rare species abundance

Note: All values rounded to the nearest hundred or ten.

Mangroves

Mangroves are characterized by trees that have adapted to seawater and changing tides. The most common mangroves along the Texas coast are called black mangroves that require adequate protection from wave action and are sensitive to cold weather. Mangroves provide a wide range of ecological services such as breaking wave energy, control of shoreline erosion, nutrient cycling, sequestering carbon dioxide, and providing habitat for birds and marine life. Provisioning services can include fuel wood and timber; however, a general value was not quantified for the Texas coast.

Regulating

Mangrove regulating services include storm protection, erosion control and carbon sequestration.

Storm Protection

Mangroves can be effective in reducing the flooding impacts of storm surges during major storms. Swell waves and wind are rapidly reduced as they pass through mangroves, which lessen wave and wind damage during storms.

Costanza et al. (2014) monetized storm protection, flood control, drought recovery and other aspects of habitat response to environmental variability mainly controlled by the vegetation structure of mangroves. The benefit of storm protection from tidal marshes and mangroves were estimated to be $2,600 per acre per year or $6,400 per hectare per year in 2018 dollars based on the meta-analysis conducted by Costanza et al. (2014). This value would apply to mangroves that are near infrastructure at risk for flood damage from potential hurricanes.

Erosion Control

Mangroves can support coastline stabilization by preventing erosion from waves and storms. The benefit from erosion control from tidal marshes and mangroves was estimated to be $1,900 per acre per year or $4,700 per hectare per year in 2018 dollars (Costanza et al., 2014). This is an average value based on the meta-analysis conducted by Costanza et al. (2014).

Carbon Sequestration

Mangroves account for about 1 percent of carbon sequestration by the world's forests, but among coastal habitats they account for 14 percent of carbon sequestration by the global ocean (Alongi, 2014). Mangroves sequester carbon far more effectively (up to 100 times faster) and more permanently than terrestrial forests. Further, studies have shown that mangrove forests store up to five times more carbon than most other tropical forests around the world (Silori, 2011).

Mangroves can store large amounts of carbon partly from the deep, organic soils within the mangrove and also the entangled root system. The sediments beneath mangroves are characterized by typically low oxygen conditions, slowing down the decay process and rates, resulting in much greater amounts of carbon accumulating in the soil. Mangroves have more carbon in their soil alone than most tropical forests have in all their biomass and soil combined (Silori, 2011).

The carbon sequestration benefits from mangroves are based on a mangrove-specific meta-regression analysis of 44 studies and 149 observations that span 18 countries, conducted by Salem and Mercer (2012). On average, mangroves sequester 5.27 metric tons of carbon/ha/year and can range from 0.02 to 90.5 metric tons of carbon/ha/year (Salem and Mercer, 2012). The average sequestration rate was converted to pounds of carbon dioxide per hectare per year and then monetized using the 2018 value for the social cost of carbon developed by the Federal Interagency Working Group on Social Cost of Carbon. The average carbon sequestration value is $400 per acre per year or $1,000 per hectare per year.

Supporting

Local variations in topography and hydrology result in differentiation of ecological types of mangroves. The combination of different geomorphological settings contributes to the diversity of mangrove ecosystems, and their specific characteristics of structure and function (Duke, 1992; Twilley et al., 1993, 1996).

Nutrient Cycling

The dense roots of mangroves help to bind and build soils. The above-ground roots slow down water flows, encouraging the deposition of sediments and reducing erosion. Mangroves are major conduits for tidal exchange of dissolved and particulate matter between the forest environment and adjacent coastal waters, as well as net exporters of organic matter and nutrients to the ocean, caused by biological and physical processes within the forest ecosystem (Singh et al., 2005).

The value for nutrient cycling and waste treatment services from mangroves is based on the Costanza et al. (2014) meta-analysis. The nutrient cycling services provided by mangroves are valued at $78,200 per acre per year or $193,300 per hectare per year (in 2018 dollars).

Food Production

According to the meta-regression analysis conducted by Salem and Mercer (2012), fisheries that depend on mangroves produce an average of 539 Kg/ha/year of fish and shellfish (ranging from 10 to 2,500 Kg/ha/year). Using the National Marine Fisheries Service Annual Commercial Landing Statistics database, the average value of landings in Texas for all species in 2016 was inflated to 2018 dollars and then multiplied by the production value. The value of food production from mangroves for fish and shellfish is a value of $1,300 per acre per year or $3,100 per hectare per year.

Habitat

Few fish are permanent residents of mangroves, but numerous marine species use mangroves as nursery grounds (Robertson and Blaber, 1992). The habitat value from mangroves is based on the Costanza et al. (2014) meta-analysis. The habitat provided by mangroves and tidal marshes is valued at $8,300 per acre per year or $20,400 per hectare per year (in 2018 dollars).

Biodiversity
The genetic resources from mangrove ecosystems are rich and include numerous varieties of microbes, fauna and flora living there. Those genes and genetic information are useful for animal and plant breeding as well as biotechnology (Hsieh et al., 2015). Therefore, genetic diversity can contribute to the security of a continuous and reliable supply of ecosystem services from mangrove ecosystems.

The value for biodiversity from mangroves is based on the Costanza et al. (2014) meta-analysis. The biodiversity services provided by mangroves are valued at $150 per acre per year or $370 per hectare per year (in 2018 dollars).

<u>Cultural Services</u>
Cultural services from mangroves may include recreational activities such as kayaking, wildlife watching, eco-tourism, and recreational fishing. The value for recreational services from mangroves is based on the Costanza et al. (2014) meta-analysis. The recreational services provided by mangroves are valued at $1,100 per acre per year or $2,600 per hectare per year (in 2018 dollars).

<u>Application of Monetized Values for Mangroves</u>
The ecosystem service values that were monetized for mangroves were based on meta-analyses. The values monetized for mangroves apply to healthy mangroves with the exception of storm protection services, which only apply to mangroves near infrastructure at risk for flood damage. The mangroves value per acre per year is $91,400 or $225,500 per hectare per year without storm protection services. With storm protection services, the mangroves value increases to $94,000 per acre per year or $231,900 per hectare per year.

Table 9-40 displays a summary of the monetized values for mangroves. While the average values estimated are good proxies, the full value of mangroves is likely underestimated.

Table 9-40: Mangroves Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare	Description
Storm Protection	$2,600	$6,400	Applies to mangroves near infrastructure at risk for flood damage
Erosion Control	$1,900	$4,700	Applies to healthy mangroves
Nutrient Cycling	$78,200	$193,300	Applies to healthy mangroves
Carbon Sequestration	$400	$1,000	Applies to healthy mangroves
Food Production	$1,300	$3,100	Applies to healthy mangroves
Habitat	$8,300	$20,400	Applies to healthy mangroves
Biodiversity	$200	$400	Applies to healthy mangroves
Recreational	$1,100	$2,600	Applies to healthy mangroves

Note: All values rounded to the nearest hundred.

Coastal Prairies
Prairies once covered over 6.5 million acres of Texas and now occupy less than 1 percent of these lands or about 65,000 acres (Baldwin et al., 2007). Coastal prairies can provide provisioning services such as grazing land for ranching and hunting land. Regulating services include nutrient control, carbon sequestration, and erosion control. Supporting services include habitat and biodiversity. Cultural/non-use services can be defined by aesthetics and recreational value.

Provisioning

Provisioning services from coastal prairies include food and water. Prairies are habitat for wild game and fruiting plants. Prairies may be grazed by both wildlife and domestic livestock. The well-draining soils allow rainfall to quickly infiltrate the soil and become groundwater. The de Groot et al. (2012) meta-analysis valued provisioning services from coastal prairies at $600 per acre per year or $1,600 per hectare per year (updated to 2018 dollars).

Regulating

Coastal prairies regulating services include nutrient control, carbon sequestration, and erosion prevention. Although, coastal prairies can support flood control through rainfall absorption by soil and plants, these benefits were not monetized. Coastal prairies may replace expensive drainage systems and retention ponds.

Nutrient Control

Coastal prairies are sinks for inorganic nitrogen and help regulate water quality by capturing and controlling the release of nutrients (Hale et al. 2014). Forbes et al. (2012) estimated that on average, prairies retain 7.36 pounds per acre per year of nitrogen. Additionally, prairie tallgrass can remove 22 pounds of nitrogen per acre per year on average (Risser et al., 1982; Seastedt, 1988). This is considered to be a conservative estimate. A study conducted in Missouri in 1969 found similar results in terms of nitrogen retention in prairie soils but calculated that prairie grass could filter 33 pounds of nitrogen per acre per year (Risser et al., 1982). Using the average value of $166 per pound of nitrogen removed from the Ribaudo et al. study (2005), prairies can be valued at $4,900 per acre per year or $12,000 per hectare per year for nitrogen removal services.

Carbon Sequestration

Prairies can sequester large amounts of carbon depending on land management practices and vegetation cover. Native prairies grasses have extensive root systems that can spread as far as 15 feet underground and carbon is stored both in the root systems and the soil underground as plants grow and form new soil (Hale et al., 2014).

The average value from four studies conducted either in Texas or in similar habitats in the mid-west was estimated to be 1,037 pounds of carbon sequestered per acre per year. The values from the four studies ranged from 712 to 2,386 pounds of carbon per acre per year (Dugas et al., 1998; Potter et al., 1999; Sim and Bradford, 2001; Suyker and Verma, 2001). The average value was converted to 3,800 pounds of carbon dioxide per acre per year and then monetized using the 2018 value for the social cost of carbon developed by the Federal Interagency Working Group on Social Cost of Carbon. The annual value of carbon per acre is $100 or $200 per hectare.

Erosion Control

The root systems of coastal prairies prevent soil erosion. If the trees and grasses in a coastal prairie were cut, the soils would become easily eroded by wind and water. Erosion prevention services from coastal prairies were valued utilizing the meta-analysis work of De Groot et al. (2012). The annual value of erosion control services from coastal prairies is $20 per acre or $50 per hectare, updated to 2018 dollars.

Supporting

Coastal prairies serve as living seed banks, providing for future agriculture and restoration projects. Prairies and the pollinator species in these habitats safeguard the landscape's genetic heritage. Thousands of species of insects such as butterflies, dragonflies, and imperiled bees rely on prairie plants for their survival. These insects also feed birds and other wildlife.

The highest monetized value from coastal prairies is from the habitat services provided. De Groot et al. (2012) valued habitat services from coastal prairies at $590 per acre per year or $1,400 per hectare per year (updated to 2018 dollars) utilizing a meta-analysis.

Cultural Services

The monetized cultural values from coastal prairies include aesthetics and recreation.

Recreation

Coastal prairies increase wildlife habitat and contribute to eco-tourism. Recreational activities may include wildlife watching and photography. Rudolph et al. (2014) conducted yearly bird surveys in Texas and found 30 different species of grassland birds. De Groot et al. (2012) valued recreational services from coastal prairies at $10 per acre per year or $30 per hectare per year (updated to 2018 dollars) utilizing a meta-analysis.

Aesthetics

Flowering perennial plants, sweeping grasses, and wildlife make prairies visually appealing. The aesthetic enhancement from coastal prairies can also increase property values within the view shed. De Groot et al. (2012) valued aesthetics from coastal prairies at $80 per acre per year or $200 per hectare per year (updated to 2018 dollars) utilizing a meta-analysis.

Application of Monetized Values for Coastal Prairies

The ecosystem service values that were monetized for coastal prairies were based on meta-analyses or studies conducted in Texas and neighboring states with similar prairie habitats. These values can be combined and applied to assess the value of coastal prairies along the Texas coast. The annual value per acre of coastal prairies is $6,300 or $15,500 per hectare. Table 9-41 displays a summary of the monetized values for coastal prairies. While the average values estimated are good proxies, the full value of coastal prairies is likely underestimated.

Table 9-41: Coastal Prairies Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare
Provisioning	$600	$1,600
Nutrient Control	$4,900	$12,000
Carbon Sequestration	$100	$200
Erosion Control	$20	$50
Habitat	$600	$1,400
Recreational	$10	$30
Aesthetics	$80	$200
Total	$6,300	$15,500

Note: All values rounded to the nearest hundred or ten.

Beaches and Dunes

Coastal beaches and dunes provide raw materials (sand) and ornamental resources (e.g., shells, driftwood, coral, and sea glass), however, these resources were not monetized. Besides the recreational and tourism value associated with beaches, coastal beaches and dunes offer protection from coastal storms, control coastal erosion, and provide habitat.

Regulating

The regulating services from beaches and dunes include storm protection and erosion control.

Storm Protection and Erosion Control

Coastal beaches and dunes ability to provide storm protection depends on their size and specifically for dunes, the presence of vegetation and sand supply from the beach (Hesp, 1989; Hacker et al., 2012). The meta-analysis conducted for New Jersey by Liu et al. estimated storm protection from beaches and vegetated dunes to be $35,600 per acre per year or $87,900 per hectare per year in 2018 dollars (Liu et al., 2010). This value combines beaches with dunes and is similar to the cost of artificial dunes estimated by Mendoza-Gonzalez et al.

Mendoza-Gonzalez et al. (2012) found that artificial dunes that were built in front of a property to protect against the impact of storm surges and hurricanes and control erosion cost $6,250 (in 2018 dollars) to cover 37.5 m^2. Considering this structure would need to be replaced every 20 years, the protection value from dunes was estimated to be $33,600 per acre per year or $83,100 per hectare per year.

To be conservative, the Mendoza-Gonzalez et al. values are suggested to value beaches and dunes that provide protection for property in locations where property owners would otherwise build protective devices.

Cultural Services

Cultural services from coastal beaches and dunes can include both the use and non-use value.

Recreation

Parsons et al. conducted a random survey of 884 Texas residents living in a county within 200 miles of the coast in 2001 to understand the recreational day-use value for beaches. Their study included 65 beaches along the Gulf coast of Texas. The per-trip value was estimated to be $38.75 per-person (updated to 2018 dollars). This value excludes night beach use, non-use values, and values related to other uses of the beach (Parsons et al., 2008). To estimate the daily value of a particular beach, the per-person per-trip value of $38.75 would be multiplied by the average daily number of visitors.

In many parts of the Gulf of Mexico, dunes are important recreational resources, through recreational uses such as 4-wheel drive and sand board rentals. Mendoza-Gonzalez et al. evaluated recreation along the coast of the Gulf of Mexico using the prices of 4-wheel drive and sand-board rentals and estimated the recreation value of dunes is between $4,300 to $6,200 per acre per year or $10,600 to $15,400 per hectare per year. If recreational use is expected to be heavy, the maximum value would be more appropriate, whereas if recreational use is expected to be minimal, the lowest estimated value would be reasonable. If recreational use is unknown, the average value of $5,300 per acre per year or $13,000 per hectare per year may be used. Recreational uses on Texas sand dunes are prohibited by state law; however, the presence of dunes is expected to provide some ancillary benefits to recreation on Texas beaches and dunes in general.

For beaches where the estimated number of visitors is unknown, a general recreational value per acre or hectare may be considered. A meta-analysis conducted for New Jersey included studies conducted in North America or Europe and estimated the combined aesthetic and recreational value from beaches to be $19,400 per acre per year or $47,900 per hectare per year in 2018 dollars (Liu et al., 2010).

Cultural and Spiritual Value

The cultural and spiritual values associated with beaches can include aesthetic qualities; cultural heritage and identity; spiritual, sacred, and/or religious importance; inspiration for culture, art, and design; and sense of place. The meta-analysis conducted for New Jersey by Liu et al. estimated the combined cultural and spiritual value from beaches to be $30 per acre per year or $80 per hectare per year in 2018 dollars (Liu et al., 2010).

Application of Monetized Values for Beaches and Dunes

The ecosystem service values that were monetized for beaches and dunes were based on meta-analyses or surveys conducted in Texas. These values can be combined and applied to assess the value of beaches and dunes along the Texas coast. Table 9-42 displays a summary of the monetized values for beaches and dunes. While the average values estimated are good proxies, the full value of beaches and dunes are likely underestimated.

If the estimated annual number of recreational beach users in unknown and the value per acre or per hectare is used, the value of ecosystem services from beaches is estimated to be $53,000 per acre or $131,000 per hectare, per year for beaches that protect property. For dunes that protect property and have recreational use, the value of ecosystem services can be $38,900 per acre or $96,100 per hectare, per year.

Table 9-42: Beaches and Dunes Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare	Description
Storm Protection and Erosion Control	$33,600	$83,100	Applies to beaches and dunes that protect property
Recreational	$19,400	$47,800	Applies to beaches (aesthetics and recreational)
	$5,300	$13,000	Applies to dunes (recreational)
	N/A	N/A	$38.75/person/trip/year, use if estimated annual number of users is available
Cultural/Spiritual	$30	$80	Applies to beaches

Note: All values rounded to the nearest hundred or ten.

Seagrass

There is an estimated 233,000 acres of seagrass beds along the Texas Coast (Thorhaug et al., 2017). Seagrass beds are one of the most productive habitats and play an important role in the Texas coastal ecosystem. Seagrass beds are important producers of food (or carbon) for many species ranging from bacteria to turtles, which then support higher trophic levels of organisms. Seagrass offers habitat and nursery ground for numerous species, including shrimp, fish, crabs, and their prey. Nearly all of these species rely on seagrass beds as a refuge or habitat for at least part of their life cycle. Seagrasses also provide habitat for migratory waterfowl, sea turtles, and a variety of wading and diving birds. Some of these animals consume seagrass directly. Additionally, seagrass stabilizes the sediment, oxygenates the water column, reduces harmful bacteria, and reduces greenhouse gasses (Texas Parks and Wildlife, 1999).

Texas has five species of seagrass along the coast: shoal grass (Halodule beaudettei), star grass (Halophilla engelmannii), manatee grass (Cymodocea filiformis), turtle grass (Thalassia testudinum), and widgeon grass (Ruppia maritima). Shoal grass, a subtropical species, is the most abundant seagrass coast wide. Shoal grass and widgeon grass often occur mixed in the higher salinity parts of all Texas bays and estuaries except for Sabine Lake. The tropical species turtle grass and manatee grass occur as far north as Aransas Bay and are most abundant in the Lower Laguna Madre or Corpus Christi Bay area. Due to its overall small size, star grass occurs in sheltered waters, in the understory along with other types of seagrass in mixed beds (Texas Parks and Wildlife, 1999).

Provisioning
In many parts of the world, seagrass beds are important cultural and economic resources for coastal people, contributing to human welfare through the provision of fishing and bait collection grounds, substrate for seaweed cultivation, medicines, and food. However, it is illegal to uproot seagrass in Texas, therefore, provisioning services were not monetized.

Regulating
Seagrass beds sequester carbon and are stabilizing agents in coastal sedimentation and erosion processes.

Erosion Control
The seagrass roots trap and stabilize sediments, which improves water clarity, water quality, and also provides protection from coastal erosion. The de Groot et al. (2012) meta-analysis valued erosion control services from seagrass beds at $12,200 per acre per year or $30,200 per hectare per year (updated to 2018 dollars).

Carbon Sequestration
The Intergovernmental Panel on Climate Change Wetlands Committee recently recognized that seagrasses make a significant contribution to the global stored carbon stock. In Texas, the highest organic carbon sinks are in the Laguna Madre, between the Padre Island National Seashore and the massive King Ranch (Thorhaug et al., 2017). Subtropical/tropical restored seagrass can sequester large amounts of carbon within a short time following restoration, which differs from mangroves that take some years before sequestration occurs in large amounts (DelVecchia et al., 2014). Greiner et al. found that restored seagrass beds are expected to accumulate carbon at a rate that is comparable to measured ranges in natural seagrass beds within 12 years of seeding (2013).

Lavery et al. studied the variability in carbon storage of seagrass habitats in Australia and found not only variability among seagrass species, but also variability due to the habitats in which they occur. The rate of carbon accumulation is highly dependent on the rate of sediment accumulation and water depth. Lavery et al. results indicate a range of carbon dioxide sequestered per hectare per year between 44 and 815 tons. The lower end of the range is comparable to estimates from Hughes (56.4 tons) and Bann and Basak (50 tons) (Hughes, 2015; Bann and Basak, 2013). Thorhaug et al. studied blue carbon dynamics in the Gulf of Mexico and for five sites located in Texas, annual carbon sequestration ranged from 10.2 to 71.5 tons per hectare (Thorhaug et al., 2017).

Based on these studies, a conservative value of 50 tons of carbon dioxide per hectare per year was used along with the 2018 value for the social cost of carbon developed by the Federal Interagency Working Group on Social Cost of Carbon to monetize the carbon sequestering value of seagrass beds. The conservative annual value of carbon sequestration is $1,070 per acre or $2,650 per hectare.

Supporting
Seagrass habitat supports many species of fish, waterfowl and sea turtles and is rich in genetic diversity. Seagrass beds are also part of the nutrient cycling process.

Nutrient Cycling
Seagrass leaves absorb nutrients in runoff from the land, capturing sand, dirt, and silt particles. Seagrass beds also take up nutrients from the soil and release them into the water through their leaves. Seagrass

beds located near urban areas or rivers that experience agricultural runoff would have much higher nutrient processing value than those located in areas less subject to such pollution.

A meta-analysis conducted by Costanza et al. (2014) valued the non-market value of nutrient cycling services from seagrass beds to be $12,700 per hectare per year or $31,300 per hectare per year (updated to 2018 dollars), which is nearly the same as the value estimated by Brenner et al. (2010) but a bit more conservative.

Habitat

Seagrasses provide nursery habitats and shelter for small invertebrates, small fish, and juveniles of larger fish species. Some species are permanent residents in seagrass beds, while others only live there for part of their life cycle. The de Groot et al. (2012) meta-analysis valued habitat services from seagrass beds at $90 per acre per year or $230 per hectare per year (updated to 2018 dollars).

Biodiversity

More species diverse seagrass ecosystems exhibit enhanced productivity, nutrient cycling, or resistance to disturbance or invasion relative to other habitats with fewer species (Hughes and Stachowicz, 2004). The de Groot et al. (2012) meta-analysis valued biodiversity services from seagrass beds at $90 per acre per year or $220 per hectare per year (updated to 2018 dollars).

Cultural Services

Seagrass habitat attracts recreational activities such as snorkeling, SCUBA diving, fishing, and non-motorized boating. The de Groot et al. (2012) meta-analysis valued recreational services from seagrass beds at $120 per acre per year or $310 per hectare per year (updated to 2018 dollars).

Application of Monetized Values for Seagrass

Current economic valuations for seagrass ecosystems are very limited and incomplete, resulting in grossly undervalued seagrass beds (Dewsbury et al., 2016). While the values estimated are good proxies, the full value of seagrass beds is likely underestimated.

The ecosystem service values that were monetized for seagrass were based on meta-analyses. These values can be combined and applied to assess the value of seagrass along the Texas coast. The annual value per acre of seagrass is $26,300 or $64,900 per hectare. Table 9-43 displays a summary of the monetized values for seagrass. While the average values estimated are good proxies, the full value of seagrass beds is likely underestimated.

Table 9-43: Seagrass Summary

Ecosystem Service	Average Annual Value per Acre	Average Annual Value per Hectare
Erosion Control	$12,200	$30,200
Nutrient Cycling	$12,700	$31,300
Carbon Sequestration	$1,100	$2,700
Habitat	$100	$200
Biodiversity	$100	$200
Recreational	$100	$300
Total	$26,300	$64,900

Note: All values rounded to the nearest hundred.

Summary

Ecosystem services from seven types of habitats were evaluated, namely: oyster reefs, coastal wetlands, bottomland forests, mangroves, coastal prairies, beaches and dunes, and seagrass. Table 9-44 displays the range of average annual values for each habitat type, presented as the annual value per hectare per year. The average annual values vary depending on the applicability of the ecosystem services to the location. These values are average values for the Texas coast and are intended to be conservative estimates of the ecosystem services provided by each habitat type.

Table 9-44: Ecosystem Services Summary

Habitat Type	Average Annual Value per Hectare per Year
Oyster Reefs	$114,300 - $224,400
Coastal Wetlands	$37,200 - $53,800
Coastal Bottomland Forests	$28,900 - $39,700
Mangroves	$225,500 - $231,900
Coastal Prairies	$15,500
Beaches	$47,900 - $131,000
Dunes	$13,000 - $96,100
Seagrass	$64,900

Note: All values rounded to the nearest hundred.

E. Incentives for Ecological Enhancements

Planning for coastal resiliency involves establishing incentives for projects that provide ecological enhancements and implementing long-term monitoring that will track the success of those projects. Coastal resiliency includes improving the ability to withstand storms, being adaptable to sea level rise, mitigating natural erosive forces, and retaining a healthy and productive landscape in the face of other natural and man-made changes. Incorporating natural elements and ecological enhancements in project designs can serve to both enhance the environment and also improve resiliency and adaptability.

Projects that draw on the inherent ecosystem functionality are often referred to as natural infrastructure or green infrastructure (green infrastructure is generally specific to stormwater management). This natural infrastructure approach, which may involve the use of a stand-alone natural ecosystem or may consist of a hybrid solution that combines a natural system and gray infrastructure to perform a desired function, provides numerous benefits when compared to traditional gray infrastructure projects (World Business Council for Sustainable Development [WBCSD] 2017).

This section outlines ecological enhancements that can be incentivized as part of programs and projects at all scales, describes long-term monitoring of habitats to assess environmental conditions metrics for project success and inform future decisions and designs, and outlines existing long-term monitoring programs and elements that could be incorporated by the GLO for the Texas coast as part of the Texas Coastal Resiliency Master Plan.

There are two broad categories to implement behavioral change in society: traditional regulatory approaches (e.g. command and control approaches) that set standards, and economic incentive or market-based policies (US EPA, 2018a). Incentivizing ecological enhancements is a process-based approach to create incentives for project proponents and/or stakeholders to incorporate nature-based components into projects that will enhance the resiliency of that system. Incentivizing ecological project enhancements within coastal communities is important and provides many co-benefits:

- Opportunity to incorporate natural resiliency and infrastructure protection into project design,
- Support economically important fisheries,
- Provide recreation opportunities,
- Support species resilience and carbon storage, and
- Opportunity for streamlining environmental permitting of built projects by integrating restoration into project design rather than mitigating elsewhere, inherently reducing net project impacts and habitat loss.

This process of eco-incentivizing can include creating incentives for the project proponent and/or creating incentives for the stakeholders, neighboring landowners, and recreational users to adopt the ecological components of the project. Incentivizing ecological improvements strikes a balance between identifying potential risks and threats that a project could improve, and then identifying the potential rewards of that project.

Risks/Threats – e.g., hurricane, wind wave run-up, sea level rise, erosion

Rewards – e.g., protection from waves and storm surges, improved shoreline function and habitat, increased habitat connectivity, purification of contaminated water by wetlands, reduction of flooding, improved resiliency

Types of Incentives

Types of incentives vary in scale, cost, and timeline. Incentives can be internal and external. Examples of external and internal incentives are listed below and draw from the World Business Council for Sustainable Development (WBCSD, 2017), the US EPA's green infrastructure stormwater program (US EPA, 2018b), and the Water Environment Federation (Water Environment Federation, 2013).

External Incentives:

- Development incentives and permitting – which may include expedited project permitting, decreased fees, zoning upgrades and reduced stormwater requirements;
- Financing:
    - Grants – which can target community groups, municipalities and private property owners;
    - Rebates and installation financing – which may include funding, tax credits or reimbursements to property owners who install green infrastructure;
    - Stormwater fee discounts – the most common type of green infrastructure incentive for property owners to decrease stormwater burdens on the city stormwater system;
    - Policies designating funds; and
    - Public-private partnerships.
- Awards and recognition – which reward innovation and increase awareness by the public and decision-makers
- Environmental education and outreach – often associated with natural infrastructure projects.
- Industry leadership – establishing projects and their proponents as champions of natural infrastructure.

Internal Organization Incentives:

- Leadership support and project champions;
- Awareness of ecological enhancements and natural infrastructure improvements;
- Technical capacity and expertise for implementing natural infrastructure; and
- Pilot projects that demonstrate physical effectiveness and cost savings associated with natural infrastructure.

Early stakeholder outreach with the local agencies and scientific community is key to the successful development process of ecological enhancement projects. Clear communication around the importance and benefit of the ecological enhancements, particularly if it results in a new restriction (e.g., seasonal recreation access or set back), is critical to obtain community support for the approach. For example, a vegetated shoreline may provide the required erosion control while simultaneously providing additional benefits for resiliency and habitat value not afforded by alternative hardscape designs. Often stakeholders will need to be educated on these additional benefits before agreeing to an alternative, ecologically-based approach.

Natural Solutions Strategies

Ecological improvements can be implemented into existing resiliency or other infrastructure projects, or as stand-alone coastal resilience projects. They can also be policy changes that result in new requirements or new projects. Some examples include:

- Softscapes
    - Vegetated shorelines and levees
    - Dunes
    - Detention basins
    - Horizontal levees
    - Habitat islands
- Hardscapes
    - Coarse substrate (gravel, cobble, shell) beach
    - Edging or sills
    - Breakwater or groin
    - Vegetated rip-rap
    - Shell or gravel berm
- Wildlife corridors
- Ecotones/transition zones
- Sub-tidal habitat substrate augmentation (e.g., oyster bed, coral reefs)
- Bioremediation plantings
- Sediment replenishment/beach nourishment
- Alter hydrologic connectivity and sediment/nutrient transport pathways
- Buffer zones and set-backs
- Greenways
- Housing development ordinances
- Low Impact Development (LID)

- Barrier island development restrictions and setbacks
- Floodplain development restrictions and set-backs
- Converting from private wells and septic to city supplied water infrastructure
- Using natural elements (e.g., vegetation) to restrict use or redirect traffic flow
- Managing recreational use to support ecosystem health
- Reduce water used for landscaping

Implementing Natural Solutions

Natural elements can be incorporated into most projects. The extent and scale of the natural solution will depend on the objectives of the project as well as the site constraints. Factors that will influence the type and extent of the natural elements include:

- **Physical space:** horizontal or vertical surface area available
- **Infrastructure:** roadways, utilities, housing complexes that require maintenance and protection
- **Forces:** typical wave and wind direction and strength, frequency and strength of storm events
- **Public access:** users of the area and existing recreational infrastructure
- **Land use:** other uses in the area, including agriculture
- **Easements and ownership:** legal agreements that may restrict property use or actions
- **Habitat and environment:** solutions should be ecologically appropriate for the environment and integrate into the surrounding landscape
- **Policy:** existing and proposed policy and ordinances, including master and general plans, that may affect the type of projects that are implemented
- **Public involvement:** level of public participation in the planning, design, and permitting phases
- **Environmental regulation and permitting:** permitting approach and feasibility, including consideration of construction impacts and mitigation requirements

Opportunities

Incorporating restoration into the project design can create opportunity for streamlining the environmental permitting process, investing at the project site rather than mitigating elsewhere, awareness raising and capacity building within regulatory agencies, and supporting policies that facilitate the process (WBCSD 2017). Findings from the WBCSD show that the most common incentives influencing the implementation and permitting of natural infrastructure projects are the potential up-front cost savings where compared to gray infrastructure, the co-benefits provided to local communities, and alignment with policy frameworks (WBCSD 2017). Note that costs in the long term can be competitive with gray infrastructure when including construction, operational, maintenance and monitoring costs but the benefits are generally greater (WBCSD 2017). Identifying the benefits to ecological incentives can take more resources and stakeholder outreach up front, but ultimately generally result in more rewarding and beneficial projects.

Barriers

According to the WBCSD, the most common barriers to ecological enhancement and natural infrastructure projects are permitting and financing (WBCSD 2017).

Barriers to permitting are related to technical project feasibility, the need for technical guidance, the complexity of permitting, and too few policy incentives (WBCSD 2017).

Barriers to financing include the ability to demonstrate the technical feasibility compared to more traditional gray infrastructure approaches, the need to quantify risk-adjusted returns, the lack of coordination across projects, and the limited use/ development of insurance products that provide implementation incentives (WBCSD 2017).

Policy

Policies are in place in the United States that support natural infrastructure projects, including Executive Orders at the Federal level, the U.S. Environmental Protection Agency (EPA) Green Infrastructure Strategic Agenda (U.S. EPA 2013), as well as at the regional, state, and local levels (WBCSD 2017). In 2015, the Obama Administration introduced an Executive Order directing all Federal agencies to factor the value of natural infrastructure and ecosystem services into Federal planning and decision making, which requires that Federal agencies integrate considerations into their plans and budgets (Zaidi A., et al. 2015).

Gulf Coast Ecosystem Restoration Council

In July 2012, the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) established the Gulf Coast Ecosystem Restoration Council (RESTORE Council), which includes the governors of the States of Alabama, Florida, Louisiana, Mississippi and Texas, the Secretaries of the U.S. Departments of Agriculture, the Army, Commerce, Homeland Security, the Interior and the Administrator of the U.S. Environmental Protection Agency (GCERA 2018). In August 2015, the RESTORE Council released for public comment a draft list of projects that will invest in restoring natural barriers to future storms and other resources critical to the health and safety of local communities and their economies, using funds from the settlement with Transocean Deepwater Inc. (Zaidi A., et al. 2015). In January 2018, the RESTORE council voted to approve the 2017 Funded Priority List: Comprehensive Plan Commitment and Planning Support, providing funding to members to enhance collaboration, coordination, pubic engagement, and use of best available science needed to make efficient use of Gulf restoration funds resulting from the Deepwater Horizon oil spill (GCERA 2018).

F. Sediment Management

Beach nourishment opportunities along the Texas Gulf shoreline are limited due to a lack of sufficient sand, both in sediment composition and quantity. The reasons for this deficit are many, and include a lack of sediment influx from a macro-hydrologic standpoint (i.e., deprivation of sediments that naturally inflow from the main Texas rivers to the Gulf); circulation patterns in the Gulf of Mexico that transport sand toward the Central and East Texas coasts; and the underlying geologic structure and lithology of the coast which form an inner continental shelf dominated by mud, rather than fine-grained sandy sediment deposits (Anderson, 2002).

The GLO is coordinating in the development of a Sediment Management Plan to quantify potential borrow sites and document best practices to help maximize this overstressed resource. A synopsis of current Gulf shore sediment conditions follows.

I. Region 1

Sabine River banks and their continuations to the west and the south, offshore of East Texas, are dominant features of Region 1. The number and composition of existing core samples across this region are highly variable. Additional sampling with geophysics along these banks may be required at closer spacing (e.g., 1000-foot line) to determine a more accurate thickness. Based on available data, it appears that existing sand is fairly clean, except when sediments are disturbed during storm events. As such, sampling (both pre- and post-storm) would be useful. In addition, detailed multi-beam bathymetry surveys to monitor sand movement should be conducted, with sand ridge areas surveyed before and after storms.

Core data from buried channels offshore of Galveston indicate that there may be sand in lower parts of the channels, buried under many feet of silt and clay. Dredging to remove the sand would likely be extremely expensive and subject to environmental impacts and associated mitigation requirements. Efforts to access the underlying sand are unlikely to be economically viable unless a cost-effective alternative use can be identified for the top layers of material that would be misplaced. Regular dredging activities are anticipated for the Galveston and Houston Ship channels, as well as the Freeport navigation channel, providing potential beneficial use opportunities for the dredged material.

There have been some successes in recent years where new cores and geophysics have led to the discovery of previously unidentified, limited-bury channels. As such, there may be useful buried sand resources in smaller channels that have not yet been found.

II. Region 2

Sediment source investigations are needed for the Guadalupe, Lavaca, and San Antonio River deltas, all of which were previously connected to the Colorado River. While there may be major submerged delta deposits and spits with high quality sands in these areas, particularly related to the formation of the barrier islands, specific accessible areas have not been identified. Regular dredging activities are anticipated for the Matagorda Ship Channel shoals, which can potentially provide some sand for nourishment projects.

III. Region 3

Central Texas has a large mud blanket up to 55 yards thick with no known offshore ridges. The inner continental shelf has a different (and apparently steeper) slope in this area which has not allowed sand ridges to form during the last sea level rise cycle, or approximately 17,000 years ago. As a result, additional work in this area to identify new sediment sources is not likely to be productive.

IV. Region 4

While South Texas may have some sand fluvial deposition resources, particularly in connection with the Rio Grande, additional research is needed. Many of the sandy sediment depositions near North Padre Islands are likely shoreface deposits, which could limit the depth and resulting available sediment volumes of these areas. The Brownsville navigation channel, however, requires regular maintenance dredging which has been beneficially used in recent years to renourish beaches on South Padre Island. Due to the large amounts of sand consistently needed to renourish beaches in this area, a further geophysical investigation is advisable.

V. Bay Sediment Sources

In general, bay sediment sources correspond to infills from fluvial sedimentation environments at bay head deltas, with occasional sandy landforms arising from the formation of Texas's barrier island chains. Sandy sediment, therefore, is most readily available in Texas bay systems at the river deltas and near existing and historical barrier islands. For each bay system, there are varying levels of overburden sediments covering these sandy deposits, based on natural circulation processes, storms, and manmade disturbances. The most accessible sand sources tend to be byproducts of dredging cycles for the maintenance of manmade navigation channels. As a general rule, further geophysical and geotechnical surveys are needed to investigate additional potential sediment sources. Clay sediment sources, which can be used for some nature-based construction projects, will be further defined in the previously mentioned Sediment Management Plan, as they primarily relate to existing placement areas and ongoing dredging activities, and require more multi-agency coordination.

G. Hurricane Harvey Assessments

This section provides a summary of coastal damages caused by Hurricane Harvey in September 2017. Imagery was studied from the Texas Civil Air Patrol MOVES Oblique Photography webpage and compared for the various regions for before and after the occurrence of Harvey. Additional imagery came from USGS Pre- and Post-Storm Photo Comparisons. Notable effects and damages for each region were visually captured and described. It is important to note that the images in this section are only of areas with visible damages post Harvey. For some regions, however, no imagery was available post Harvey. It is possible that more damages exist than those documented below.

All aerial imagery was from the Texas Civil Air Patrol MOVES Oblique Photography website. Pre-Harvey imagery was from the Tx Statewide Imagery layer. Post Harvey imagery was visible in the following four layers: NOAA DMC 09-02, NOAA DMC 09-01, NOAA DMC 08-31, NOAA DMC 08-30.

Imagery was not available for Region 4, as that area did not experience any significant damages resulting from Hurricane Harvey.

Figure 9-9, below, shows locations with coastal change that occurred as a result of Hurricane Harvey.

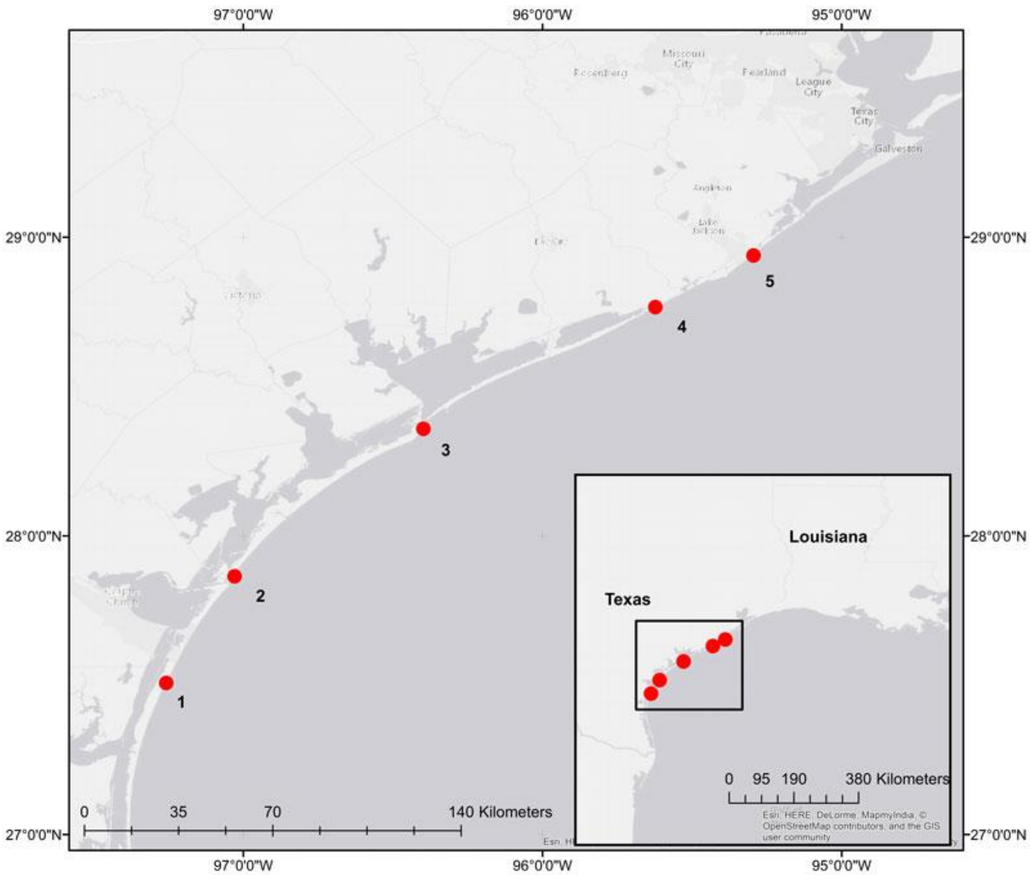


Figure 9-9: Locations of observed coastal change due to Hurricane Harvey[4]

I. REGION 1

Port Arthur/Bridge City/Orange - Moderate inundation

The Port Arthur ship channel shows minimal changes after the storm, with the exception of a few small islands throughout the area. Large areas of wetlands also appear to have been inundated or partially inundated post-Harvey. See Figure 9-10 through Figure 9-15 for further details.

[4] Image obtained from U.S. Geological Survey "Pre- and Post-Storm Photo Comparisons – Texas" (USGS, 2017)

The Sabine Neches Canal appears to be mostly unaffected. The small island circled in red north of the ship channel may have had minor impacts.

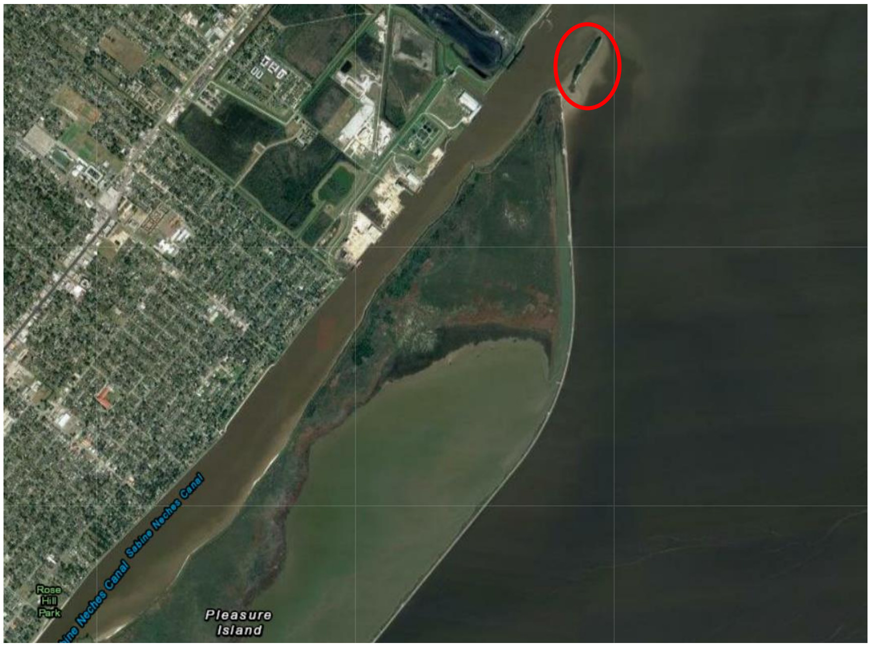


Figure 9-10: Sabine Neches Canal Pre-Harvey

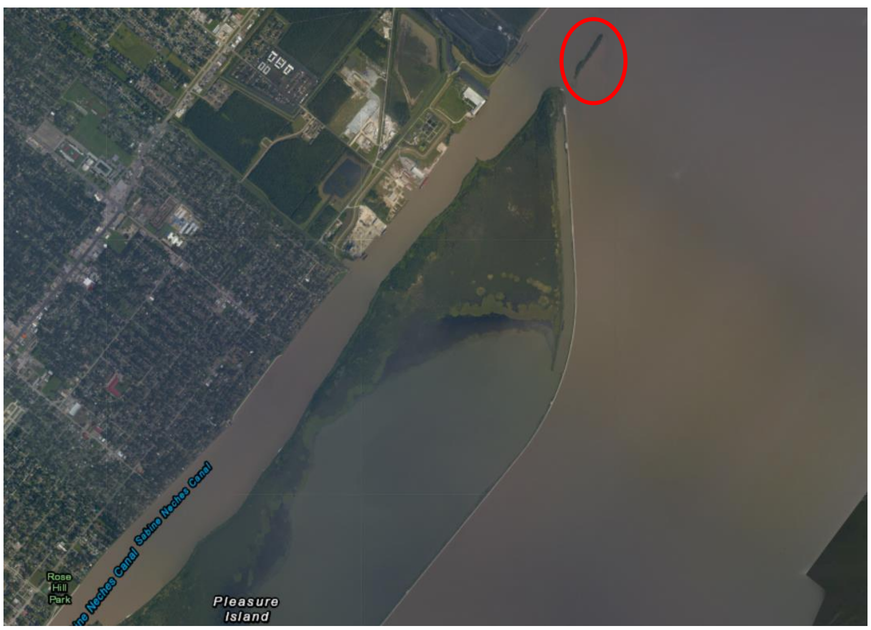


Figure 9-11: Sabine Neches Canal Post-Harvey

Imagery suggests near total inundation for two of the Northern Islands. The third island (visible to the left in both photographs) appears mostly unaffected post Harvey. The wetlands along the coastline directly north of the two northeastern-most islands also appear to be significantly inundated.

Figure 9-12: Northern Islands in Sabine Lake Pre-Harvey

Figure 9-13: Northern Islands in Sabine Lake Post-Harvey

The island circled in red appears to have been partially inundated, along with large portions of wetlands in Orange County north of the Neches River.

Figure 9-14: Bird Island and Wetlands North of Neches River Pre-Harvey

Figure 9-15: Bird Island and Wetlands North of Neches River Post-Harvey

Texas Point National Wildlife Refuge - No imagery available

McFaddin National Wildlife Refuge - No imagery available

Bolivar Peninsula - Limited imagery; appears to have no long-term impacts observed

Galveston Island East - Moderate erosion
The Galveston Island East aerials show moderate changes after the storm, with the emphasis on beachside erosion issues. Large areas of coastal beach appear to have been washed out and eroded post-Harvey. See Figure 9-16 through Figure 9-17 for further details.

Imagery suggests moderate erosion along the length of Galveston East beach. Some areas appear more affected than others.

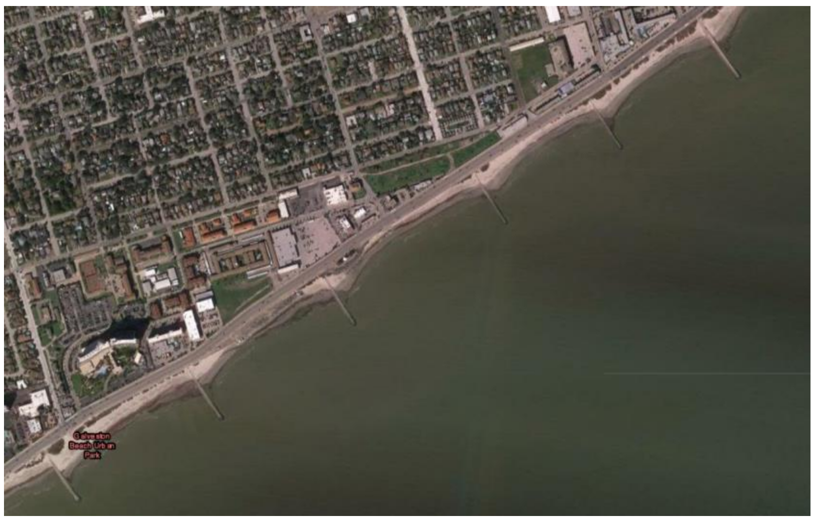


Figure 9-16: Galveston East Beach Aerial Pre-Harvey

Figure 9-17: Galveston East Beach Aerial Post-Harvey

Galveston Island West - Heavy erosion and moderate inundation
The Galveston Island West aerials show heavy changes after the storm, with emphasis on beachside erosion issues. Large areas of coastal beach appear to have been washed out and eroded post-Harvey. Additionally, parts of the island appear to have been partially inundated by the storm. See Figure 9-18 through Figure 9-27 for further details.

Imagery suggests heavy erosion along the length of Galveston West beach. In this particular area, it appears that several lakes near the shoreline are now directly connected to the ocean due to beach erosion issues.

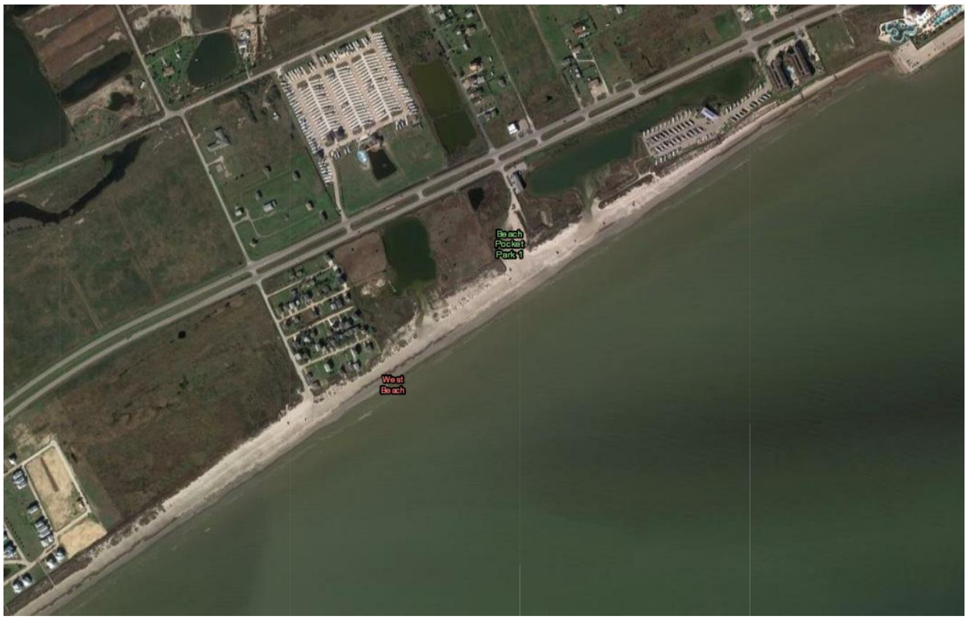


Figure 9-18: Galveston West Beach Aerial Pre-Harvey

Figure 9-19: Galveston West Beach Aerial Post-Harvey

Portions of low-lying coastal land in the Galveston West Coves (Dalehite and Dana Coves) appear to have been partially inundated in several spots; leading to little or no "buffer" between residential homes and the ocean.

Figure 9-20: Galveston West Coves Pre-Harvey

Figure 9-21: Galveston West Coves Post-Harvey

Partial inundation of land along the Jumbile Cove is apparent post Harvey. Jamaica Beach also may have slight to moderate beach erosion in areas.

Figure 9-22: Jumbile Cove and Jamaica Beach Pre-Harvey

Figure 9-23: Jumbile Cove and Jamaica Beach Post-Harvey

Partial land inundation is visible on the north side of the Island, and moderate beach erosion apparent on the south side of the Island.

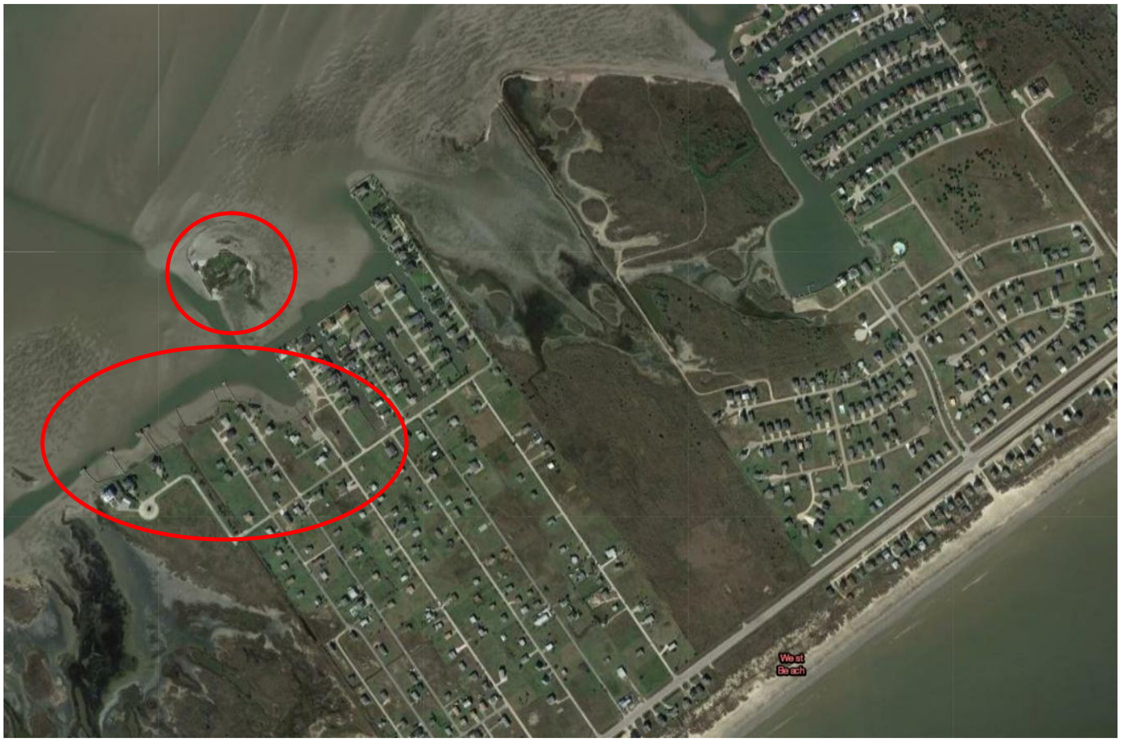


Figure 9-24: Galveston West Beach and Cove Pre-Harvey

Figure 9-25: Galveston West Beach and Cove Post-Harvey

Again, heavy beach erosion is visible on the south and western tips of the island, and partial inundation is apparent to the north.

Figure 9-26: Western-Most Tip of Galveston West Pre-Harvey

Figure 9-27: Western-Most Tip of Galveston West Post-Harvey

Follet's Island - Moderate erosion and moderate inundation
The Follet's Island aerials show moderate changes after the storm, with the emphasis on beachside erosion issues. Large areas of coastal beach appear to have been washed out and eroded post-Harvey. See Figure 9-28 through Figure 9-29 for further details.

Partial inundation is apparent on the west coast of Follet's Island. In addition, beach erosion is visible to the north and the eastern tip of the island.

Figure 9-28: Follet's Island Pre-Harvey

Figure 9-29: Follet's Island Post-Harvey

Galveston Bay (Back Bays) - Moderate erosion and heavy inundation

The Galveston Bay aerials show moderate changes after the storm, with the emphasis on inundation issues. Most of the inundation occurs along beaches and wetland areas. Erosion is also visible along other beaches in the bay. See Figure 9-30 through Figure 9-37 for further details.

Note that imagery was not available for some portions of the Galveston Bay; including Bacliff, Kemah, Clear Lake, Seabrook, and most of the eastern side of the bay including Double Bayou and Smith Point.

Beachside inundation is visible on the western side of Galveston Bay near the Bayport Channel entrance.

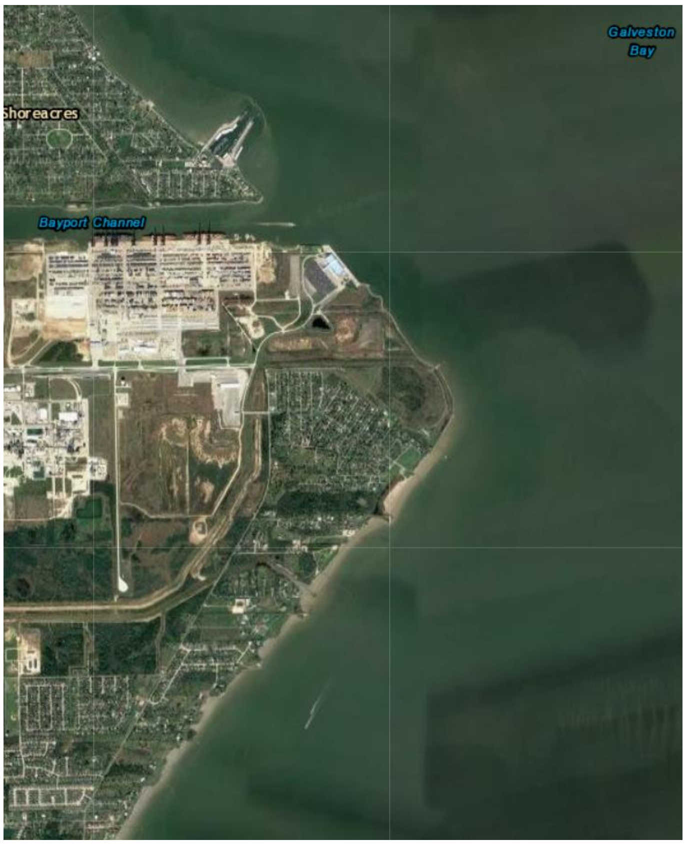


Figure 9-30: Bayport Beach and Channel Pre-Harvey

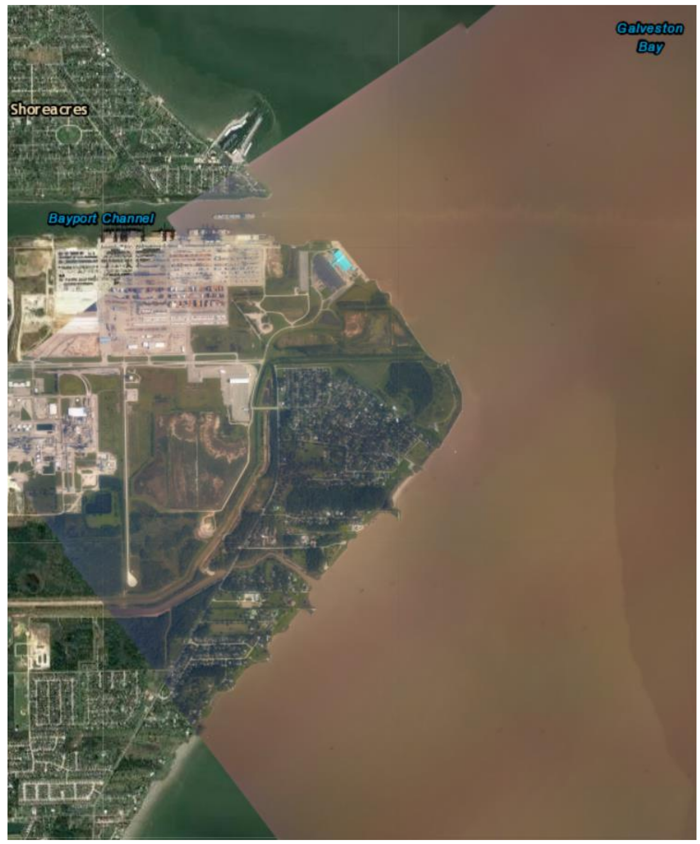


Figure 9-31: Bayport Beach and Channel Post-Harvey

Partial inundation is apparent along Atkinson Island and the Houston Ship Channel in the northwestern region of Galveston Bay.

Figure 9-32: Houston Ship Channel Entrance and Atkinson Island Pre-Harvey

Figure 9-33: Houston Ship Channel Entrance and Atkinson Island Post-Harvey

Partial inundation is apparent along Atkinson Island and near Ash Lake and Beach City in the northwestern region of Galveston Bay.

Figure 9-34: Atkinson Island and North East Galveston Bay Pre-Harvey

Figure 9-35: Atkinson Island and North East Galveston Bay Post-Harvey

Partial inundation is apparent along Alligator Bayou and wetlands in Anahuac in the northern region of Trinity Bay.

Figure 9-36: Alligator Bayou and Anahuac Pre-Harvey

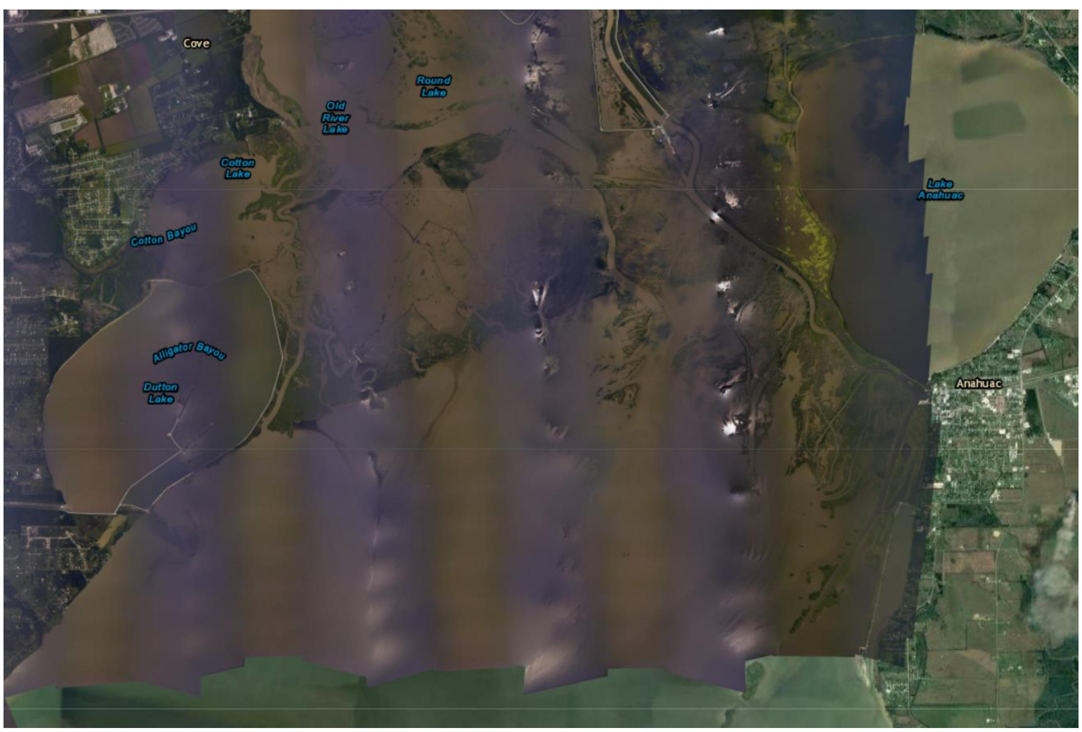


Figure 9-37: Alligator Bayou and Anahuac Pre-Harvey

II. Region 2

Surfside/Quintana/Freeport - Limited imagery; Beach erosion at Surfside

The Surfside comparison photos from USGS show beach erosion in Surfside after Hurricane Harvey. See Figure 9-38 for further details.

Erosion of the beach in front of this developed area in Surfside, Texas, occurred as a result of elevated water levels during the storm. The vegetated dune at the bottom of the image was overwashed with sand being moved between and behind the oceanfront homes.

Figure 9-38: Surfside Beach Pre- and Post-Harvey

Brazos River - Limited imagery

San Bernard National Wildlife Refuge - High inundation

The San Bernard NWR aerials show high levels of inundation visible in several locations after the storm. See Figure 9-39 through Figure 9-44 for further details.

Significant inundation is visible in areas immediately adjacent to Cedar Lake and the San Bernard River.

Figure 9-39: Cedar Lake and Surrounding San Bernard NWR Pre-Harvey

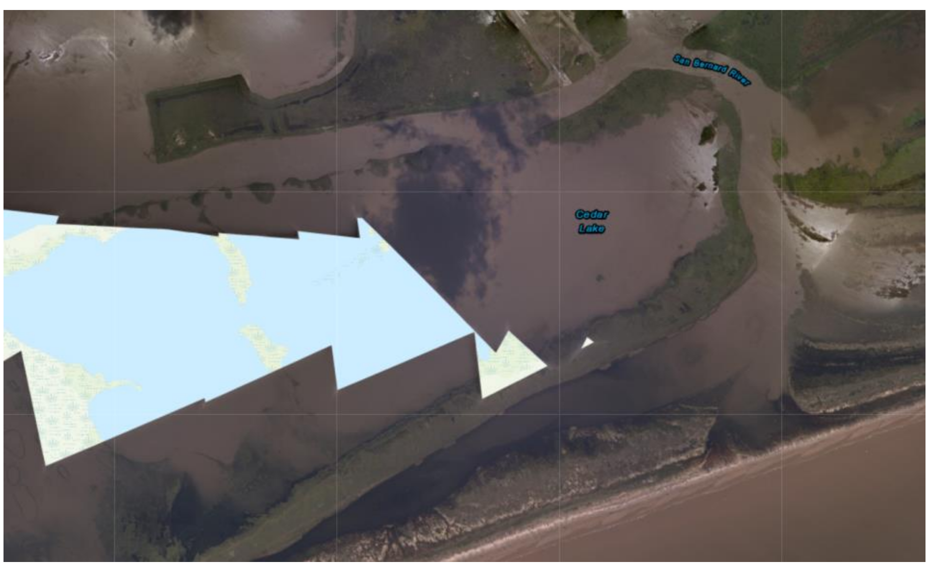


Figure 9-40: Cedar Lake and Surrounding San Bernard NWR Post-Harvey

Moderate inundation is apparent in the areas near Jones Lake and San Bernard NWR.

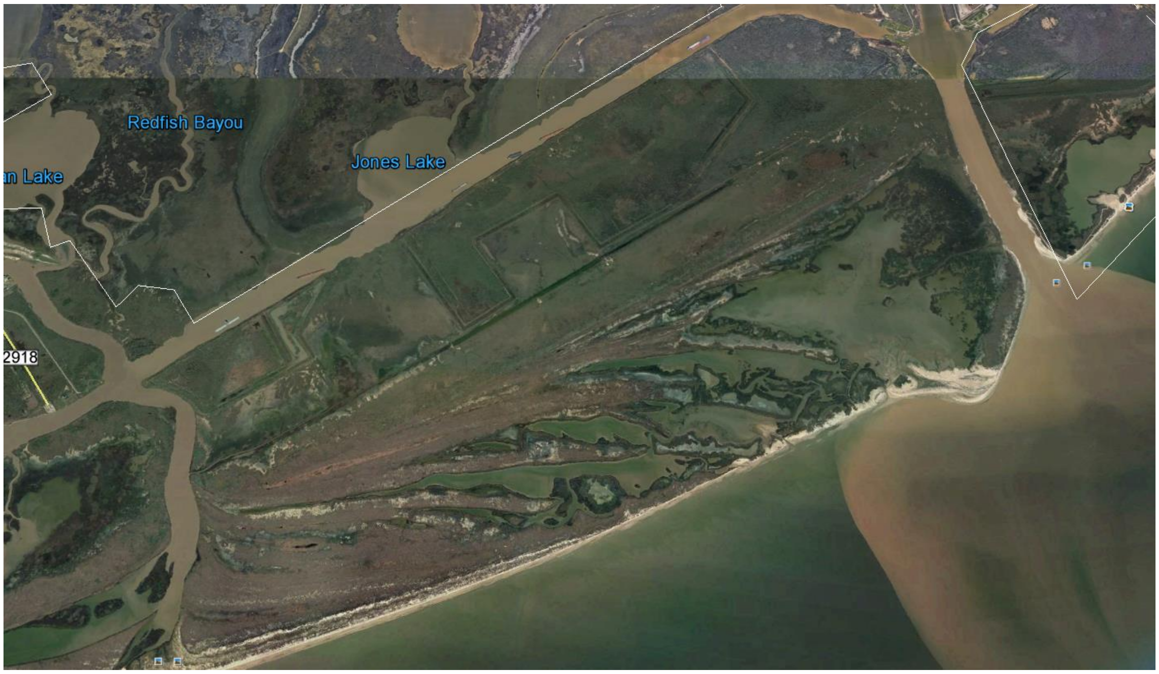


Figure 9-41: Jones Lake and Northern Portion of San Bernard NWR Pre-Harvey

Figure 9-42: Jones Lake and Northern Portion of San Bernard NWR Post-Harvey

Significant inundation is visible to the North of the San Bernard NWR along the San Bernard River and Pelican Lake.

Figure 9-43: North of San Bernard NWR Pre-Harvey

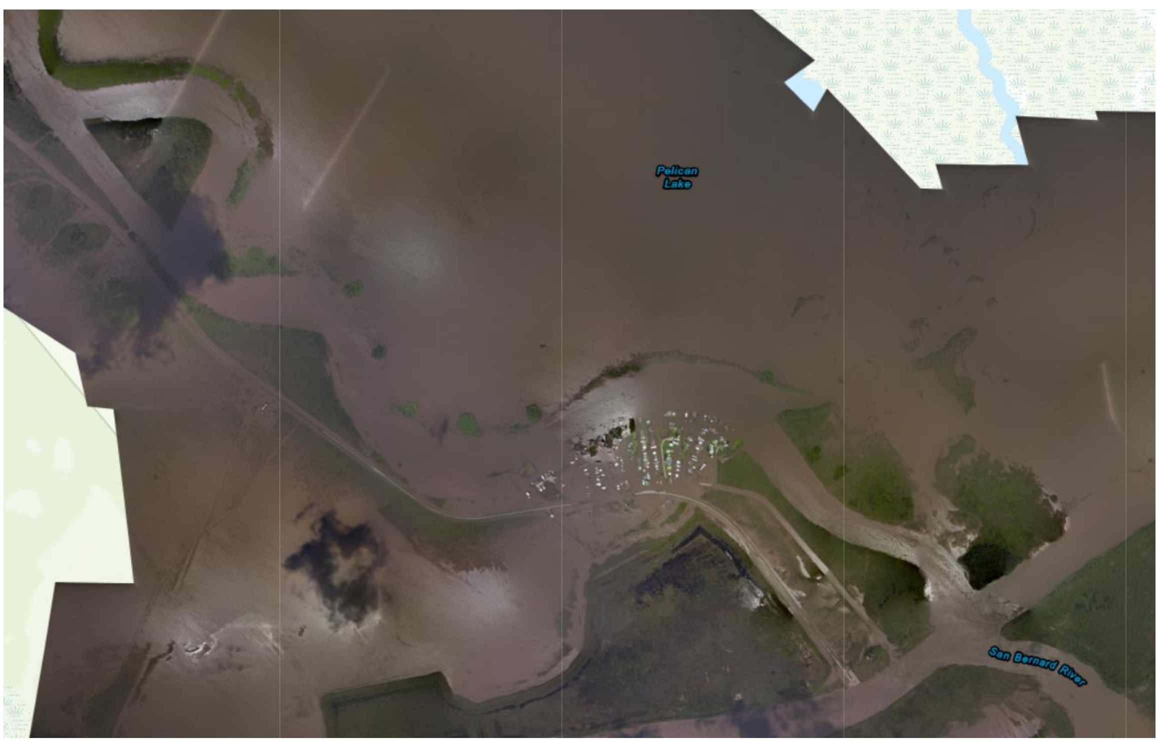


Figure 9-44: North of San Bernard NWR Post-Harvey

Sargent - High erosion

The Sargent Beach shows high erosion after the storm along the length of the area's shoreline. Large areas of coastal beach appear to have been washed out and eroded post-Harvey. Some spots also show sediment and debris washed up post-Harvey. See Figure 9-45 through Figure 9-53 for further details.

Sediment and debris appear to have blocked portions of the roadway on Highway 457 parallel to the shoreline.

Figure 9-45: Sargent Joe Parks Jr. Memorial Highway (457) Pre-Harvey

Figure 9-46: Sargent Joe Parks Jr. Memorial Highway (457) Post-Harvey

Imagery suggests severe erosion along the Sargent Beach shoreline in several areas. Some areas appear more affected than others

Figure 9-47: Shoreline near Intersection of Highway 457 and Canal Drive Pre-Harvey

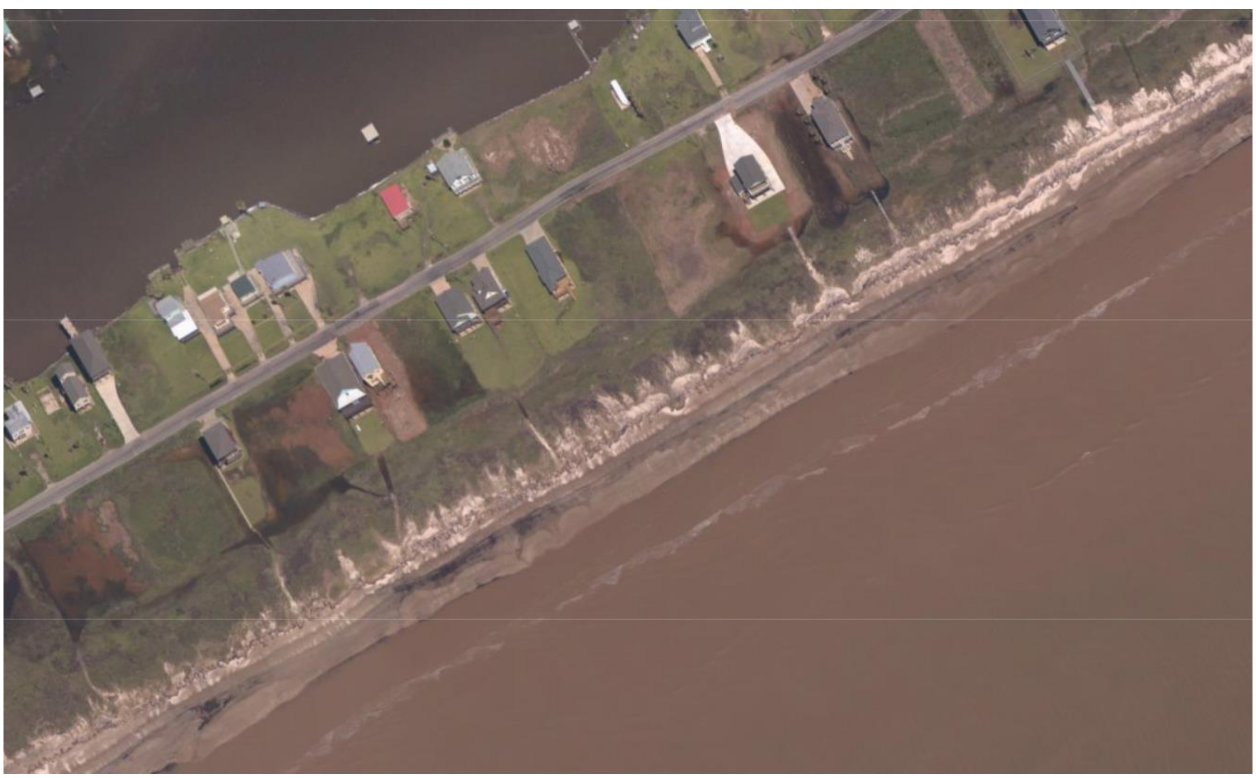


Figure 9-48: Shoreline near Intersection of Highway 457 and Canal Drive Post-Harvey

Shoreline appears to have severe erosion along length of Sargent beach running parallel to Canal Drive.

Figure 9-49: Central Sargent Shoreline along Canal Drive Pre Harvey

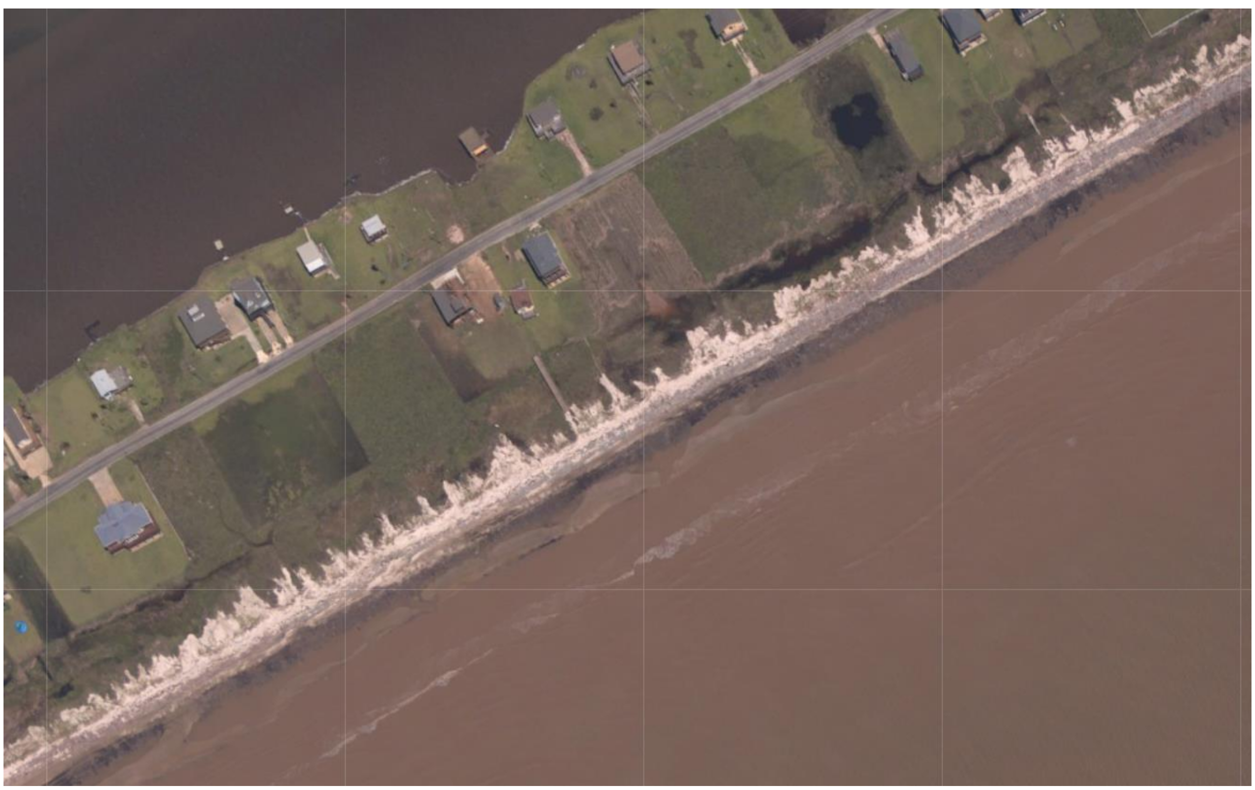


Figure 9-50: Central Sargent Shoreline along Canal Drive Post-Harvey

Continuation of severe shoreline erosion in Sargent Beach is evident in the Northern portion of the area.

Figure 9-51: North Sargent Shoreline along Canal Drive Pre-Harvey

Figure 9-52: North Sargent Shoreline along Canal Drive Post-Harvey

Sand dunes along this stretch of coast in Sargent were overwashed by large waves during the storm. Sand from the beach and dunes is covering the roadway behind the dunes, which may be impassable.

Figure 9-53: Sargent Dunes Pre-and Post-Harvey

East Matagorda Bay - No imagery available

Matagorda Peninsula - Minor erosion

Imagery shows little to no damage along the coastline of the Matagorda Peninsula. One spot on the north end of the peninsula shows the potential of having had some minor erosion occurring from Harvey, however no other storm related damage was observed in the area. See Figure 9-54 through Figure 9-55 for further details.

The appearance of minor erosion is visible along the coastline of the Northern section of Matagorda Peninsula.

Figure 9-54: Northern Coast of Matagorda Peninsula Pre-Harvey

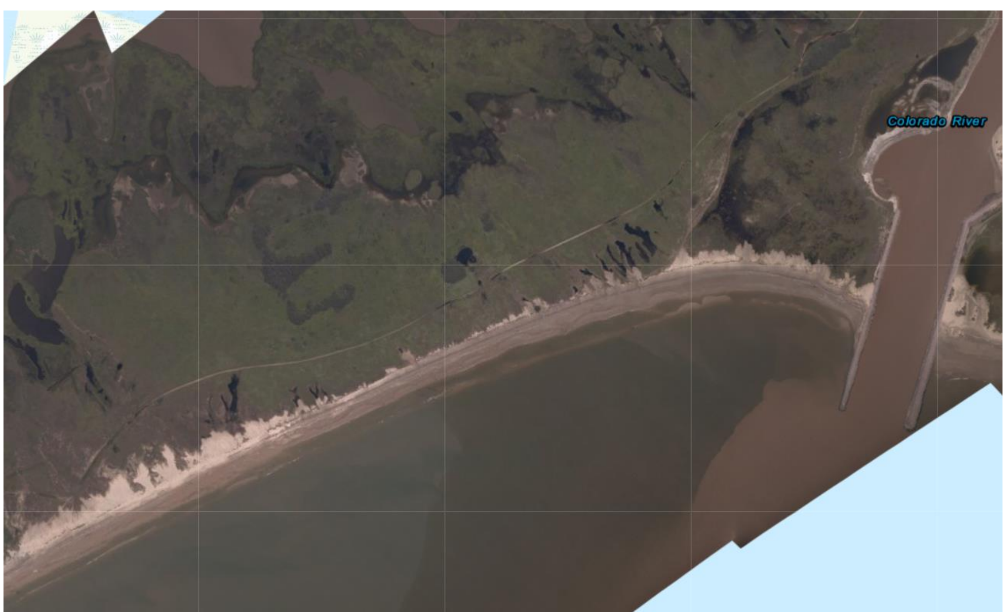


Figure 9-55: Northern Coast of Matagorda Peninsula Post-Harvey

Port O'Connor/Indianola/Port Lavaca - No imagery available

Matagorda Island - Moderate inundation and erosion

Overall, this area appears to have moderate inundation and erosion resulting from Harvey. Imagery shows moderate damage along the coastline of the Matagorda Island including erosion, inundation, and dune blowouts. See Figure 9-56 through Figure 9-62 for further details.

Large portions of the southern Matagorda Island coastline appear to have severe erosion in several different locations.

Figure 9-56: South Matagorda Island Coastline Pre-Harvey

Figure 9-57: South Matagorda Island Coastline Post-Harvey

Imagery suggests partial inundation on the southern tip of Pelican Island.

Figure 9-58: Pelican Island Pre-Harvey

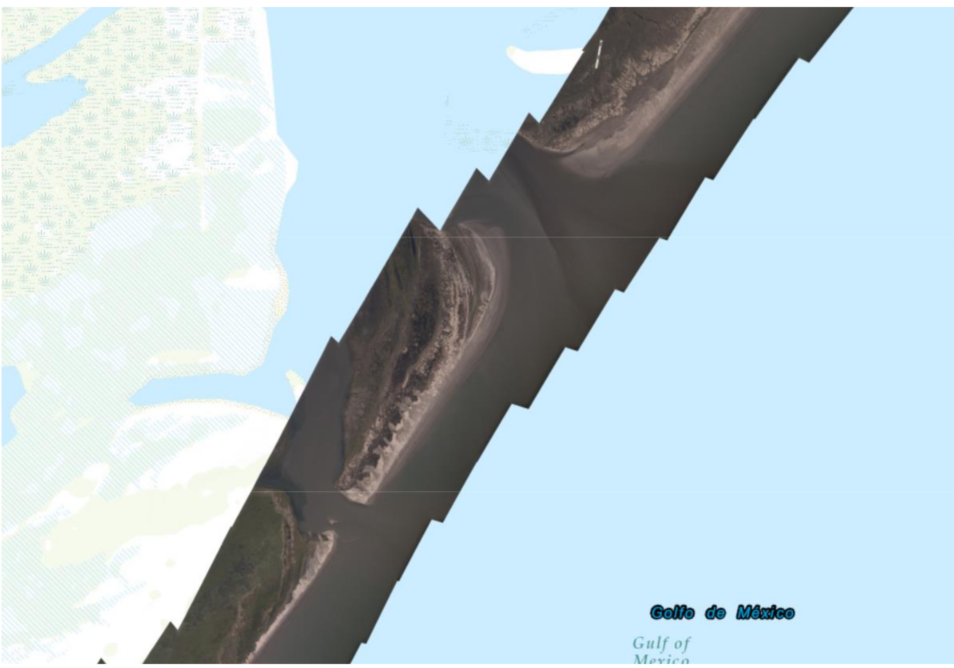


Figure 9-59: Pelican Island Post-Harvey

A potential dune blowout is visible on the coast in the northern part of Matagorda Island.

Figure 9-60: North Matagorda Island Coastline Pre-Harvey

Figure 9-61: North Matagorda Island Coastline Post-Harvey

At the north end of Matagorda Island, storm waves and surge inundated a low-lying section of the coastline causing a 340-meter wide breach.

Figure 9-62: North Matagorda Island Pre- and Post-Harvey

III. Region 3

San Jose Island - Limited imagery; Moderate gulf shoreline erosion and significant erosion of dunes due to direct impact of Hurricane Harvey

Imagery for San Jose Island was only available for the gulf facing shoreline Post Harvey. The imagery shows moderate erosion resulting after the storm. See Figure 9-63 through Figure 9-65 for further details.

The imagery for Cedar Bayou on the northern tip of San Jose Island indicates high erosion resulting from Harvey.

Figure 9-63: Cedar Bayou North of San Jose Island Pre-Harvey

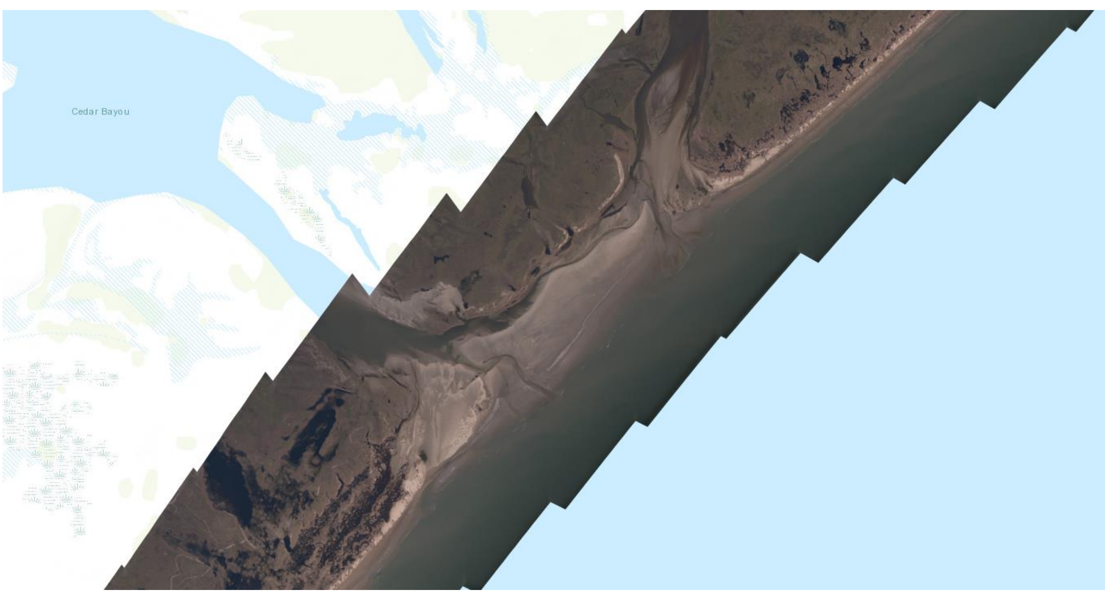


Figure 9-64: Cedar Bayou North of San Jose Island Post-Harvey

Multiple dune breaches were cut through the south end of South Jose Island, just north of Aransas Pass.

Figure 9-65: South Jose Island Pre- and Post-Harvey

Fulton/Rockport/Copano Bay - No imagery available

Port Aransas - Limited imagery; Heavy gulf shoreline erosion
Port Aransas shows high erosion levels after the storm along the entire length of the gulf facing shoreline. In addition, there were several locations indicating the possibility of dune blow outs. See Figure 9-66 through Figure 9-71 for further details.

Shoreline erosion is visible near the Nueces County Park just South of Turtle Cove.

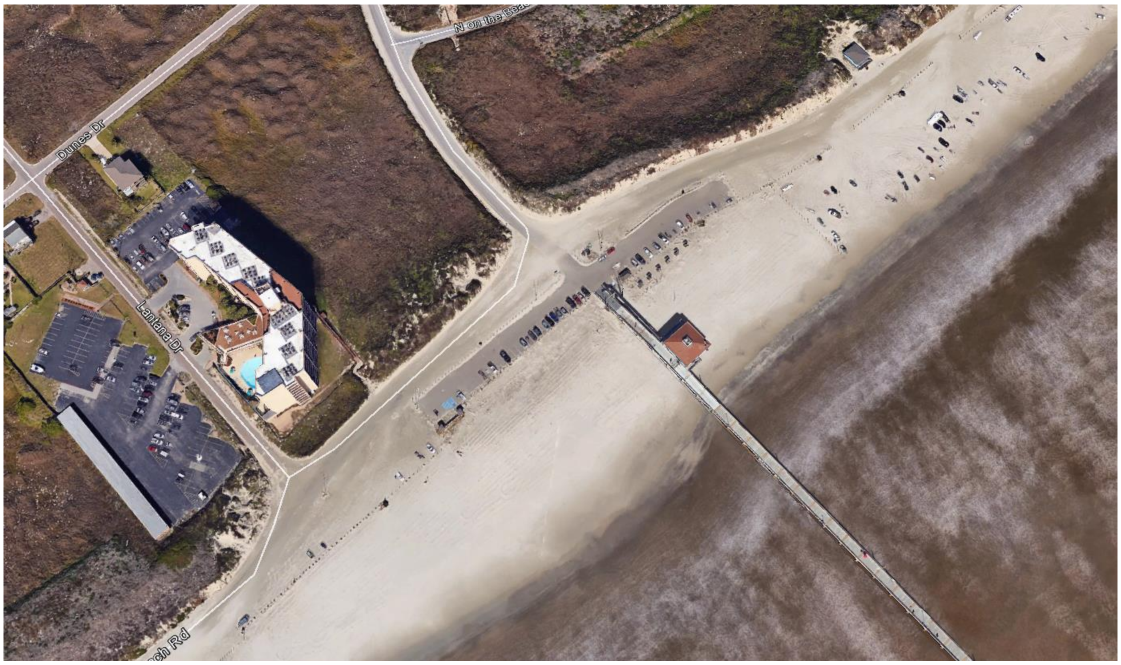


Figure 9-66: Nueces County Park Shoreline Pre-Harvey

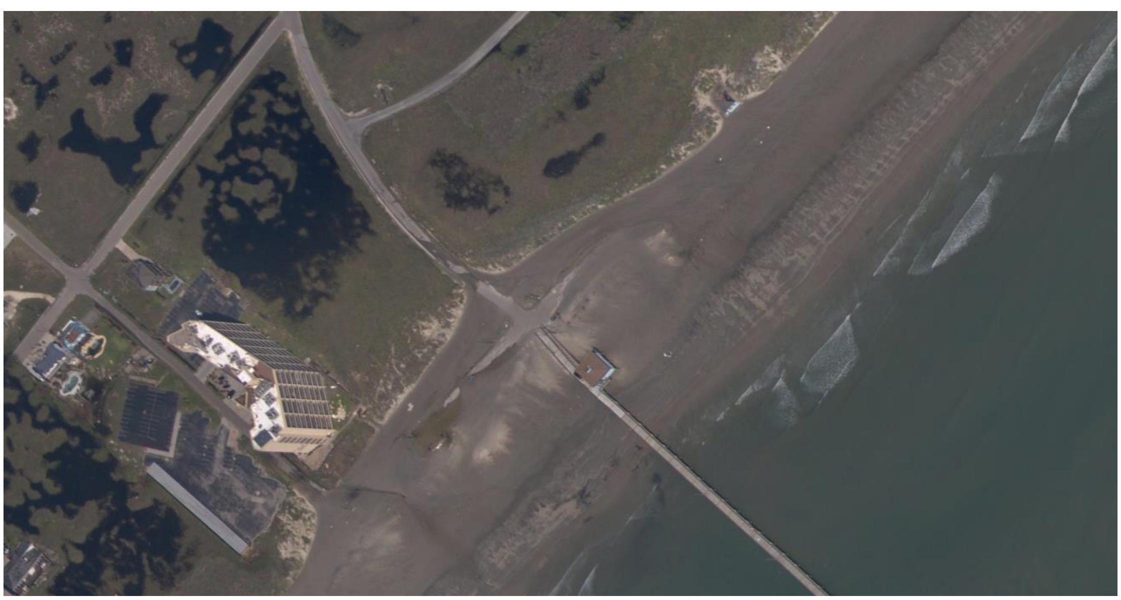


Figure 9-67: Nueces County Park Shoreline Post-Harvey

Dune blowouts and erosion are visible in the Turtle Cove area of Port Aransas.

Figure 9-68: Turtle Cove Pre-Harvey

Figure 9-69: Turtle Cove Post-Harvey

Dune blow outs and erosion are visible near Lydia Ann Island on the gulf facing shoreline Post-Harvey.

Figure 9-70: Lydia Ann Island Pre-Harvey

Figure 9-71: Lydia Ann Island Post-Harvey

Corpus Christi - No imagery available

Flour Buff - No imagery available

Mustang Island – Dune erosion
Mustang Island imagery shows dune erosion as a result of Hurricane Harvey. See Figure 9-72 for further details.

Elevated water levels during Hurricane Harvey reached the base but did not overtop the ~5m high dunes in Mustang Island, leading to dune erosion.

Figure 9-72: Mustang Island Dunes Pre- and Post-Harvey

Padre Island North of Baffin Bay - No imagery available

Baffin Bay - No imagery available

IV. Region 4
No significant storm impacts from Hurricane Harvey.

H. Long-Term Environmental Monitoring Programs
Long-term environmental monitoring programs are important in order to assess the health of the ecosystem and the long-term success of environmental projects. Scientists readily agree on the importance of long-term monitoring (Dodds et al. 2012, Lohner and Dixon 2013, Stow et al. 1998). There is

also great concern over both the lack of support (funding, time) for collecting long-term data and lack of forethought put into developing effective monitoring programs (Lindenmayer and Likens 2010, Hughes et al. 2017). This section provides a cursory overview of some existing long-term monitoring program models and provides some insight on what a potential program could look like for the Texas coast.

Monitoring can be done on a project or site-specific scale, where data collected is aimed at answering specific questions around the effectiveness of an action or the need for an action. Alternatively, monitoring can be conducted at a larger, regional scale across numerous sites to answer questions around regional trends. Project-specific monitoring is frequently required by project permits and may be short-term (1-10 years); long-term monitoring of restoration sites, because it is often not required, is frequently not conducted. However, having a long-term data set (>10 years), is particularly important for assessing trends, such as impacts to the changing climate and environmental conditions that have a long-time horizon.

Establishing a regional long-term monitoring program would help the GLO:

- Better understand the health and condition of their lands,
- Assess resiliency of lands to change, and
- Implement pro-active actions that could be done to improve resiliency and reduce the need for more costly reactive actions later.

If established in partnership with on-going programs, the GLO could leverage data collected by others and could share in the responsibilities and costs associated with analyzing and maintaining the data. The diagram to the right shows conceptually how long-term monitoring can inform intervention and management actions. Monitoring allows managers to identify trends and changes, research and evaluate those changes, and provide intervention and management if needed.

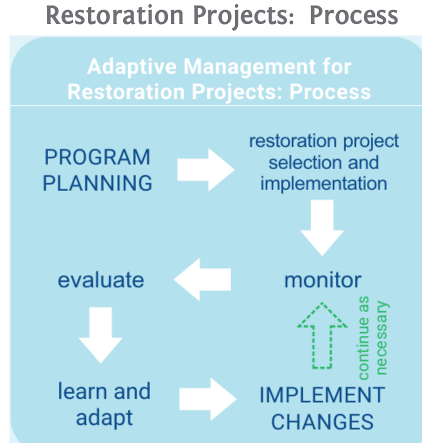
I. Priorities, Goals and Objectives of a GLO Monitoring Program

Priorities

A successful monitoring program typically incorporates the following priority steps:

- **Establish the program goals and objectives**, including scale and time-frame;
- **Identify key stakeholders** and the authority or partnership that will be overseeing the program;
- **Establish a plan with a scientific approach** where specific, measurable, and repeatable metrics for data that will be monitored and a framework for how those data will be entered and shared; and
- **Implement an Adaptive Management framework** to create a feedback loop into program design, that integrates dynamism and the ability to modify the process as the program progresses and more information about the natural and project systems are learned.
    - Adaptive management begins in the planning stages and continues over the life of a project; hallmarks include:

Adaptive Management for Restoration Projects: Process



From Ocean Conservancy 2018

ecosystem monitoring, science-based decision-making and stakeholder engagement (Ocean Conservancy 2018).
    - Potential benefits include reduced long-term cost, decreased failure risk, public trust, and improved restoration outcomes, among others (Ocean Conservancy 2018).

Goals and Objectives

The first step in developing a long-term monitoring program for the GLO is to establish program goals and identify objectives that can be implemented to reach those goals. The goal(s) of the program will be based on the questions that the monitoring program aims to address as well as the scale, time-frame, and available resources anticipated. Some possible objectives of a Texas coastal monitoring program could be to:

- Assess the overall health or conditions of coastal resources;
- Establish rapid and repeatable methods that can be implemented over time;
- Collect data that allows comparison across years;
- Provide a program that is consistent with other regional and federal programs;
- Help identify problem areas that may require further monitoring or actions before they cause significant damage or become costly to repair;
- Cover a wide variety of biological and physical parameters (i.e., 'vital signs');
- Adapt to changing climatic and environmental conditions;
- Document the drivers (natural and anthropogenic) of change and their effects on the Texas coast;
- Monitor the effects of natural or anthropogenic disturbances;
- Reduce uncertainty around changing conditions;
- Evaluate the performance of coastal protection or restoration programs to support decision making;
- Support planning, engineering and design activities; or
- Provide data that can help managers to better understand the ecosystem and provide management solutions.

II. Example Regional Programs as Models

The Gulf Coast Region has several established (or establishing) long-term monitoring programs that could be used as models, or as partners, for the collection and analysis of data. Some examples are briefly described below.

National Park Service Vital Signs Monitoring Program

The National Park Service (NPS) Vital Signs Program is a well-established program implemented throughout various regions of the United States. Texas falls within the Gulf Coast Network (GCN) region and contains four parks: Big Thicket National Preserve, San Antonio Missions National Historical Park, Palo Alto Battlefield National Historic Site, and Padre Island National Seashore. Of these, Padre Island is best representative of the Texas coastline. The GCN developed its vital signs monitoring plan in 2007; many of the suggestions herein are based on that plan (Segura 2007). The plan outlines conceptual ecological models, rational for vital signs selected for monitoring, and sampling protocols. Monitoring is recommended for a variety of physical and biological elements. Monitoring protocols have been developed and peer reviewed for each identified vital sign; while the specific monitoring methods vary by resource, each monitoring protocol has a standardized format describing the data collection, management, and reporting.

Louisiana's System-Wide Assessment and Monitoring Program (SWAMP)
Louisiana has developed a coast-wide monitoring plan that considers sampling both of the natural and the human systems (Hijueros and Hemmerling 2015). The natural systems monitoring is focused into five categories: weather and climate, biotic integrity, water quality, hydrology, and physical terrain. Many of the monitored elements are similar to those of the NPS Vital Signs Program.

Other Programs
There are many monitoring programs of various scales throughout the country. The United States Geological Survey maintains stations nation-wide that collect water resources data, including groundwater, precipitation, and stream flow (USGS Water Data). The United States Environmental Protection Agency has established protocols for monitoring the condition of coastal waters (U.S. EPA Aquatic Surveys).

III. Monitoring Parameters
To identify priorities for monitoring along the Gulf Coast, the National Park Service conducted a series of meetings with their Board of Directors and Science and Technical Advisors, followed by visits with park superintendents and staff over a four-year period. Initially, 42 vital signs were identified, and from these, 19 were prioritized (Segura 2007).

Primary priorities include:

- Weather/Climate
- Subsidence/Relative Sea Level Rise[5]
- Coastal Dynamics
- Water Chemistry
- Water Nutrients
- Water Toxics
- Non-native Vegetation
- Non-Native Animals
- Salt Marsh Plant Communities
- Riparian Communities
- Marine and Estuarine Submerged Aquatic Vegetation
- Forest Health
- Amphibians
- Migratory Birds
- Resident Birds
- Terrestrial Vegetation
- Threatened, Endangered, and Rare Small mammals
- Threatened, Endangered, and Rare Plants
- Fire and Fuel Dynamics
- Land Cover/Land Use

[5]Subsidence/Relative Sea Level Rise is considered a primary priority for the Resiliency Plan. Determined a secondary priority by NPS (Segura, 2007).

Secondary priorities include (Segura 2007):

- Freshwater Wetland Communities
- Marine Invertebrates
- Marine and Estuarine Fish
- Threatened and Endangered Birds, Fish and Reptiles

These priority vital signs may be a good starting point for developing priorities and monitoring protocols for the entire Texas Coast; however, GLO may wish to re-evaluate and prioritize their own parameters based on the specific characteristics and needs of their lands.

IV. Monitoring Methods and Resources

For the parameters listed above, there are existing resources for protocols and monitoring methods. Additional methods can be developed as long-term monitoring plans with defined goals are developed. Some available existing resources, by higher-level category, are listed below.

- Species Abundance and Diversity – Amphibians and Birds
    - Amphibians
        - Southeast Coast Network – protocols include automated recording devices, visual encounter surveys, skin swabs
        - Segura 2007 – protocols include pitfall traps, drift fence traps, and visual surveys; artificial habitat (cover boards); net and trap sampling in aquatic habitats; audio census
    - Birds
        - Heartland Network Landbirds monitoring protocols
        - Pacific Island Network bird monitoring
- Community Structure and Complexity – Terrestrial and Wetland Vegetation
    - LiDAR + Ground Truthing
    - Louisiana SWAMP
- Water Quality
    - EPA National Aquatic Resource Surveys
    - Southeast Coast Network
    - Louisiana SWAMP
- Weather/Climate
    - Existing Weather Stations
- Geology/Erosion (Coastal Dynamics)
    - LiDAR
- Land Cover/Use
    - Southeast Coast Network
    - Adjacent Lands Information Network

V. Next Steps

Developing an effective and cost-efficient program will require:

- Development and consensus around program goals;
- Identifying the scale and time-frame of program;
- Reaching out to potential partner organizations;
- Identifying project proponents and project champions;
- Establishing a shared data platform and a stakeholder collaboration process;
- Coordination with regulatory and permitting agencies; and
- Identifying funding: there are numerous grants available for coastal resiliency planning, for which this program could be eligible, such as from the Gulf Research Program or the National Oceanic and Atmospheric Administration

I. Recommended Typical Project Planning, Permitting and Design Process

Recommended steps for taking a project from "Conceptual" status to "Shovel-Ready" status, considering the resiliency of the project are shown in Figure 9-73. Not all steps will be applicable to every project.

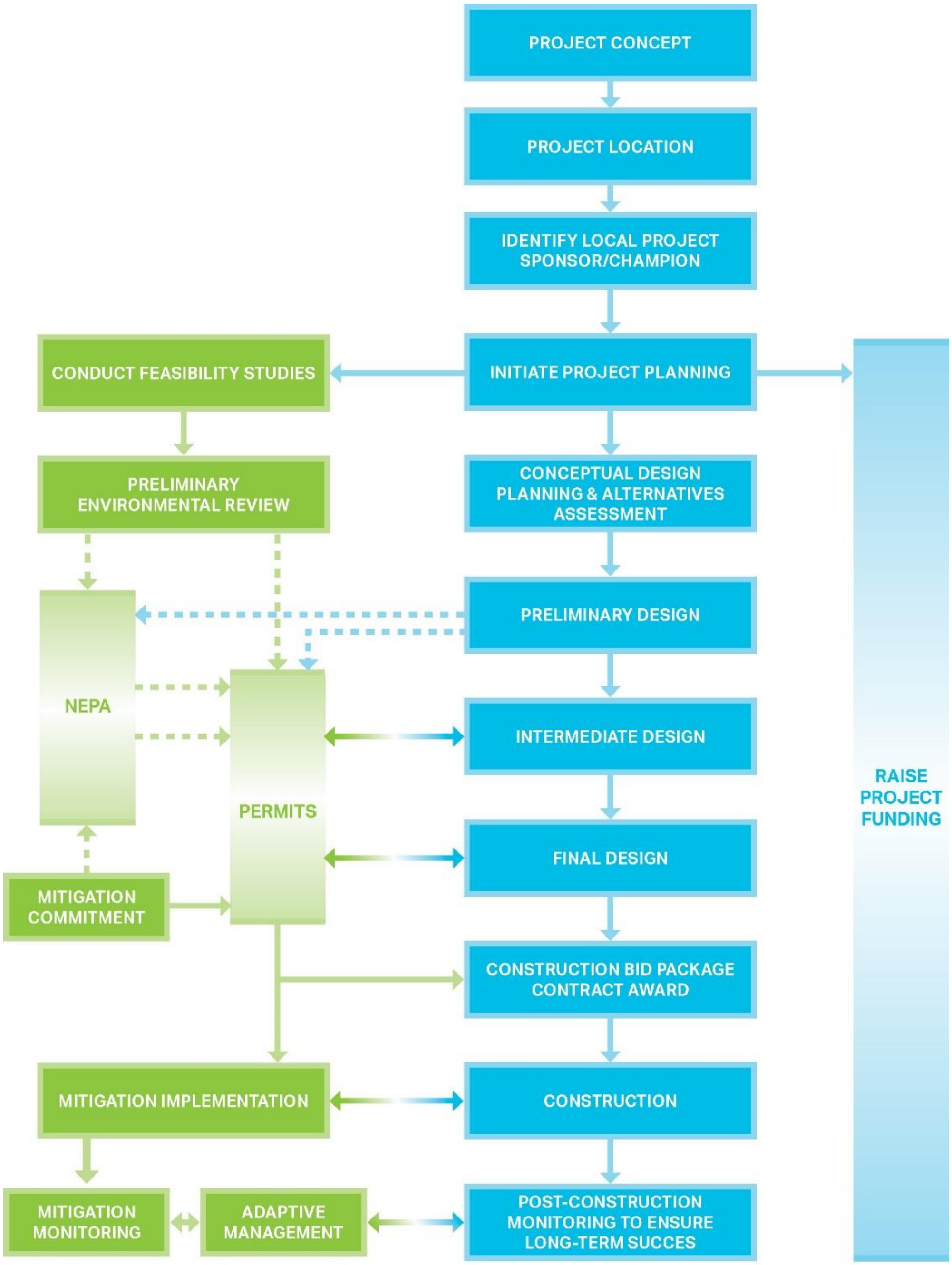


Figure 9-73: Conceptual Project Planning, Permitting & Design Process Flow Chart

To incorporate resiliency into all aspects of the planning, design, implementation, and monitoring of the project, the following considerations are recommended:

- Identify a local sponsor who will support and champion the project, as well as any possible interested stakeholders, private/public partnerships, etc., now and into the future.
- Review the project site for potential benefits to issues of concern and evaluate if there are potential areas where the project might have residual negative impacts. Consider how to modify the project design to create the most benefit to issues of concern and to avoid negative impacts.

- Understand the geomorphological and hydromorphological development of the site, including how these factors may impact the project site in the future.
- Review the project site for, at minimum, the following conditions that may impact the proposed project:
    - historical shoreline change rates (e.g., erosion);
    - historical changes to local and upstream hydrology;
    - coastal conditions (e.g., wave climate, potential for storm surge);
    - available coastal models and data (e.g., NOAA tidal stations);
    - historical and recent storm activity and impacts;
    - past, present, or future human development at or near the project site and upstream of the site;
    - proximity to transportation and access routes (e.g., ship channels, highways);
    - past, present, and future expected uses of the project site;
    - resilience of materials selected for design;
    - environmental spills;
    - historical habitat conversion or changes;
    - presence of wildlife; and
    - any other applicable environmental factors or human activities.
- Determine the expected relative sea level rise in the vicinity of the project, and determine what improvements or modifications are needed to the project design to account for potential future conditions to maximize project life span.
- Consider the environmental, social, and economic benefits/impacts of implementing the project and the expected conditions without the project.
- Consider the local community's and the public's perceptions, goals, and feedback. A project will be most resilient if it is favorably received by the local community and provides mutually beneficial results.
- Determine how the project will be managed and maintained in the future. When possible, include at least 3 years of monitoring activities in the project budget to inform project performance and adaptive management.

SECTION 10. PROJECT PRIORITIZATION AND IMPLEMENTATION

A. PROJECT PRIORITIZATION

Prioritized projects were identified for each Resiliency Strategy based on the results of the TAC and technical assessments. The proposed projects analyzed during the assessments were sorted into three tiers based on the assessment results, to yield manageable and actionable sets of projects for immediate consideration. Although the TAC evaluation process did not change from the 2017 Resiliency Plan, the statistical methodology used to prioritize projects was updated.

In the 2019 Resiliency Plan, projects were sorted into tiers based on their TAC approval rating (Priority Score) and their ability to have positive impacts in addressing IOCs (IOC Sum). The first tier of projects is included in the 2019 Resiliency Plan. Projects were identified as Tier 1 if their Priority Score was in the top 25 percent of their region, Tier 2 if their Priority Score was in the middle 50 percent of their region, and Tier 3 if their Priority Score was in the bottom 25 percent of their region. Additionally, projects that were not in the top 25 percent based on their Priority Score but had an IOC Sum in the top 25 percent of their region, were also included in Tier 1. Coastwide projects were evaluated separately from regional projects using the same methodology but using overall project statistics instead of statistics separated by region. Tier 2 projects will continue to be evaluated in future iterations of the Resiliency Plan. Projects identified as Tier 3 require additional research and development, or are already captured under another, larger project. Table 10-1 summarizes the typical Priority Score and IOC Sum criteria for each region based on this procedure.

The 2017 Resiliency Plan used a slightly different approach to prioritizing projects, based primarily on TAC approval ratings. Projects were identified as Tier 1 if they received high TAC approval ratings exceeding 80 percent, Tier 2 if they received moderate (60-80 percent) TAC approval, and Tier 3 if their TAC approval rating was below 60 percent. Tier 2 projects were not included in the 2017 Resiliency Plan but were reevaluated by the TAC for the 2019 Resiliency Plan.

The new 2019 tiering methodology evaluates projects using separate statistics for each region. Region 1 projects typically score higher than other regions, so using separate region statistics helps prevent an over emphasis on Region 1 projects. Additionally, projects with a high IOC Sums (i.e. top 25 percent) were included in Tier 1, even if their Priority Score falls below the 75th percentile, allowing projects with strong positive IOC impacts to be a part of the 2019 Resiliency Plan.

A detailed discussion of recommended Resiliency Strategies, including the projects which comprise these strategies, can be found in the Resiliency Plan. Additional project-specific data and technical assessment data are provided in appendices to this Report.

Table 10-1: Typical Project Result Criteria

Project Result	Priority Score		IOC Sum	Next Steps
Tier 1	Region 1A	>90%	>16.84	Tier 1 projects are aligned with the Resiliency Strategies put forth by the Resiliency Plan. These projects are proposed candidates to be considered to most effectively target coastal resiliency.
	Region 1B	>91%	>14.54	
	Region 2	>82%	>14.36	
	Region 3	>87%	>14.52	
	Region 4	>88%	>16.39	
Tier 2	Region 1A	>79%	11.38-16.84	Highly evaluated projects in Tier 2 will continue to be considered in the future, particularly as Tier 1 projects are completed.
	Region 1B	>58%	10.65-14.54	
	Region 2	>52%	10.90-14.36	
	Region 3	>43%	11.17-14.52	
	Region 4	>68%	10.37-16.39	
Tier 3	Region 1A	<79%	<11.38	Tier 3 projects generally do not meet the concept of resiliency. These projects may need additional information or conceptualization in order to meet the proposed criteria for coastal resiliency.
	Region 1B	<58%	<10.65	
	Region 2	<52%	<10.90	
	Region 3	<43%	<11.17	
	Region 4	<68%	<10.37	

B. Adaptive Management

I. Key Concepts

Adaptive management is an interdisciplinary management approach and an iterative learning process that promotes flexible decision making in the face of uncertainties (National Academy of Sciences 2004, U.S. Army Corps of Engineers (USACE) 2009). As outcomes from management actions and other events become better understood, the process improves over time. At the core of adaptive management is the iterative approach of modifying existing strategies and implementing new management strategies as new information is learned. Adaptive management differs from a traditional trial and error management approach because it emphasizes 'learning by doing' with a formal iterative approach, thereby reducing uncertainty in future success (Walters 1986, National Academy of Sciences 2004, USACE 2009). The approach includes:

- Careful elucidation of goals,
- Identification of alternative management objectives and hypotheses of causation, and
- Procedures for the collection of data followed by evaluation and reiteration (Allen et al. 2011).

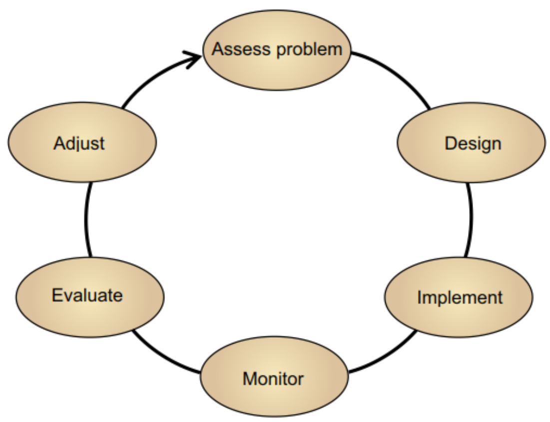
Adaptive management was developed in the 1970's by Ecologist C.S. Holling and coworkers at the University of British Columbia (Holling 1978). While initially designed to resolve issues based in natural resources management, it has beneficial applications to engineering, policy, socio-economics, and other processes, by reducing uncertainties and improving understanding and interrelationships (USACE 2009). The Department of the Interior uses the following definition, which is adopted from the National Research Council:

Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.

– Adaptive Management, U.S. Department of the Interior Technical Guide (Williams et al. 2009)

The adaptive management approach is generally shown as a wheel of six main steps, where the processes of structured decision making and learning are continuous (see Figure 1).

Figure 10-1: Adaptive management process



From Nyberg 1999, as shown in Williams et al. 2009

The six main steps involved in adaptive management are as follows, from Nyberg 1999:

- **Problem Assessment:** identified through workshops where participants define the scope of the problem, synthesize existing knowledge, and explore potential management outcomes. Explicit forecasts are made for outcomes, and key gaps are identified, in order to assess which actions are most likely to meet management objectives.
- **Design:** designing a management plan and monitoring program that will provide reliable feedback about the effectiveness of the chosen actions and ideally yield information that will fill key gaps identified in step 1. The evaluation of proposed designs is made on the basis of costs, risks, informativeness, and ability to meet management objectives.
- **Implementation:** the plan is put into practice.
- **Monitoring:** indicators are monitored to determine the effectiveness of the actions in meeting management objectives, and to test the hypothesized relationships which formed the basis of the forecasts.
- **Evaluation:** comparing the actual outcomes to forecasts and interpreting the reasons underlying any differences.
- **Adjustment:** practices, objectives, and the models used to make forecasts are adjusted to reflect new understanding.

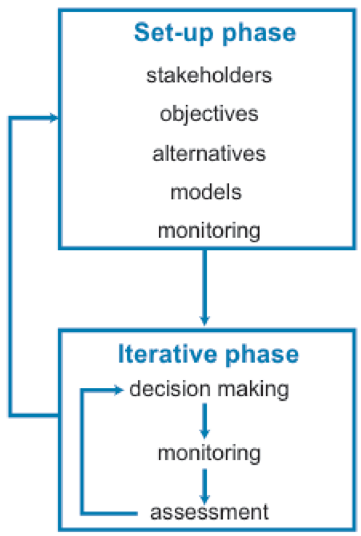
This process and new understanding gained can then further lead to reassessment of the problem, new questions, and new options to try in a continual cycle of improvement (Nyberg 1999). General principles in adaptive management include: involving stakeholders, developing and cultivating partnerships, embracing learning, documenting decisions, and adjusting as necessary (CMP 2013).

As described in the Adaptive Management: U.S. Department of the Interior Technical Guide, Williams et al. (2009), defines application of adaptive management in two phases: set-up and iterative.

Set-up Phase: stakeholder involvement, defining management objectives, potential alternatives, models, and monitoring.

Iterative Phase: an on-going cycle of decision making, monitoring, and assessing what is learned to make more informed management decisions moving forward, thereby, continuing the process.

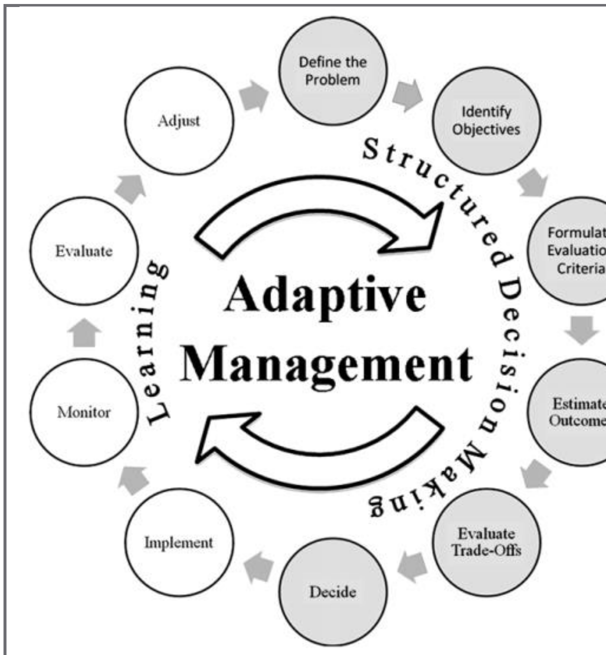
Figure 10-2: Two phase learning in adaptive management and its iterative cycle



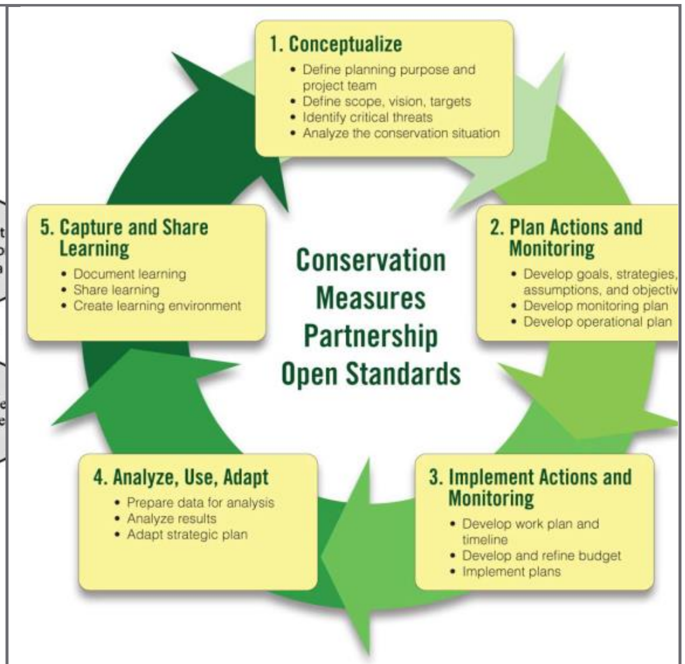
From Williams et al. 2009

Figure 10-3 shows two different adaptations of the adaptive management process. In Figure A, Allen, et al. (2011) draws on these two concepts and divides the process into 10 steps and into two categories: ***structured decision making*** and ***learning***. In Figure B, Conservation Measures Partnership Open Standards include 5 steps. Note that the underlying process is consistent.

Figure 10-3: Adaptive management process applications



A. 10 Step Process from Allen et al. 2011

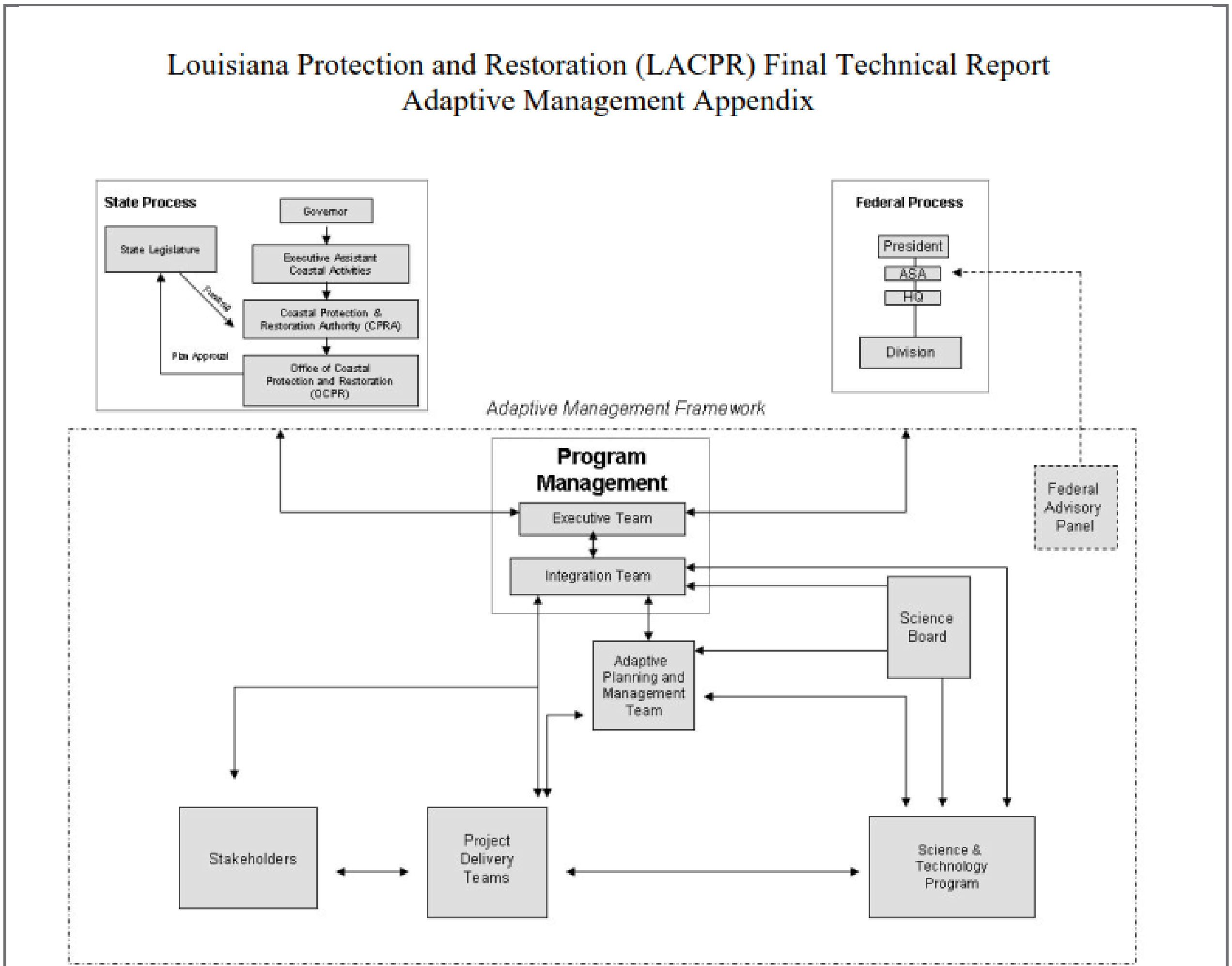


B. 5 Step Process from Conservation Measures Partnership 2013

II. Adaptive Management at the GLO

A goal of the 2019 Resiliency Plan is to develop an adaptive management framework within the GLO that fits within the existing GLO structure. This should be applicable both at the Plan level and at the Project level. An example framework is shown in Figure 10-4 below.

Figure 10-4: Example Adaptive Management Framework



From USACE 2009

To achieve this goal, several questions were addressed:

- How does the GLO foresee implementing adaptive management within the existing framework?
- To what extent does it work within the GLO's framework?
- Are new integrations or connections within the GLO necessary to accomplish implementing adaptive management?

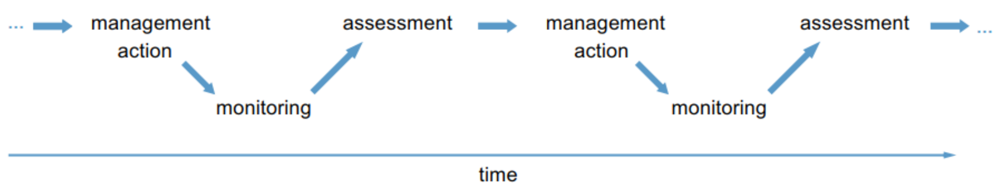
III. Implementation

Successful implementation of adaptive management will ensure that the overall plan and individual projects:

- Contribute to greater coastal resiliency, including vulnerable undeveloped areas.
- Ensure that the efforts being done are consistently improving over time.

The main elements of project-level adaptive management are similar to the programmatic framework, but the nature of the interactions is slightly different. For each project, a specific adaptive management plan can be developed. Templates can be developed to ensure consistency of approach across projects (The Water Institute of the Gulf, 2013). Implementation will involve action, monitoring and assessment over time (Figure 10-5).

Figure 10-5: Iterative process of adaptive management



From Williams et al. 2009

Key steps in the implementation process would include:

1. Integrate adaptive management into the institutional model of the coastal protection and restoration program;
2. Support the role of science and decision making;
3. Encourage learning throughout the adaptive management process at all levels of the institutional model; develop and apply a transparent decision-making process;
4. Initiate the principles of adaptive management in existing programs and projects; and
5. Develop a governance structure that facilitates adaptive management implementation.

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Project Evaluation Tables

Project Information				GLO Planning Team Screenings		TAC Issue of Concern Scoring									TAC Overall Results				Tier	
Project ID	2019 Resiliency Plan ID	Region	Project Name	Initial Screening	Programmatic Model	ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	IOC Sum	Feasibility	Y Count	N Count	Priority	2019 Project Tier	Notes & Exceptions
1	R0-1	0	Texas Coastal Resiliency Master Plan	Pass	10.00	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	1.000	1	Existing GLO priority
2311	R0-10	0	Beach Monitoring and Maintenance Program	Pass	<Null>	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	1.000	1	2017 Tier 1 Project and Existing GLO priority
9090	R0-11	0	Subsidence Study and Monitoring	Pass	1.81	2.45	2.24	2.59	2.83	2.88	1.61	2.24	0.43	17.27	3.12	67	16	0.807	1	
9097	R0-12	0	Longshore Transport Modeling	Pass	3.67	2.15	3.06	1.74	2.36	1.86	0.95	2.21	0.36	14.68	2.89	68	26	0.723	1	
9118	R0-13	0	Long-Term Hydrologic Monitoring Program	Pass	2.45	1.78	1.11	1.35	1.93	2.11	3.18	2.37	0.21	14.03	3.234	76	17	0.817	1	
9180	R0-14	0	Development of Optimal Coastwide Bathymetric and Topographic Models	Pass	1.48	2.09	2.22	2.53	2.59	2.52	1.29	1.84	0.87	15.95	2.55	21	7	0.750	1	
10013	R0-15	0	Data Collection to Support Continual Updates to the National Wetlands Inventory Dataset	Pass	3.79	2.95	1.412	2.056	2.006	1.748	2.248	2.908	0.252	15.58	3.034	74	21	0.779	1	
9093	R0-2	0	Dune Management and Access Plan	Pass	4.34	2.90	3.61	1.70	3.13	2.53	1.13	2.86	0.38	18.23	3.168	88	15	0.854	1	
9164	R0-3	0	Texas Seagrass Restoration	Pass	5.24	3.41	1.33	2.20	1.95	1.52	2.86	3.36	0.21	16.82	3.0275	63	11	0.851	1	
2	R0-4	0	Derelict Structure and Vessel Removal Program	Pass	0.85	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	1.000	1	2017 Tier 1 Project and Existing GLO Priority
1237	R0-5	0	Abandoned and Derelict Petroleum Production Structure Removal Program	Pass	2.97	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	1.000	1	2017 Tier 1 Project and Existing GLO Priority
9095	R0-6	0	Evacuation Route Study for Coastal Resilience	Pass	3.23	0.92	0.77	0.86	2.31	2.21	0.70	1.12	0.38	9.26	2.97	67	28	0.705	1	
9111	R0-7	0	State Flood Assessment and Flood Risk Management	Pass	1.70	1.51	1.18	1.28	2.42	2.89	2.76	1.95	0.42	14.41	2.982	73	17	0.811	1	
9183	R0-8	0	Texas Coastal Nonpoint Source Pollution Program	Pass	<Null>	1.51	1.18	1.28	2.42	2.89	2.76	1.95	0.42	14.41	2.982	73	17	0.811	1	Existing GLO priority
1187	R0-9	0	Sediment Management Plan	Pass	5.12	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	1.000	1	2017 Tier 1 Project and Existing GLO Priority
29	R1-1	1	Anahuac National Wildlife Refuge Living Shoreline	Pass	4.30	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	1	0.952	1	2017 Tier 1 Project
9	R1-10	1	Brazoria National Wildlife Refuge GIWW Shoreline Protection	Pass	4.55	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	35	1	0.972	1	2017 Tier 1 Project
11	R1-11	1	Follet's Island Wetland Restoration	Pass	3.39	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	37	0	1.000	1	2017 Tier 1 Project
255	R1-12	1	Candy Abshier Wildlife Management Area Shoreline Protection and Marsh Restoration	Pass	5.92	3.05	0.71	3.11	2.12	1.32	1.56	2.64	0.03	14.54	3.26	31	3	0.912	1	
346	R1-13	1	O'Quinn IH-45 Causeway Intertidal Marsh Restoration	Pass	6.17	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	35	2	0.946	1	2017 Tier 1 Project
1194	R1-14	1	Galveston Island State Park Wetland Restoration & Shoreline Protection - Phase 3	Pass	5.92	3.24	0.39	3.19	2.06	1.5	2.21	3.06	0.03	15.68	3.56	34	2	0.944	1	
3025	R1-15	1	Green's Lake Shoreline Protection & Wetland Restoration - Phase 2	Pass	6.17	3.35	0.53	2.68	2	1.22	2.22	2.97	0.06	15.03	2.91	32	3	0.914	1	
9066	R1-16	1	Dollar Bay Wetland Creation, Restoration and Acquisition	Pass	6.17	3.17	0.28	2.74	1.84	1.55	2.21	3.06	0	14.85	3.34	35	1	0.972	1	
9099	R1-17	1	Oyster Lake - West Bay Breach Protection - Phase 3	Pass	1.77	3.28	0.33	3	1.97	1.45	2.28	3.17	0.06	15.54	3.43	34	1	0.971	1	
9161	R1-18	1	East Bay Living Shorelines and Wetland Restoration	Pass	7.92	3	0.59	2.83	2	1.52	1.89	2.9	0.08	14.81	2.9	26	7	0.788	1	
35	R1-19	1	McFaddin National Wildlife Refuge Shoreline Restoration	Pass	9.38	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	19	1	0.950	1	2017 Tier 1 Project
30	R1-2	1	Willow Lake Shoreline Stabilization	Pass	8.29	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	19	1	0.950	1	2017 Tier 1 Project
252	R1-20	1	Bolivar Peninsula Beach and Dune Restoration	Pass	4.40	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	19	1	0.950	1	2017 Tier 1 Project. Evaluated in Region 1A and 1B.
252	R1-20	1	Bolivar Peninsula Beach and Dune Restoration	Pass	4.40	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	27	6	0.818	1	2017 Tier 1 Project. Evaluated in Region 1A and 1B.
9081	R1-21	1	Texas Point Beach Nourishment Project	Pass	4.40	3.45	3.65	2.17	3.00	2.58	2.00	3.15	0.83	20.83	3.85	17	2	0.895	1	
9026	R1-22	1	Galveston Island West of Seawall to 8 Mile Road Beach Nourishment	Pass	1.86	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	27	7	0.794	1	2017 Tier 1 Project
315	R1-23	1	Follet's Island Nourishment and Erosion Control	Pass	3.64	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	22	11	0.667	1	
1171	R1-24	1	Sabine Pass Jetty Repair	Pass	1.48	1.28	1.61	1.00	1.61	1.33	0.83	1.63	1.39	10.69	3.16	16	2	0.889	1	
9064	R1-25	1	Sabine-Neches Channel Shoreline Protection	Pass	2.35	2.32	1.53	2.82	2.10	1.86	1.64	2.50	0.74	15.49	3.1	18	2	0.900	1	
9072	R1-26	1	Southeast Texas Regional Water Supply Study and Improvements	Pass	2.29	1.57	0.17	0.61	2.48	2.95	3.45	2.10	0.17	13.49	3.63	20	0	1.000	1	
9073	R1-27	1	Interstate 10 Drainage Improvements at Cow Bayou	Pass	2.05	1.41	0.75	0.76	2.67	3.48	2.39	2.14	0.90	14.50	3.65	20	0	1.000	1	
9074	R1-28	1	Southeast Texas Regional Wastewater Treatment Improvements	Pass	1.39	1.61	0.33	0.60	2.71	2.94	3.74	2.17	0.27	14.36	3.84	20	0	1.000	1	
9078	R1-29	1	Improve State Highway 73 at Bridge City	Pass	0.95	0.78	0.50	0.88	3.05	3.24	1.78	2.11	0.44	12.78	3.5	19	0	1.000	1	
320	R1-3	1	Old River Cove Restoration	Pass	2.91	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	1	0.952	1	2017 Tier 1 Project
9084	R1-30	1	Elevate State Highway 87 and Widen State Highway 124 to Improve Evacuation Capabilities	Pass	0.71	1.28	1.68	1.56	3.15	2.83	0.78	2.00	0.59	13.87	2.95	16	3	0.842	1	
9182	R1-31	1	Southeast Texas Regional Drainage Study and Improvements	Pass	2.29	0.39	0.33	0.50	2.83	3.30	2.50	1.70	0.71	12.26	3.06	16	1	0.941	1	
9172	R1-32	1	City of Seabrook Wastewater Treatment Plant Relocation	Pass	0.66	0.87	0.26	0.45	2.28	2.66	3	1.97	0.13	11.62	2.97	23	5	0.821	1	
21	R1-33	1	Galveston Bay Rookery Island Restoration	Pass	4.55	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	35	1	0.972	1	2017 Tier 1 Project
797	R1-34	1	Dickinson Bay Rookery Island Restoration - Phase 2	Pass	3.90	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	32	4	0.889	1	2017 Tier 1 Project
240	R1-35	1	Coastal Heritage Preserve	Pass	2.89	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	36	0	1.000	1	2017 Tier 1 Project
9046	R1-36	1	Follet's Island Conservation Initiative	Pass	2.64	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	34	1	0.971	1	2017 Tier 1 Project
9088	R1-37	1	Cedar Bayou Acquisitions	Pass	4.63	2.81	0.07	1.8	2.39	2.36	2.26	2.7	0.14	14.53	3.09	29	3	0.906	1	
9102	R1-38	1	Columbia Bottomlands Preservation	Pass	4.05	3.23	0.03	0.29	1.88	2.27	2.29	2.89	0	12.88	3.09	32	3	0.914	1	
9108	R1-39	1	East and West Galveston Bay Watershed, Wetland and Habitat Conservation	Pass	6.54	3.26	0.23	1.97	2.59	2.44	3	3.31	0.24	17.04	3.53	33	1	0.971	1	
380	R1-4	1	Gordy Marsh Restoration and Shoreline Protection	Pass	4.91	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	36	0	1.000	1	2017 Tier 1 Project. Evaluated in Region 1A and 1B.
380	R1-4	1	Gordy Marsh Restoration and Shoreline Protection	Pass	4.91	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	19	2	0.905	1	2017 Tier 1 Project. Evaluated in Region 1A and 1B.
9130	R1-40	1	West Galveston Bay Acquisition Program	Pass	2.52	3.07	0.15	1.52	2.33	2.41	2.68	2.83	0	14.99	3.14	27	3	0.900	1	
834	R1-41	1	Salt Bayou Siphons	Pass	6.60	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	1	0.952	1	2017 Tier 1 Project
9085	R1-42	1	Replace Water Control Structure at Star Lake	Pass	3.48	2.95	1.63	1.62	2.33	2.67	3.41	3.23	1.11	18.95	3.3	18	2	0.900	1	
9107	R1-43	1	The Marshland Restoration Project at Anahuac National Wildlife Refuge	Pass	5.51	3.48	1.30	1.91	2.14	2.27	3.09	3.18	0.74	18.10	3.91	18	2	0.900	1	
9150	R1-44	1	Greater Armand Bayou Preservation Project	Pass	8.06	3.17	0	1.39	2.52	2.66	3.05	3.11	0.06	15.96	3.31	37	1	0.974	1	
794	R1-45	1	Galveston Bay Oyster Reef Planning & Restoration	Pass	5.79	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	37	0	1.000	1	2017 Tier 1 Project
9173	R1-46	1	Texas City Levee Erosion Control and Marsh and Oyster Reef Restoration	Pass	3.90	2.81	0.94	2.84	2.38	2	1.77	2.75	0.06	15.55	2.86	21	4	0.840	1	
8000	R1-47	1	Orange County Hurricane Flood Protection Levee	Fail	2.09	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	NA	1	Project evaluated under federal process
8001	R1-48	1	Port Arthur Hurricane Flood Protection Levee	Fail	0.96	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	NA	1	Project evaluated under federal process
8002	R1-49	1	Freeport Hurricane Flood Protection Levee	Fail	2.17	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	NA	1	Project evaluated under federal process
457	R1-5	1	Sabine-Neches Waterway Dredge Placement Island Habitat Restoration	Pass	3.15	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	0	1.000	1	2017 Tier 1 Project
9025	R1-6	1	Bessie Heights Wetland Restoration	Pass	3.75	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	1	0.952	1	2017 Tier 1 Project
9082	R1-7	1	Moody National Wildlife Refuge Conservation and Restoration	Pass	9.07	3.48	1.85	2.87	2.55	2.77	2.57	2.96	0.53	19.57	3.1	16	3	0.842	1	
9083	R1-8	1	Double Bayou Habitat Preservation	Pass	4.16	2.71	1.22	2.85	2.55	2.20	2.38	2.52	0.61	17.05	2.56	11	7	0.611	1	
10000	R1-9	1	Chambers County Wetland Restoration	Pass	5.79	3.41	1.63	2.50	2.62	2.77	2.91	3.14	0.67	19.64	3.11	15	4	0.789	1	
4	R2-1	2	Brazos River to Cedar Lake Creek GIWW Stabilization	Pass	4.60	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	28	0	1.000	1	2017 Tier 1 Project
52	R2-10	2	Chester Island Restoration	Pass	5.21	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	25	3	0.893	1	2017 Tier 1 Project
9027	R2-11	2	San Antonio Bay Rookery Island Restoration	Pass	1.95	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	25	3	0.893	1	2017 Tier 1 Project
9126	R2-12	2	Coon Island Restoration	Pass	3.85	3.17	0.68	2.5	1.75	1.26	1.13	3	0	13.49	2.9	23	5	0.821	1	
600	R2-13	2	Half Moon Oyster Reef Restoration - Phase 3	Pass	5.01	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	29	0	1.000	1	2017 Tier 1 Project
922	R2-14	2	Oliver Point Oyster Reef Restoration	Pass	3.19	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	27	1	0.964	1	2017 Tier 1 Project
1240	R2-15	2	Chinquapin Oyster Reef Restoration	Pass	3.19	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	27	1	0.964	1	2017 Tier 1 Project
9103	R2-16	2	Lavaca Bay Oyster Reef Restoration	Pass	3.19	3.11	0.48	1.27	1.05	0.77	2.62	3.17	0.13	12.60	3.29	26	4	0.867	1	
9069	R2-17	2	San Antonio Bay Hydrologic Regional Watershed Plan	Pass	2.72	2.23	0.8	1.76	2.14	2.58	3.2	2.77	0.05	15.53	2.92	22	2	0.917	1	
9070	R2-18	2	Matagorda Bay Regional Inflow Study	Pass	3.67	1.89	0.53	1.29	1.75	2.18	3.05	2.63	0	13.32	2.96	19	4	0.826	1	
9101	R2-19	2	Brazos River and San Bernard River Restoration Strategy and Management Plan	Pass	2.66	2.44	2.33	1.76	1.79	2.07	2.24	2.35	0.14	15.12	2.85	17	2	0.895	1	
51	R2-2	2	Boggy Cut GIWW Stabilization	Pass	6.95	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	29	0	1.000	1	2017 Tier 1 Project
62	R2-3	2	Welder Flats Wildlife Management Area	Pass	5.80	2.92	0.62	2.73	1.95	1.53	2.1	3.04	0	14.89	3.03	22	5	0.815	1	
418	R2-4	2	Sargent Beach & Dune Restoration	Pass	2.41	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	24	4	0.857	1	2017 Tier 1 Project
430	R2-5	2	Redfish Lake Living Shoreline	Pass	4.75	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	26	3	0.897	1	2017 Tier 1 Project
644	R2-6	2	Mad Island Shoreline Protection and Ecosystem Restoration	Pass	4.60	3.13	0.72	3.25	2.63	2	2.18	2.84	0	16.75	3.58	27	3	0.900	1	

9114	R2-7	2	Ocean Drive Living Shoreline	Pass	4.34	2.26	0.67	2.52	2.56	1.7	1.46	2.24	0.05	13.46	2.83	24	5	0.828	1	
9115	R2-8	2	Port Lavaca Living Shoreline	Pass	3.61	2.44	0.86	2.54	2.24	1.67	2.19	2.58	0.14	14.66	3.03	23	7	0.767	1	
9117	R2-9	2	Palacios Shoreline Revitalization Project	Pass	4.99	2.24	0.91	2.38	2.78	2.46	2.09	2.33	0.13	15.32	2.97	24	3	0.889	1	
70	R3-1	3	Goose Island State Park Habitat Restoration and Protection	Pass	3.18	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	30	2	0.938	1	2017 Tier 1 Project
72	R3-10	3	Long Reef and Deadman Island Shoreline Stabilization and Habitat Protection	Pass	3.59	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	32	1	0.970	1	2017 Tier 1 Project
696	R3-11	3	Shamrock Island Restoration - Phase 2	Pass	3.59	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	32	1	0.970	1	2017 Tier 1 Project
1202	R3-12	3	Tern Island and Triangle Tree Island Rookery Habitat Protection	Pass	2.61	3.27	0.53	2.79	1.48	1.36	0.71	3.36	0.11	13.61	3.14	27	4	0.871	1	
9006	R3-13	3	Dagger Island Shoreline Protection	Pass	4.51	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	30	1	0.968	1	2017 Tier 1 Project
9014	R3-14	3	Causeway Island Rookery Habitat Protection	Pass	3.43	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	31	0	1.000	1	2017 Tier 1 Project
75	R3-15	3	Nueces River Delta Shoreline Stabilization	Pass	4.60	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	32	1	0.970	1	2017 Tier 1 Project
443	R3-16	3	Nueces County Hydrologic Restoration Study	Pass	3.97	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	30	1	0.968	1	2017 Tier 1 Project
605	R3-17	3	Guadalupe Delta Estuary Restoration	Pass	4.10	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	30	0	1.000	1	2017 Tier 1 Project
9147	R3-18	3	Guadalupe River and Delta Wildlife Management Area Acquisition	Pass	3.71	2.93	0.43	1.57	1.68	1.85	2.31	3.07	0.12	13.96	2.7	26	4	0.867	1	
809	R3-19	3	Coastal Bend Gulf Barrier Island Conservation	Pass	1.82	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	33	1	0.971	1	2017 Tier 1 Project
437	R3-2	3	Fulton Beach Road Protection	Pass	4.84	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	31	1	0.969	1	2017 Tier 1 Project
9045	R3-20	3	Packery Channel Nature Park Habitat Restoration - Phase 2	Pass	7.89	3.46	1	3.09	2.69	2.1	1.39	2.97	0.22	16.92	3.53	28	5	0.848	1	
9059	R3-21	3	Little Bay Restoration Initiative	Pass	6.03	3	0.59	2.1	2.04	1.74	2.83	2.79	0.3	15.39	2.68	19	10	0.655	1	
10005	R3-22	3	Restore Barrier Island Bayside Wetlands on Mustang Island	Pass	7.37	3.26	0.81	3.11	2.38	1.92	1.96	2.77	0.38	16.59	2.54	20	9	0.690	1	
9134	R3-23	3	Port Aransas Nature Preserve Stabilization and Restoration	Pass	4.14	3.69	0.66	3.5	3.43	2.81	1.79	3.48	0.43	19.79	3.51	35	0	1.000	1	
9136	R3-24	3	Corpus Christi Bay Wastewater, Stormwater Quality and Pollution Management Improvements	Pass	3.19	2.04	0.3	0.52	1.43	1.22	3.67	2.25	0.95	12.38	2.7	26	4	0.867	1	
9135	R3-25	3	Baffin Bay Watershed Monitoring and Management Plan	Pass	1.91	3.04	0.25	1.18	1.1	1.21	3.66	3.17	0.11	13.72	3.27	29	2	0.935	1	
829	R3-26	3	Corpus Christi & Nueces Bays Oyster Reef Restoration	Pass	5.35	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	30	3	0.909	1	2017 Tier 1 Project
9145	R3-27	3	Copano Bay Oyster Reef Restoration	Pass	2.57	3.44	0.25	1.35	1.35	0.9	2.94	3.56	0.17	13.96	3.51	30	3	0.909	1	
1196	R3-3	3	Aransas National Wildlife Refuge Dagger Point Shoreline Preservation	Pass	4.18	3.35	0.92	3.63	2.53	1.92	1.33	2.92	0.06	16.66	3.14	33	3	0.917	1	
9001	R3-4	3	Portland Living Shoreline	Pass	4.60	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	29	4	0.879	1	2017 Tier 1 Project
9003	R3-5	3	Shell Point Ranch Wetlands Protection	Pass	1.82	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	26	1	0.963	1	2017 Tier 1 Project
9004	R3-6	3	Lamar Beach Road Protection	Pass	3.62	2.18	0.62	3.5	3.2	2.94	1.16	2.36	0.39	16.35	3.31	33	4	0.892	1	
9008	R3-7	3	Flour Bluff Living Shoreline	Pass	3.72	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	25	5	0.833	1	2017 Tier 1 Project
9139	R3-8	3	Newcomb's Point Shoreline Stabilization	Pass	3.37	3	0.52	3.27	2.12	1.45	1.06	3.06	0.19	14.67	3.06	30	3	0.909	1	
9158	R3-9	3	Indian Point Marsh Area Living Shoreline	Pass	4.60	3.14	0.55	3.37	2.6	2.1	1.83	2.79	0.21	16.59	3.16	29	2	0.935	1	
96	R4-1	4	Bahia Grande Hydrologic Restoration	Pass	6.57	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	29	0	1.000	1	2017 Tier 1 Project
9051	R4-10	4	South Padre Island Coastal Beach Protection	Pass	4.43	2.63	2.68	2.23	2.39	1.81	1.52	2.84	0.2	16.30	2.85	26	2	0.929	1	
9123	R4-11	4	City of South Padre Island Living Shoreline	Pass	4.27	3.39	1.62	3.43	2.71	2.52	2.64	3.04	0.61	19.96	3.03	25	2	0.926	1	
9154	R4-12	4	South Padre Island Park Development	Pass	4.39	3.13	1.57	2.66	1.96	1.91	2.09	2.72	0.35	16.39	3.26	19	9	0.679	1	
10011	R4-13	4	Laguna Madre Relative Sea Level Rise Monitoring and Adaptive Management	Pass	2.24	2.81	2.22	2.87	3.21	2.98	2.29	2.87	0.4	19.65	3.07	23	3	0.885	1	
822	R4-2	4	Paso Corvinas Wetlands & Hydrologic Restorations	Pass	7.71	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	27	1	0.964	1	2017 Tier 1 Project
9125	R4-3	4	Development of the Lower Laguna Madre and Brownsville Ship Channel Watershed Protection Plan	Pass	8.12	2.83	1.13	1.6	2.22	1.98	3.46	3	0.81	17.03	3.35	27	1	0.964	1	
145	R4-4	4	City of South Padre Island Gulf Shoreline Restoration	Pass	3.48	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	28	0	1.000	1	2017 Tier 1 Project
452	R4-5	4	Bird and Heron Islands Restoration	Pass	4.10	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	24	3	0.889	1	2017 Tier 1 Project
9062	R4-6	4	Restore Upper and Lower Laguna Madre Dredge Placement and Rookery Islands	Pass	3.57	3.22	1.06	2.4	2.13	1.68	1.33	3.29	0.21	15.32	3.1	24	2	0.923	1	
9121	R4-7	4	Mansfield Rookery Island Shoreline Protection	Pass	1.83	3.21	1.12	2.5	1.89	1.33	1.61	3.36	0.2	15.22	3.32	21	2	0.913	1	
9042	R4-8	4	Bahia Grande Living Shoreline	Pass	5.34	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	24	2	0.923	1	2017 Tier 1 Project
9063	R4-9	4	Restore Barrier Island Backside Wetlands on South Padre Island	Pass	6.89	3.05	1.22	2.95	2.33	2.16	2.13	2.91	0.35	17.10	2.79	19	5	0.792	1	
44		1	Trinity - San Jacinto Estuary Freshwater Inflows	Pass	3.00	2.58	0.07	0.86	0.67	0.78	3.24	3.03	0.04	11.27	2.77	28	4	0.875	2	
9076		1	Conserve Cypress-Tupelo Wetlands at Big Thicket Preserve	Pass	5.62	3.26	0.75	1.48	2.24	2.55	2.74	2.87	0.85	16.73	3.2	17	3	0.850	2	
9018		1	Hydrologic Restoration of Upper Cow Bayou	Pass	5.37	2.74	0.80	1.19	2.23	2.57	3.09	2.35	0.60	15.56	2.67	16	3	0.842	2	
779		3	Copano Bay Oyster Reef Restoration	Pass	3.80	3.12	0.44	1.53	1.28	0.76	2.91	3.16	0.19	13.39	3.03	26	5	0.839	2	
9166		1	Hillebrandt Bayou Drainage Study	Pass	3.66	2.20	0.69	0.88	2.37	2.75	3.10	2.35	0.29	14.63	2.94	15	3	0.833	2	
9019		1	Rose City Wetland Restoration	Pass	2.51	3.32	0.65	1.52	2.14	2.17	2.45	3.05	0.79	16.09	2.9	15	3	0.833	2	
9096		1	Maggie's Cove Wetland Restoration	Pass	5.92	3.11	0.2	2.97	1.74	1.36	1.94	2.8	0.03	14.15	3.06	29	6	0.829	2	
1230		2	Matagorda Bay System Priority Landscape Conservation	Pass	2.36	3	0.53	1.67	2	1.73	2.58	2.63	0.15	14.29	3.15	21	5	0.808	2	
4528		2	Dressing Point Rookery Island Protection	Pass	3.57	3.68	0.78	2.14	1.76	0.91	0.91	3.23	0	13.41	3.38	25	6	0.806	2	
9170		0	Reinstate DermoWatch Program to Assess Coastwide Oyster Health	Pass	3.34	1.91	0.28	0.78	0.72	0.5	2.67	3.09	0.06	10.01	3.06	22	6	0.786	2	
3185		1	Bay Harbor Habitat Restoration Project	Pass	6.05	2.83	0.37	2.06	1.13	0.83	1.17	2.71	0.03	11.13	3.03	22	6	0.786	2	
9152		3	Nueces River Freshwater Inflows (Riverine and Groundwater)	Pass	2.60	2.78	0.25	1.24	1.33	1.29	3.61	2.67	0.16	13.33	2.91	20	6	0.769	2	
9052		4	Protect Freshwater Resacas and Watershed to Lake Laguna Atascosa (Waters/Dulaney Acquisition)	Pass	4.14	3.11	0.4	1.16	1.4	1.84	2.76	2.85	0.28	13.80	3.31	20	6	0.769	2	
9086		1	GIWW Armoring and Wetland Restoration on Bolivar Peninsula	Pass	5.18	2.6	0.23	2.63	1.89	1.48	1.56	2.21	0.21	12.81	2.91	26	8	0.765	2	
9144		3	Mission Bay and St. Charles Bay Marsh Migration Corridors	Pass	2.97	2.79	0.39	2.13	1.85	1.68	2.09	3.09	0.07	14.09	2.9	26	8	0.765	2	
9122		4	Lower Rio Grande Valley Mitigation Bank	Pass	3.48	3.23	1.4	1.76	1.85	2.07	2.35	2.5	0.57	15.73	2.84	16	5	0.762	2	
9055		4	Bahia Grande Watershed Corridor Protection	Pass	2.82	3.04	0.83	1.38	2.08	1.84	2.64	2.92	0.28	15.01	3.31	19	6	0.760	2	
1222		2	City of Port Lavaca Shoreline Clean Up, Debris and Submerged Structures Removal	Pass	0.85	1.82	0.42	1.28	1.12	1	2.11	2.12	3.77	13.64	3.5	22	7	0.759	2	
8006		3	Corpus Christi Coastal Storm Risk Reduction	Pass	0.75	0.41	0.23	1.87	3.46	3.52	0.52	0.82	0.36	11.19	2.3	22	7	0.759	2	
9181		0	Retrofit Planning	Pass	1.48	1.52	0.75	1.06	1.82	2.64	3.06	1.91	0.25	13.01	2.65	23	8	0.742	2	
1214		1	Essex Bayou Habitat Restoration Engineering	Pass	6.25	2.94	0.17	1.17	1.53	1.3	2.62	2.75	0.07	12.55	2.86	20	7	0.741	2	
9091		1	Houston-Galveston Regional Stormwater Management Improvements	Pass	1.53	1.07	0.72	0.97	2.57	2.94	2.23	1.71	0.11	12.32	2.74	25	9	0.735	2	
9179		4	Lower Rio Grande Valley and Boca Chica Development Planning	Pass	3.89	2.38	1.31	1.34	2.31	2.17	2	2.62	0.04	14.17	2.76	19	7	0.731	2	
9138		3	Oso Creek and Oso Bay Wastewater, Stormwater Quality and Habitat Improvements	Pass	4.16	2.49	0.36	1.34	1.28	1.42	3.51	2.55	0.09	13.04	2.52	25	11	0.694	2	
9041		4	Harlingen Ship Channel Living Shoreline	Pass	4.60	3.07	0.72	2.68	1.85	1.88	1.92	2.44	0.23	14.79	3.07	18	8	0.692	2	
98		4	Adolph Thomae Jr. County Park - Phase 3	Pass	2.47	2.78	0.85	3.13	2.23	1.9	1.92	2.38	0.4	15.59	3.15	18	8	0.692	2	
1221		2	Lavaca River Abandoned Oil Well Project	Pass	1.38	1.32	0.24	0.43	1	0.71	2.71	2.04	3.28	11.73	3.03	20	9	0.690	2	
9132		1	West Galveston Bay, West Bay and Dickinson Bayou Regional Watershed Conservation	Pass	4.13	1.86	0.12	0.76	1.15	2.04	2.93	2.04	0.02	10.92	2.59	22	10	0.688	2	
4550		1	Land Acquisitions at County Parks - Phase 3	Pass	2.52	2.73	0.65	1.19	1.64	1.74	2.18	2.52	0.19	12.84	2.8	22	10	0.688	2	
9163		2	Colorado River Locks	Pass	0.24	1.22	0.24	0.88	1.06	1.41	1.63	1.53	1	8.97	2.96	17	8	0.680	2	
9120		4	Remove Old Causeway Fishing Pier to South Padre Island	Pass	0.24	1.69	0.38	0.92	0.75	0.58	1.04	2.42	2.59	10.37	3.14	17	8	0.680	2	
9142		3	Repair TX-188 Bridge Over Port Bay	Pass	2.90	1.19	0.3	1.16	2.47	1.47	0.67	1.53	0.57	9.36	2.88	21	10	0.677	2	
10001		1	Galveston-Trinity Bay Water Quality and Quantity	Pass	4.02	1.71	0.25	0.55	0.75	0.9	2.63	2	0.11	8.90	2.52	18	9	0.667	2	
9094		1	Galveston Island and Bolivar Peninsula Wastewater Distribution Improvements	Pass	0.20	0.94	0.14	0	1.37	1.47	3.31	2.11	0.39	9.73	2.39	23	12	0.657	2	
9105		2	Restore East Matagorda Bay Wetlands	Pass	3.11	2.91	0.65	2.43	2.11	1.35	2.25	2.65	0.05	14.40	2.48	17	9	0.654	2	
686		2	Matagorda Bay Tributary Inflow Protection	Pass	1.38	2.72	0.14	1	1.13	1.25	3.16	2.82	0	12.22	2.48	18	10	0.643	2	
9067		2	Stabilize County Road 457 East of Mitchell's Cut	Pass	0.38	1	1.95	0.76	2.35	2.42	0.85	1.1	0.1	10.53	2.59	15	9	0.625	2	
1199		1	Babe's Beach Nourishment	Pass	1.86	1.5	3.08	0.24	2	1.36	0.39	1.33	0.03	9.93	3.24	20	13	0.606	2	
1223		3	Bay Shore Drive Erosion Mitigation and Shoreline Stabilization	Pass	0.95	0.87	0.58	2.84	2.81	2.3	0.5	1.17	0.1	11.17	3.33	20	13	0.606	2	
9100		1	Christmas Bay and Bastrop Bay Seagrass Restoration Project	Pass	4.62	3.26	0.04	1.76	1.19	0.96	2.19	3.04	0.04	12.48	2.16	18	12	0.600	2	
9087		1	GIWW Barge Mooring Areas	Pass	0.53	0.72	0.16	0.77	1.07	0.91	0.58	0.97	1.3	6.48	2.81	20	14	0.588	2	
298		1	Raise County Road 257	Pass	3.45	0.48	1.28	0.93	2.44	2.22	0.17	0.86	0.14	8.52	2.12	18	13	0.581	2	
10006		2	Monitoring and Future Maintenance of Barrier Island Backside Wetlands on Matagorda Island and Mat	Pass	4.60	2.41	1.22	2.09	1.56	1.12	1.88	2.18	0.06	12.52	2.96	15	11	0.577	2	
8005		2	Matagorda Levee Drainage System Upgrades	Pass	0.91	0.63	0.16	0.4	2.45	3.08	1.3	1.05	0.1	9.17	2.8	15	11	0.577	2	
9110		2	Stabilize Entrance to the Matagorda Ship Channel	Pass	0.86	1.38	1.59	1.5	1.82	1.24	1.37	1.81	0.19	10.90	2.4	15	11	0.577	2	

9141	3	Shell Ridge Road Shoreline Stabilization	Pass	4.84	1.43	0.7	3.07	2.54	2.29	0.59	1.33	0.15	12.10	2.43	16	12	0.571	2	
10012	2	Hurricane Harvey Recovery Maintenance and Monitoring on San Jose Island and Matagorda Island	Pass	2.75	2.585	2.825	1.325	2.37	1.48	0.84	2.35	0.335	14.11	2.54	14	11	0.560	2	
9113	2	Oyster Lake - Matagorda Bay Shoreline Stabilization	Pass	4.75	2.68	0.77	2.72	1.81	1.23	1.43	2.5	0.05	13.19	2.5	15	13	0.536	2	
9157	3	Monitoring the Gulf Coast Aquifer Water Table	Pass	2.85	1.2	0.13	0.27	0.31	0.82	3.17	1.75	0	7.65	2.88	11	10	0.524	2	
9146	2	Restore Breach at Fish Pond on Matagorda Island	Pass	2.84	2.55	2	1.68	1.74	1.35	1.84	1.89	0	13.05	2.19	13	12	0.520	2	
10009	3	Bay Side Wetland Restoration at Port Bay and Copano Bay	Pass	4.57	2.57	0.7	2.57	2.58	2	2.13	2.61	0.1	15.26	2.18	10	11	0.476	2	
9140	3	Elevate Hwy. 35N Near Holiday Beach	Pass	0.35	0.48	0.29	0.54	2.6	2.55	0.32	0.67	0.07	7.52	1.93	14	17	0.452	2	
9175	3	Westside Harbor Project	Pass	1.01	0.42	0.46	1.56	2.29	2	0.73	0.85	0.38	8.69	2.29	11	15	0.423	2	
9131	1	Sabine Lake Rookery Island Creation	Pass	3.60	3.25	1.00	2.32	1.42	1.26	1.26	3.10	0.47	14.08	3.03	13	5	0.722	3	
9168	0	Expanded Aquatic Life and Seafood Monitoring Program	Pass	2.92	1.56	0.19	0.38	0.53	0.53	2.79	3.06	0.19	9.23	2.81	18	9	0.667	3	
9155	1	Sabine Lake Oil and Gas Access Channels	Pass	2.94	3.05	0.76	2.21	2.05	1.79	2.33	2.50	1.00	15.70	2.61	12	6	0.667	3	
9054	4	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	Pass	3.14	3.24	0.81	1.56	1.56	1.38	2.88	2.81	0.31	14.55	3.32	12	6	0.667	3	
9037	4	Cable Fence and Bollard Protection for the Greater Boca Chica Area	Pass	3.69	2.67	2.17	1.24	1.07	0.82	0.86	2.69	0.21	11.73	2.86	17	10	0.630	3	
9171	1	Regional Detention Improvements in Adams Bayou and Cow Bayou Watersheds	Pass	0.95	0.97	0.77	0.87	2.19	2.97	1.87	1.39	0.39	11.42	2.61	14	9	0.609	3	
9119	4	Raymondville Drain	Pass	0.63	0.92	0.23	0.46	1.94	2.72	2.13	1.52	0.15	10.07	2.39	15	10	0.600	3	
9165	1	Treasure Island Municipal Utility District Water Treatent Plant	Pass	3.42	1.05	1.5	1.05	2.18	1.82	2.09	1.48	0.18	11.35	2.88	15	12	0.556	3	
9077	1	Riverfront Park Retaining Structure	Pass	3.50	1.35	0.38	1.39	2.53	2.35	1.32	1.58	0.50	11.38	3.11	9	8	0.529	3	
9177	4	Bahia Grande Tract and Interior Wetland Channel Maintenance	Pass	5.26	2.54	0.62	1.69	1.48	1.24	2.04	2.52	0.08	12.21	2.42	10	9	0.526	3	
9128	2	Matagorda Bay Regional Acquisition Program	Pass	4.31	2.17	1.68	1.41	1.21	0.89	1.15	2.13	0.1	10.74	2.88	14	13	0.519	3	
9159	2	City of Port Lavaca Harbor Channel Beneficial Use of Dredge Material, Sediment Investigations and Hab	Pass	1.81	2.17	0.57	1.65	1.4	1.16	1.05	2	0.6	10.60	2.61	14	13	0.519	3	
9079	1	Port Neches Shoreline Stabilization	Pass	3.65	1.95	0.72	2.11	1.84	1.79	2.32	2.20	0.47	13.40	2.53	8	8	0.500	3	
9127	2	Beach Stabilization South of Matagorda Ship Channel Jetties	Pass	1.08	1.82	2.92	1.26	2.04	1.43	0.55	1.62	0.05	11.69	2.52	13	13	0.500	3	
811	4	Laguna Atascosa National Wildlife Refuge Zarate Tract Acquisition	Pass	6.39	3.12	0.8	1.6	1.6	1.93	2.2	2.75	0.27	14.27	3.25	7	7	0.500	3	
9178	4	Laguna Atascosa National Wildlife Refuge - Lake Atascoasa Water Flow Improvement	Pass	2.24	1.74	0.31	0.69	1.82	2.38	1.81	1.93	0	10.68	2.69	12	12	0.500	3	
6034	1	Farm to Market Road 3005 Improvements	Pass	3.45	0.39	1.07	0.66	2.57	2	0.25	0.6	0.11	7.65	2.46	15	16	0.484	3	
9174	1	Purchase South Deer Island as Ecologial Index Site	Pass	7.06	2.23	0.37	1.57	0.8	0.7	0.97	2.57	0.03	9.24	2.48	11	12	0.478	3	
9162	1	Brazos River Floodgates	Pass	0.24	0.58	0.25	0.48	1.83	1.57	0.8	0.58	1.09	7.18	2.58	12	14	0.462	3	
112	1	Treasure Island Nourishment Project	Pass	1.86	1.6	2.83	0.85	2.17	1.46	0.5	1.09	0.15	10.65	2.22	15	18	0.455	3	
9098	1	State Highway 332 Improvements	Pass	3.93	0.5	0	0.23	1.74	1.38	0.36	0.72	0.48	5.41	2.52	12	15	0.444	3	
1218	1	The Bolivar Peninsula Nature Trail	Pass	6.85	2.09	0.91	0.7	0.81	0.6	1.23	2.09	0.14	8.57	2.78	14	19	0.424	3	
9169	0	Coastwide Assessment of Dolphin Population	Pass	2.92	1.31	0.16	0.23	0.39	0.35	2.06	2.59	0.13	7.22	2.59	10	14	0.417	3	
9133	3	Reconstruct Dunes on San Jose Island	Pass	0.99	2.22	2.94	1.2	2.61	1.69	0.48	2.03	0.26	13.43	2	15	21	0.417	3	
9151	0	Coastwide Emergency Response Boat Access Initiative	Pass	1.89	0.59	0.42	0.47	1.21	1.26	0.90	1.42	1.28	7.55	2.558	34	49	0.410	3	
9124	4	Brownsville Ship Channel Rookery Island Restoration	Pass	4.10	2.4	1.2	2.26	1.54	1.17	1.31	2.5	0.3	12.68	2.62	11	16	0.407	3	
9104	2	Farm to Market Road 2031 and State Highway 60 Improvements	Pass	0.77	0.72	0.42	1.17	2.67	3	0.95	1.64	0.06	10.63	2.07	10	18	0.357	3	
9143	3	Nueces Bay North Shore Living Shoreline	Pass	4.60	2.1	0.61	2.97	2.29	1.93	1.25	1.64	0.08	12.87	2.13	11	20	0.355	3	
9112	2	State Highway 185 Improvements	Pass	0.25	0.43	0.3	0.48	2.31	2.04	0.32	1	0.09	6.97	2.48	9	17	0.346	3	
9137	3	Bob Hall Pier Beach Nourishment	Pass	0.99	1.59	2.88	0.38	2.23	1.76	0.55	2.03	0.33	11.75	2.55	11	21	0.344	3	
9071	3	Elevate JFK Causeway from Mainland to Padre Island	Pass	2.60	1.64	0.5	1	2.38	1.95	1.55	1.7	0.4	11.12	1.62	10	21	0.323	3	
9065	1	Widen State Highway 36 to 4-Lane Divided Highway	Pass	1.29	0.33	0.11	0.26	1.89	1.54	0.19	0.52	0.22	5.06	2.61	8	19	0.296	3	
9116	2	Remove or Retrofit USACE Revetment	Pass	2.36	1.75	2.28	2.05	1.79	1.33	1.06	1.65	0.44	12.35	1.59	8	19	0.296	3	
6013	3	Ocean Drive Bridge Improvements and Living Shoreline	Pass	0.41	1.81	0.48	1.65	1.86	1.62	2.05	1.7	0.15	11.32	1.76	8	20	0.286	3	
9109	2	Colorado River Delta – Matagorda Bay Acquisition	Pass	3.98	2.4	0.45	1.2	1.52	1.24	2.36	2.63	0	11.80	2.36	8	22	0.267	3	
9148	3	Beach Nourishment South of Corpus Christi Ship Channel Entrance	Pass	0.99	2.18	2.96	0.68	2.32	1.86	0.65	1.7	0.11	12.46	2.3	7	21	0.250	3	
1145	3	Prevent Erosion of Sunfish Island	Pass	3.59	2.54	0.52	2.46	1.73	1.13	0.7	1.86	0.14	11.08	1.79	7	24	0.226	3	
9149	3	Enhance Talley Island and Traylor Island for Use as Rookery Islands	Pass	2.03	2.62	0.73	2.68	1.77	1.42	1.12	2.19	0.19	12.72	1.23	7	27	0.206	3	
6007	1	Pelican Island Bridge Replacement	Pass	0.66	0	0	0.38	1.61	0.85	0.12	0.31	0.86	4.13	1.96	6	24	0.200	3	
9156	2	Freshwater Delivery from Colorado River to East Matagorda Bay	Pass	2.24	2.05	0	0.63	0.47	0.63	1.85	1.76	0	7.39	1.54	5	21	0.192	3	
9153	3	Padre Island Seawall Restoration	Pass	0.71	0.79	2.26	1	2.58	2.26	0.58	1.16	0.35	10.98	2	5	23	0.179	3	
9129	2	Demolish Old Military Airfield	Pass	2.19	2.16	0.54	0.73	0.83	0.48	0.76	1.65	1.85	9.00	1.73	4	27	0.129	3	
6037	1	Orange County Wastewater Treatment Improvements	Pass	1.31	1.86	0.56	0.61	2.00	2.50	3.61	2.27	0.56	13.96	3.18	20	0	1.000	X	Combined with Project ID #9074
9050	2	Sargent Ranch Addition to San Bernard National Wildlife Refuge	Pass	4.31	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	28	1	0.966	X	Completed.
9047	1	Sabine Ranch Habitat Protection	Pass	5.02	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	20	1	0.952	X	2017 Tier 1 Project; Completed
337	1	Old River Cove Wetland Restoration	Pass	3.15	Null	Null	Null	Null	Null	Null	Null	Null	Null	Null	19	1	0.950	X	Combined with Project ID #320
9080	1	Beaumont to Port Arthur Pump System Improvements	Pass	1.39	0.39	0.33	0.50	2.83	3.30	2.50	1.70	0.71	12.26	3.06	16	1	0.941	X	Combined with Project ID #9182
86	3	Mustang Island State Park Acquisition	Pass	2.44	Null	Null	Null	Null	Null	Null	Null	Null	0.00	Null	26	2	0.929	X	Project completed.
423	2	Matagorda Bay System Hydrologic Restoration Study	Pass	3.92	Null	Null	Null	Null	Null	Null	Null	Null	0.00	Null	25	2	0.926	X	Combined with Project ID #9070
9068	2	Powderhorn Ranch Wetland Acquisition and Restoration - Phase 2	Pass	3.22	2.96	0.5	2.12	1.77	1.59	2.22	3.12	0.1	14.38	3.19	25	2	0.926	X	Removed by original submitter. No longer feasible.
241	1	Sweetwater Preserve Expansion	Pass	2.89	Null	Null	Null	Null	Null	Null	Null	Null	0.00	Null	29	3	0.906	X	Project completed.
322	1	North Pleasure Island Dredge Placement Island Restoration	Pass	3.52	Null	Null	Null	Null	Null	Null	Null	Null	0.00	Null	17	3	0.850	X	Combined with Project ID #457
9053	4	Laguna Heights Wetlands Acquisition	Pass	2.82	Null	Null	Null	Null	Null	Null	Null	Null	0.00	Null	21	4	0.840	X	Project completed.
9075	1	Beaumont Freshwater Distribution and Treatment Improvements	Pass	1.39	0.38	0.27	0.40	2.29	2.17	3.06	1.78	0.60	10.94	3.06	15	3	0.833	X	Combined with Project ID #9072
4564	1	Lower Neches Wildlife Management Area Wetland Restoration	Pass	2.51	3.43	0.90	1.76	2.43	2.22	2.16	3.14	0.80	16.84	3.03	15	4	0.789	X	Combined with Project ID #9025
9167	0	Coastwide Abandoned Pipeline Removal	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project sufficiently addressed under other measures
3479	0	Cemetery Resaca Restoration Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					More information needed
3759	0	Hugh Ramsey Nature Park Education Center and Wetland Revitalization Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
4513	0	Chocolate Bayou Wetland Restoration Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
4520	0	Columbia Bottomlands Addition – Yelderman Tract	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
4581	0	Warren Lake Protection and Restoration Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					More information needed
4585	0	Brazos River Wetlands Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
9089	0	Statewide Education, Outreach and Coordination Program	Fail	1.81	Project not evaluated by TAC									Project not evaluated by TAC					Project sufficiently addressed under other measures
1215	0	Texas Master Plan for Beneficial Use of Dredged Material	Fail	1.48	Project not evaluated by TAC									Project not evaluated by TAC					Coordination ongoing
1228	0	Protecting and Restoring a Staple Texan Industry: The Post-Deepwater Horizon Oil Spill Texas Shrimp Fi	Fail	1.48	Project not evaluated by TAC									Project not evaluated by TAC					More information needed
1229	0	Texas Gulf Shrimp Consumption, Tourism and Marketing Proposal - Phase 1	Fail	1.48	Project not evaluated by TAC									Project not evaluated by TAC					More information needed
1238	1	Jefferson County Ecosystem Restoration Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project sufficiently addressed under other measures
9160	1	Centralized Wastewater Infrastructure in Orange County	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project sufficiently addressed under other measures
1208	1	214 Jettyview Village of Surfside	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3035	1	Gordy Marsh Shoreline Protection and Marsh Creation	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3143	1	Bolivar Peninsula Shoreline and Habitat Restoration and Protection Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3168	1	East Bay and Gulf Intracoastal Waterway Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
3173	1	McFaddin NWR Willow Lake Restoration and Shoreline Protection	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3175	1	Smith Point Marsh and Shoreline Restoration	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3177	1	Pelican Island Beneficial Use Marsh Restoration and Shoreline Protection	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3182	1	Pirates Beach CEMS Beach Stabilization Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3183	1	Carancahua Beach Dune Restoration	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3205	1	Shoreacres Bayfront Shoreline	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project
3234	1	Dunes of West Beach - Natural Dune Nourishment	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Project complete, ongoing or withdrawn
3236	1	Treasure Island Beach Nourishment Project	Fail	<Null>	Project not evaluated by TAC									Project not evaluated by TAC					Duplicate project

3242	1	Riverwalk - Ochiltree Park, City of Orange	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3245	1	McFaddin Beach Restoration-Refuge Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3246	1	Marsh Restoration and Shoreline Protection of the GIWW at McFaddin National Wildlife Refuge	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3250	1	Fort Anahuac Park Levee Road Shoreline Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3252	1	Buffalo Bayou Elysian Bend to Guadalupe Plaza Erosion Control	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3253	1	Pine Gully Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3254	1	Canal City Marsh Restoration-Canal Dredging	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3257	1	Little Beach Large Scale Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3352	1	Big Reef Marsh Restoration and Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3519	1	City of Houston Buffalo Bayou-Hidalgo Greenway Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3521	1	City of Houston Buffalo Bayou-Tony Marron Greenway Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3687	1	Community-based Oyster Restoration: West Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3703	1	Galveston Seawall Beach Restoration and Retention Alternatives Analysis	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3863	1	Brazos River Conservation Easement - Clemens Unit TDCJ	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3907	1	Bayou House Nature Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4007	1	Allen's Landing Bank Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4012	1	Baytown Nature Center Crystal Bay Breakwater	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4126	1	Taylor Bayou Pocket Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4150	1	Buffalo Bayou Green Tree Reservoir Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4169	1	Clear Creek Erosion Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4174	1	Dune Restoration on Beach Drive	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4189	1	Oak Island Waterfront Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4509	1	Bolivar Peninsula Salt Marsh Protection and Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4531	1	Far West Galveston Island Dune Restoration - Section A	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4533	1	Follett's Island Wetland Protection Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4534	1	Freshwater Delivery Siphon - J.D. Murphree Wildlife Management Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4545	1	J.D. Murphree WMA Shoreline and Ecosystem Protection - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4760	1	Buffalo Bayou Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4762	1	Nourishment of Tiger Creek Marsh & Wetlands Ecosystem	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4839	1	City of Nassau Bay - Wetlands Creation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4870	1	Tiki Island Wetlands Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4527	1	Dickinson Bay Island II Restoration Project	Fail	8.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4485	1	Cade Ranch – Bolivar Peninsula TX	Fail	7.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4324	1	Nature Center Wetland Enhancement & Shoreline	Fail	7.06	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4494	1	East Bay Oyster Restoration	Fail	6.52	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3850	1	Tiki Island Maintenance Dredge & Beneficial Use Project	Fail	6.17	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
10004	1	West Galveston Wetlands Adaptive Management	Fail	5.79	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3413	1	Treasure Island MUD Shoreline Protecton	Fail	5.30	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
10002	1	Hydrologic Restoration Adaptive Management	Fail	4.65	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4535	1	Galveston Bay Oyster Restoration and Restorable Habitat Inventory	Fail	4.51	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3038	1	Port of Port Arthur Shoreline Protection	Fail	4.43	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
10003	1	Oyster Reef Restoration Adaptive Management	Fail	3.75	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4566	1	San Jacinto Battleground Seawall Replacement - Phase 2	Fail	3.36	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4539	1	Hydrological Restoration of the Salt Bayou Marsh Watershed	Fail	3.24	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3235	1	Galveston County Pocket Park #4 Shoreline Protection and Estuarine Habitat Restoration	Fail	2.90	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3636	1	Land Acquisition for a Habitat Restoration Technology Center Educational Wetland Park	Fail	2.89	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4554	1	McAllis Point Phase II Land Acquisition Project	Fail	2.77	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4510	1	Buffalo Bayou - Hidalgo Greenway Acquisition	Fail	2.51	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4547	1	Land Acquisition Brays Greenway, Mid City Property	Fail	2.43	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4548	1	Land Acquisition Brays Greenway, Munoz Property	Fail	2.43	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4549	1	Land Acquisition White Oak Bayou Greenway, Desoto Apartment Property	Fail	2.43	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1233	1	Salt Bayou Beach Ridge Restoration E&D	Fail	2.37	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3545	1	Armand Bayou Watershed Partnership - Strategic Plan Implementation - Phase 2	Fail	2.18	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3166	1	Marsh Restoration and Shoreline Protection of the GIWW at J.D. Murphree	Fail	1.89	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1198	1	Treasure Island MUD Beach Nourishment w-BUDM	Fail	1.86	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3403	1	Dellanera Park Beach Nourishment	Fail	1.86	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1200	1	Galveston Park Board Backpassing Nourishment Practices- Alternative Analysis	Fail	1.81	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1201	1	Galveston Park Board Sustainable Funding Strategies Study	Fail	1.81	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1209	1	Village of Surfside Beach Beach Nourishment	Fail	1.77	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3170	1	CR257 Shoreline Stabilization Project	Fail	1.76	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1216	1	Workforce Economic Development to Enhance Sustainable Offshore Energy Systems in the Gulf of Mex	Fail	1.68	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3525	1	Restoration of Lower White Oak Bayou and Buffalo Bayou	Fail	1.68	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1203	1	GIWW Rollover Bay Reach Beach Nourishment w-BUDM FY2018 Event (Gilchrist)	Fail	1.61	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6033	1	Hwy 6 Road Elevation	Fail	1.59	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
8003	1	Houston-Galveston Storm Surge Suppression and CSRM	Fail	1.59	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1217	1	Upper Texas Coast Tourism Marketing & Mobile Wayfinding App	Fail	1.51	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
10007	1	Houston Ship Channel Deepening and Widening	Fail	1.32	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4186	1	McCullom Park	Fail	1.12	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
6003	1	Fairwood Road Bridge Repair	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6004	1	Diversion Channel Bridge Repair	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6005	1	Highway 6 Bridge Repair	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6006	1	Highway 6 over Highland Bayou Bridge Repair	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6008	1	Bay Street Bridge Repair	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6017	1	Choate Road Alternative Evacuation Route Project Construction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6018	1	Red Bluff Alternative Evacuation Route Project Construction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6019	1	Federal Road Alternative Evacuation Route Project Construction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6020	1	Galveston Island Airport Bridge Construction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6032	1	Pelican Island Ferry Landing	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6047	1	FM 646 Roadway Expansion	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6048	1	FM 517 Roadway Improvement and Expansion	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6049	1	SH 146 Arterial Roadway Expansion	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6050	1	SH 146 Railroad Overpass Construction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6051	1	SH 146 Roadway Expansion	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6052	1	IH 45 N Bridge Replacement	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6053	1	IH 45 Roadway Reconstruction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6054	1	IH 14 Roadway Improvements	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6055	1	IH 45 N Texas City WYE Roadway Reconstruction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6056	1	IH 45 Texas City WYE Roadway Reconstruction	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

6057	1	IH 45 SH 146 SH 6 Interchange Improvements	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6058	1	SH 87 Roadway Improvements	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6062	1	SH 146 Roadway Expansion	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6063	1	SH 146 Roadway Widening	Fail	0.66	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6025	1	Port Arthur Proctor Street Repair/Extension	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6028	1	Nederland Road Improvement Project for Evacuation Route	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6044	1	FM 1495 Roadway Improvement	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6045	1	SH 36 Roadway Expansion	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6065	1	SH 87 Shoreline Protection	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6066	1	SH 82 Shoreline Protection	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6067	1	US 69 Roadway Improvements	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6068	1	US 69 Bridge Improvements	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6069	1	US 69 S Roadway Improvements	Fail	0.53	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6002	1	Bridge Upgrades on FM 2354 over Cedar Gully	Fail	0.45	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
6024	1	Vidor South FM 105 Lane Expansion	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6046	1	FM 2004 Bridge Improvements	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6059	1	SH 146 Bridge Improvements	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6061	1	SH 146 Traffic Signal Improvement	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6064	1	SH 99 Tollway and Interchange Construction	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
9092	1	Beaumont Freshwater Distribution and Treatment Improvements	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4568	1	Sea Rim State Park Improvements Phase 3	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
6027	1	Martin Operating Partnership Facility Secondary Road Construction	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6043	1	Convert Water Treatment Plant	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6026	1	Jefferson County La Belle Road Repair	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6060	1	FM 2354 Roadway Expansion	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6021	1	Highway 36 Evacuation Route Widening	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6038	1	Orange County Mitigation Action 17	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6039	1	Surfside Shores Sewer System	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6042	1	New Water Supply System and Water Treatment Study	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6070	1	SH 36 Roadway Expansion	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6040	1	West Jefferson County Municipal Utility District waterline	Fail	0.13	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1219	1	Quintana Beach Public Fishing Pier Restoration	Fail	0.00	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3192	2	Sargent Marsh Shoreline Protection and Wetland Restoration - Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4067	2	Brown Cedar Cut Hydraulic Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4268	2	Cheval Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4511	2	Calhoun County Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
5058	2	Matagorda Bay Nature Park and Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5061	2	Palacios Coastal Area Enhancement Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
5064	2	Trull Marsh Wetlands Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4123	2	Supplemental Water for the Myrtle-Foester Whitmire Unit	Fail	6.15	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1220	2	Oyster Resource and Recovery Center	Fail	5.82	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
1232	2	Matagorda Wetlands Acquisition and Conservation	Fail	5.47	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1204	2	Schicke Point Wetland Protection & Restoration Phases 2-3	Fail	4.75	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1236	2	Gulf Coast Migratory Waterfowl Habitat Enhancement	Fail	4.32	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1234	2	Cow Trap Lake Bird Nesting Island Improvements	Fail	3.57	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
10008	2	Matagorda Ship Channel Improvement Study	Fail	3.46	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4526	2	Cow Trap Lake Marsh Terracing Project	Fail	3.11	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4551	2	Mad Island WMA Protection and Ecosystem Restoration - Phase II	Fail	3.11	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
9106	2	San Bernard National Wildlife Refuge Wetland Restoration	Fail	3.11	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1235	2	Matagorda Bay Rookery Island, Feasibility Study and Alternatives Analysis	Fail	3.05	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1195	2	Sargent Beach Segmented Breakwater & Beach Nourishment Pilot Study	Fail	2.14	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
1210	2	Carancahua Bay Shoreline Protection-Alternative Analysis	Fail	1.36	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4299	2	Port Lavaca Bayfront Peninsula Bulkhead Improvements	Fail	0.65	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6009	2	Victoria County Bridge Replacement	Fail	0.27	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6035	2	Point Comfort/Port Lavaca Causeway Upgrade	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6071	2	FM 1593 Roadway and Drainage Improvement	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6072	2	US 59 Frontage Road	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6022	2	Nile Valley Parkway Upgrade	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6029	2	Nile Valley Parkway Bridge Construction	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6030	2	Nile Valley Parkway Road Extension	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4779	2	Bayfront Peninsula Improvement: A Shoreline Access Project	Fail	0.08	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
9176	3	Solid Waste Recycling and Invasive Species Removal on Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3037	3	Cole Park Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3196	3	Packery Channel Marsh Enhancement/Creation and Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3225	3	Broadway Drive Shoreline Stabilization and Ecosystem Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3268	3	Saltwater Pool Beach Nourishment Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3270	3	Rockport Harbor South Shoreline Stabilization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3271	3	Cove Harbor Shoreline Protection Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3273	3	Portland Causeway Marsh Restoration and Shoreline Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3274	3	Harbor Island Stabilization - Continuation of CEPRA Cycle 1,2,3 Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3409	3	North Padre Island Beach Nourishment and Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3494	3	Increasing Freshwater Inflow Through Log Jam Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3732	3	Aransas Woods Habitat Preservation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3742	3	Connie Hagar Habitat Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4048	3	Port Aransas Nature Preserve Wetlands Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4119	3	Shoreline Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4156	3	Oso Creek Watershed Habitat Conservation Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4260	3	Beach Stabilization and Waterfront Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4558	3	Nueces River / Nueces Estuary Water Quality Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4559	3	Nueces River Delta Wetland Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4790	3	Freshwater Inflow Management of Nueces Bay using Salinity Monitoring Station and Neutral Networks	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4803	3	Riviera Beach Park - Shoreline Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4837	3	Cayo del Oso Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4842	3	Construction of Jetty and Erosion Response & Habitat Protection @ Public Boat Ramp @ Kaufer-Huber	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4866	3	Ropes Park Expansion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
5047	3	City of Aransas Pass Land Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4069	3	Fish Pass Hydraulic Restoration Project	Fail	5.18	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
1212	3	Indian Point Shoreline Protection & Restoration	Fail	4.60	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project

4507	3	Big Tree Ranch Acquisition	Fail	3.06	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4525	3	Copano Bay Shoreline Stabilization Project at Town of Bayside	Fail	2.15	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4937	3	Padre Balli Park Interpretive Area (Phase II)	Fail	2.15	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3867	3	Coastal Bend Regional Park Land Acquisition	Fail	2.06	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
10010	3	Corpus Christi Ship Channel Deepening and Widening	Fail	2.03	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1197	3	Shamrock Island Protection & Habitat Enhancement Phase 3	Fail	1.56	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
6000	3	Construct/Elevate Bridge at Staples Street	Fail	1.54	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1207	3	Bay Shore Beach Beach Nourishment w-BUDM Phase 1	Fail	1.36	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
1224	3	Texas State Aquarium Expansion Project: Caribbean Journey	Fail	1.35	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4182	3	Fulton Park Seawall Restoration	Fail	1.01	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3788	3	Polliwog Pond Bird Sanctuary Restoration and Construction Project	Fail	1.00	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
1213	3	North Padre Island Beach Nourishment w-BUDM	Fail	0.99	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
6001	3	Construct/Elevate Bridge at Weber Road	Fail	0.75	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6012	3	Construct/Elevate Bridge at Yorktown Boulevard	Fail	0.75	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1206	3	Port Aransas Marina Shoreline Restoration Phase 3	Fail	0.71	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
6036	3	BP 35 Upgrades	Fail	0.67	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6014	3	Naval Base Ocean Drive Bridge Improvements	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6085	3	SH 44 Roadway Expansion	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6086	3	SH 286 Freeway Extension	Fail	0.41	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6023	3	FM 774 and Highway 35 Intersection Upgrade	Fail	0.35	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6010	3	Bayside Bridge Inspection and Repair	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6011	3	Key Allegro Bridge Upgrade	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6076	3	FM 2725 from SH 361 to FM 1069	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6081	3	FM 2725 Roadway Improvement and Expansion	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6087	3	SH 361 Roadway and Signal Improvement	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6073	3	CR Bridge Improvements	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6075	3	US 181 Auxiliary Lane Construction	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6077	3	FM 893 from CR 3685 Stark Road to 0.2 miles W of CR70 Gum Hollow	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6078	3	CR from STR1 drainage ditch to 0.25 miles E of FM 774	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6080	3	US 181 from Sunset Road to FM 3239 Buddy Ganem	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6082	3	FM 893 Roadway Improvement	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6083	3	IH 37 Roadway Expansion	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6084	3	IH 37 Freeway Expansion	Fail	0.25	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6041	3	Drinking Water Supply System	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6088	3	IH 37 Freeway Widening	Fail	0.20	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6015	3	I77 Bridge Repair/Replacement	Fail	0.16	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6031	3	Route 77 Enhanced Evacuation Route Construction	Fail	0.16	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6074	3	US 183 Roadway Improvements	Fail	0.16	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6079	3	US 183 from Goliad County line to SH 202	Fail	0.16	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3261	4	Mansfield East Cut Beach Nourishment and Bird Island Nourishment Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3275	4	Port Mansfield Shoreline Stabilization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3276	4	Port Mansfield Wildlife Sanctuary Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3430	4	Bird Habitat Beneficial Use Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3460	4	Dredging Site/Beneficial Use Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3501	4	Native Plant Center - South Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3858	4	Atwood Dune Restoration Continuation at South Padre Island, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3913	4	Los Fresnos Nature Habitat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4003	4	Port Mansfield South Beach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4078	4	Boca Chica Beach Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4504	4	Acquisition Along the Coastal Corridor in Cameron County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4552	4	Mansfield Channel Bird Island Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4781	4	Canal C	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4809	4	Wetland Mitigation/Birding Land Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5057	4	La Posada Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3187	4	Dune Restoration	Fail	1.95	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
1226	4	Sea Turtle Incorporated Education Complex	Fail	1.62	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4244	4	South Padre Island Migratory Bird Sanctuary Expansion	Fail	1.62	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
1211	4	Adolph Thomae Park Shoreline Protection Phase 3Adolph Thomae Park Shoreline Protection Phase 3	Fail	1.48	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3449	4	Gulf of Mexico Nature & Native Plant Center	Fail	1.39	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
1205	4	South Padre Island-Brazos Santiago Pass Beach Nourishment w-BUDM FY2018 event	Fail	1.12	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1225	4	Raymondville Drain Project Phase 2 - Restoring Drainage and Flood Control	Fail	0.63	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
8004	4	South Padre Island Storm Surge Suppression and CSRM	Fail	0.39	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1227	4	E.K. Atwood Park Pavilion Improvements Project	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4253	4	Treasure Island Circle Beach Park	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
6016	4	Cameron County Action #9	Fail	0.33	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3001	<Null>	Galveston Seawall BUDM West of 61st to 103rd Street	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3002	<Null>	GIWW Rollover Bay Reach Beneficial Use of Dredged Material FY2015 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3003	<Null>	Economic and Natural Resource Benefit Report	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3004	<Null>	Beach Monitoring and Maintenance Plan Monitoring (Cycle 8 & 9)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3005	<Null>	Sand Management Plan for Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3006	<Null>	Critical Erosion Area Update	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3007	<Null>	BEG Shoreline Change Rate Update	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3008	<Null>	Corps Feasibility Study Rescoping Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3009	<Null>	Surfside Emergency Beach Nourishment and Phase 3 Groin Engineering Alternative Analysis	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3010	<Null>	Port Aransas Nature Preserve Shoreline Protection Repair	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3011	<Null>	CR257 Road Repair and Protective Revetment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3012	<Null>	Dickinson Bayou Wetland Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3013	<Null>	South Padre Island Beach Nourishment with BUDM FY2014 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3014	<Null>	Adolph Thomae Jr. Park Shoreline Stabilization Phase 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3015	<Null>	Arturo Galvan Coastal Park Living Shoreline	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3016	<Null>	Keith Lake Fish Pass Baffle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3017	<Null>	Development of A Comprehensive Beach Monitoring Program for Galveston & Follett's Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3018	<Null>	Shamrock Island Habitat Protection & Enhancement Phase II-A: Breakwaters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3019	<Null>	Innovative Technology Seaweed Prototype Dunes Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3020	<Null>	Galveston Island Tourism Development Beach User Surveys	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3021	<Null>	Follett's Island Nearshore Beach Nourishment Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3022	<Null>	GIWW Rollover Bay Reach Beach Nourishment with BUDM FY2014 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3023	<Null>	North Jetty Sand Search Investigation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

3024	<Null>	Engineering Analysis of Submerged Structures Leveraging CIAP	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3026	<Null>	Oyster Lake Habitat Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3027	<Null>	Seawall Beach Nourishment Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3028	<Null>	Nueces River Delta Shoreline Stabilization-Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3029	<Null>	Magnolia Inlet Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3030	<Null>	Moses Lake Phase 3 - Dollar Bay Shoreline Protection and Wetland Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3031	<Null>	Mustang & North Padre Island Beach Maintenance Impacts & Best Practices	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3032	<Null>	Cedar Bayou - Vinson Slough Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3033	<Null>	Identifying and Evaluating Onshore Sand Sources using Airborne and Ground Geophysics	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3034	<Null>	Virginia Point Wetland Protection and Restoration Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3036	<Null>	Port Alto Beach Sediment Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3039	<Null>	McGee Beach BMMP Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3040	<Null>	Rockport Beach BMMP Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3041	<Null>	Indianola Beach BMMP Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3043	<Null>	Isla Blanca Park Beach Nourishment with BUDM FY2012 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3044	<Null>	Beach Monitoring and Maintenance Plan Monitoring Surveys	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3045	<Null>	Economic and Natural Resource Benefits Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3046	<Null>	Effects of Hurricane Ike Study, Phase 2 and 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3047	<Null>	End of Seawall Beach and Dune Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3048	<Null>	End of Seawall Resen Waves Beach Stabilization Demonstration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3049	<Null>	South Padre Island Beach Nourishment with Beneficial Use of Dredged Material FY2012 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3050	<Null>	Moses Lake Shoreline Protection Project Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3051	<Null>	Dickinson Bayou Wetland Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
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3074	<Null>	Nueces River Delta Shoreline Stabilization and Habitat Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3075	<Null>	Galveston Seawall Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3138	<Null>	Sylvan Beach Shoreline Protection and Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3145	<Null>	Town of Quintana Beach Nourishment and Dune Reconstruction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3146	<Null>	Treasure Island Shoreline Stabilization, Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3147	<Null>	Nueces Bay Causeway - Marsh Restoration and Shoreline Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3148	<Null>	McFaddin NWR Protection Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3149	<Null>	Restoring Estuarine Habitats in West Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3150	<Null>	Sargent Beach Dune and Beach Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3151	<Null>	Rollover Pass Beach Nourishment with BUDM	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3157	<Null>	Isla Blanca Park Beach Nourishment Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3158	<Null>	Virginia Point Marsh Planting and Shoreline Erosion Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3159	<Null>	CEPRA Cycle 6 Aerial Photography	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3164	<Null>	SPI Demonstration Project - Independent Review/Design Criteria and Monitoring Plan Requirement De	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3189	<Null>	North Padre Island Sand Source Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3190	<Null>	San Luis Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3191	<Null>	Developing an Approach to Identifying and Characterizing Onshore Sand Resources: Surface Mapping, I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3193	<Null>	Sargent Beach Dune and Beach Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3194	<Null>	Texas Bay Shorelines: Updating and Posting Matagorda Bay Historical Shoreline Change Rates	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3195	<Null>	Cedar Bayou and Vinson Slough Hydraulic Restoration Protection Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
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3199	<Null>	Quintana Beach Nourishment Hurricane Rita FEMA Repair Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3203	<Null>	San Luis Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3207	<Null>	Village of Surfside Beach - Revetment Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3208	<Null>	Cordgrass Planting Along Shorelines of the GIWW at McFaddin NWR	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3211	<Null>	San Bernard River Sand Source Investigation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3214	<Null>	West Galveston Island Beach Nourishment Hurricane Rita FEMA Repair Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3224	<Null>	Little Beach - Beach and Dune Restoration with Beneficial Use of Dredged Materials	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3228	<Null>	Bermuda Beach Hazardous Debris Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3229	<Null>	Smith Point Marsh Restoration Emergency Repair	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
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3231	<Null>	Engineering Evaluation of Washover Features	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
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3237	<Null>	House Acquisition and Demolition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3238	<Null>	Harbor of Refuge Public Dock Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
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3248	<Null>	GIWW McFaddin NWR Breakwater and Marsh Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3269	<Null>	Little Bay Marsh Creation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3272	<Null>	Effectiveness of BioRock Technology for Shoreline Protection and Habitat Restoration of the Nueces Ri	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3277	<Null>	Coastal Shoreline Change Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3284	<Null>	West Bay Bird Island Shorelien Protection & Habitat Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3288	<Null>	Surfside Beach Beach Nourishment and Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3295	<Null>	Corpus Christi Ship Channel - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3314	<Null>	South Padre Island Park Road 100 - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3316	<Null>	Surfside Beach Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3317	<Null>	Indianola-Magnolia Beach Shoreline Protection Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3318	<Null>	Texas A&M University Dredging Methodologies Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3319	<Null>	Causeway Bird Island - Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3320	<Null>	Rockport Beach - Renourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3321	<Null>	Fulton Beach - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3322	<Null>	Goose Island State Park - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3323	<Null>	Indian Point - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3324	<Null>	Saluria Bayou - Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3325	<Null>	West Bay Bird Island - Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3326	<Null>	Texas A&M Pelican Island - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3327	<Null>	Sylvan Beach Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3328	<Null>	Caplen Shores - Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3329	<Null>	Sand Resources Central Coast Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3330	<Null>	CEPRA Cycle 2 Economic and Natural Resource Benefits Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3331	<Null>	Texas Shoreline Change Project - Erosion Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3332	<Null>	Kaufer-Hubert Park - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3333	<Null>	Corpus Christi Ship Channel, Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3334	<Null>	Piper Channel - Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3335	<Null>	Galveston Bay Erosion Rate Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3336	<Null>	McFaddin Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3337	<Null>	Port Arthur Pleasure Island - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3338	<Null>	East Bay - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3339	<Null>	State Highway 82 Pleasure Island - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3340	<Null>	Rural Bays - Mission Bay - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3341	<Null>	Rural Bays - Bayside - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3342	<Null>	Rural Bays - Ingleside - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3343	<Null>	Caplen Beach - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3344	<Null>	Rollover Pass Beach Nourishment with BUDM - 2002	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3345	<Null>	Jumbile Cove - Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3346	<Null>	San Luis Pass - Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3347	<Null>	West Galveston Island - Spanish Grant - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3348	<Null>	West Galveston Island - Pirates Beach - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3349	<Null>	West Galveston Island - Sea Isle - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3350	<Null>	Quintana Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3351	<Null>	Post TS Fay Aerial Photography	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3353	<Null>	Aerial Photography, Coastwide	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3354	<Null>	Rollover Pass Monitoring by Texas A&M University Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3355	<Null>	Rollover Pass Beach Nourishment with BUDM - 2003	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3356	<Null>	Halls Lake Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3357	<Null>	Port Lavaca Bayfront Peninsula - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3358	<Null>	Port Lavaca Bayfront Access - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3359	<Null>	Moses Lake Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3360	<Null>	Omega Bay Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3361	<Null>	Little Cedar Bayou Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3362	<Null>	GIWW McFaddin Reach - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3363	<Null>	McFaddin Dune Restoration Damage Assessment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3364	<Null>	Mesquite Point Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3365	<Null>	Pleasure Island Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3366	<Null>	Texas Point Refuge Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3367	<Null>	South Padre Island Park Road 100 - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3368	<Null>	South Padre Island Beach Nourishment with BUDM	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3369	<Null>	Kaufer-Hubert Park Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3370	<Null>	Rural Bay Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3371	<Null>	Corpus Christi Beach Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3372	<Null>	Jumbile Cove - Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3374	<Null>	Texas A&M-Corpus Christi University Beach - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3375	<Null>	Surfside Beach - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3376	<Null>	Gilchrist-Caplen Beach - Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3377	<Null>	GIWW Rollover Pass Beach Nourishment with BUDM - 2000	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3378	<Null>	Rose City Marsh, Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3379	<Null>	Bessie Heights Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3380	<Null>	Nueces Bay - Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3381	<Null>	Key Allegro Shoreline Protection - Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3382	<Null>	Rollover Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3383	<Null>	Corpus Christi Ship Channel Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3384	<Null>	North Deer Island - Shoreline Protection and Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3385	<Null>	CEPRA Cycle 1 Economic and Natural Resource Benefit Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3386	<Null>	Keith Lake Cut Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3387	<Null>	Aerial Photography Cycle 1 Projects	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3388	<Null>	Indianola Beach Shoreline Protection and Beach Nourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project

3389	<Null>	GIWW Rollover Pass Beach Nourishment with BUDM - 2001	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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3392	<Null>	Surfside Bathymetric Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3393	<Null>	Sand Sources Upper Coast Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3394	<Null>	Key Allegro Road and Bay Shore	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3395	<Null>	Clear Lake Park Shoreline Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3396	<Null>	Beach Renourishment with BUDM	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3397	<Null>	Follet's Island Nearshore Beach Nourishment Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3398	<Null>	Bolivar Beach Restoration Leveraging CIAP	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3399	<Null>	Key Allegro Revetment Repair	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3400	<Null>	Mad Island Wildlife Management Area Shoreline Protection II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3401	<Null>	Adolph Thomae Park Shoreline Protection Project - Phase III Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3402	<Null>	Shamrock Island Protection and Habitat Enhancement Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3404	<Null>	Galveston Park Board U.S. Army Corp of Engineers Permit Amendments	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3405	<Null>	Greens Lake Shoreline and Marsh Protection - Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3406	<Null>	Innovative Technology: Sustaining Dune Growth With Seabales	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3407	<Null>	Isla Del Sol Shoreline and Marsh Protection Erosion Response Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3408	<Null>	Local Dredging Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3410	<Null>	Causeway Rookery Island Habitat Protection, Nueces Bay Texas - Design and Engineering	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3411	<Null>	Port Alto North Beach Shoreline Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3412	<Null>	Sundown Island Shoreline Erosion Protection and Habitat Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3414	<Null>	Moses lake & Dollar Bay Shoreline Protection and Wetland Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3415	<Null>	Upland Sand Source Assessment Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3416	<Null>	Development of Comprehensive Baseline Beach and Shoreface mapping for the Upper Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3417	<Null>	Value of Galveston Beaches and Benefits of Nourishment to Homeowners	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3418	<Null>	BEG Shoreline Change Update	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3419	<Null>	A Prototype Information System for Monitoring and Predicting Phytoplankton Productivity over Galves	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3420	<Null>	Boater Waste Education Campaign: Communicating Environmental Impact and Facilitating Enforcemen	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3421	<Null>	Bucket Brigade - What Is in Our Water?	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3422	<Null>	Cataloguing Texas Coastal Species Interactions: A Database for Coastal Managers, Scientists and Educat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3423	<Null>	Cease the Grease Campaign: Enhancing Outreach and Launching Grease Recycling Pilot Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3424	<Null>	Evaluating Groundwater Inflow and Nutrient Transport to Texas Coastal Embayments, Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3425	<Null>	Lower Rio Grande Valley Low Impact Development Outreach Education and Demonstration Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3426	<Null>	Moonlight Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3427	<Null>	Nueces Bay Marsh Volunteer Plantings	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3428	<Null>	Nueces Delta Wetland Functionality Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3429	<Null>	Alkalinity Decline and Acidification in Drought-Affected Mission-Aransas Estuary	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3431	<Null>	Developing an Approach to Assess Onshore Sand Resources for Future Beach Nourishment Needs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3432	<Null>	Ocean Circle Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3433	<Null>	Palacios Coastal Education Pavilion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3434	<Null>	Pesticide Loading and Sediment Accumulation in Baffin Bay: Addressing an Important Stakeholder Con	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3435	<Null>	Port Neches River Front Enhancement Clean Up Project (Phase I)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3436	<Null>	Port Neches Riverfront Enhancement Planning & Design Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3437	<Null>	Restaurants to Reefs: Galveston Bay Oyster Shell Recycling Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3438	<Null>	San Benito Wetlands Project - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3439	<Null>	Shell Bank: Oyster shell recycling, community engagement, teacher institute, and oyster health	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3440	<Null>	Texas Coastal Planning Program: Providing Technical Assistance to Texas Coastal Communities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3441	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3442	<Null>	The Wetland Plant Partnership	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3443	<Null>	Toward Wetland Protection in the Houston-Galveston Region: Assessing Mitigation Practices and Facilit	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3444	<Null>	Trash or Treat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3445	<Null>	Development of Depth of Closure Survey Beach Profiling Program for the Upper Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3446	<Null>	Ecosystem Services Studies along the Galveston Bay Margin System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3447	<Null>	Evaluation of Factors Contributing to the Occurrence of Virulent Vibrio vulnificus in Aransas and Copan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3448	<Null>	Gulf Blvd Beach Access Improvements Phase 4	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3450	<Null>	Improving Water Quality of the Effluent from Cattail Marsh Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3451	<Null>	Pinfish as a Biological Indicator of Sewage Nitrogen Integration into the Lower Laguna Madre Food We	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3452	<Null>	Poinsettia Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3453	<Null>	Rockport Beach Access For All	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3454	<Null>	WaterIQWet - Urban to Coastal (Water IQ Watershed Education Training) Aransas, Nueces, Galveston, a	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3455	<Null>	Development of Database Identifying Potential Location of Coastal Natural Resources Within the City	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3456	<Null>	Austwell Water Front Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3457	<Null>	Coastal Stormwater Education and Outreach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3458	<Null>	Composting Toilets for Fennessey Ranch in Bayside, Texas, Expanding Educational Opportunities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3459	<Null>	Developing and Implementing a South Texas Floodplain Management Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3461	<Null>	Ecotoursim Development Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3462	<Null>	Effects of Inflows on Phytoplankton Over Galveston Bay and San Antonio Bay Under Urbanization and	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3463	<Null>	Lighthouse Beach Park Learning Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3464	<Null>	Mission River Kayak Launch Site	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3465	<Null>	Morphodynamic modeling of Galveston Island to Assess and Predict Beach Erosion and Assess Island S	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3466	<Null>	NEWT (Normalized Elevation-Width Transects): Enabling Rapid Analysis and Web Display of Lidar-deriv	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3467	<Null>	Detailed Geological Framework Study of the Shoreface and Innershelf of Western Brazoria and Eastern	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3468	<Null>	Ward Island Trail Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3469	<Null>	Automated Detection of Harmful (and/or Toxic) Algae Blooms (HABs) in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3470	<Null>	Baffin Bay Volunteer Water Quality Study: Data Collection and Outreach to Address Water Quality Con	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3471	<Null>	Boater Waste Education Campaign: Communicating Environmental Impact and Facilitating Enforcemen	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3472	<Null>	Cameron County Public Beach Access #4 - Enhancements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3473	<Null>	Cease the Grease Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3474	<Null>	A Paleoperspective on Baffin Bay - Understanding the Modern System Through its Past	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3475	<Null>	Assessment of the Trophic Response of Primary and Secondary Producers to Timed Freshwater Release	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3476	<Null>	Baseline Mapping for Mangrove Monitoring in Matagorda Bay and East Matagorda Bay, Texas Gulf Coas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3477	<Null>	Evaluating Groundwater/Freshwater Inflows and Nutrient Transport to Texas Coastal Embayments, Pha	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3478	<Null>	Blast Off on Boca Chica Beach: Balancing Public Access with the Proposed SpaceX Launch Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3480	<Null>	Designing for Impact	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3481	<Null>	Detailed Geological Study to Assess Conditions and Predict Changes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3482	<Null>	Development of an Oil and Gas Tracing Ocean Glider for Leak Detection in Existing Submarine Pipelines	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3483	<Null>	Development of Artificial Oyster Habitat Using Seawater Electrification and Carbonate Deposition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals

3484	<Null>	Examining Beach Access in Texas: Post Severance	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3485	<Null>	Fishing the Mother Lagoon	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3486	<Null>	Galveston Bay Oyster Shell Recycling Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3487	<Null>	GIS Analysis and Modeling of Texas Rookery Island Erosion Risk Along the GIWW	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3488	<Null>	Gulf Boulevard Beach Access Improvements Phase 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3489	<Null>	High-resolution Lidar Observations of Rookery Islands in the Upper Laguna Madre to Define a Monitori	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3490	<Null>	Hilltop Nature Park Enhancements, Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3491	<Null>	Flood Risk Situational Awareness for Emergency Response	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3492	<Null>	Freshwater Inflow Circulation Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3493	<Null>	Galveston Bay Drive & Discover Guide Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3495	<Null>	Nueces Bay Public Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3496	<Null>	Tracking Long-Term Trends in Seagrass Cover and Condition in Texas Coastal Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3497	<Null>	Seaside Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3498	<Null>	Land Use Change, Flood Vulnerability, and Coastal Hazard Policy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3499	<Null>	Lower Rio Grande/Rio Bravo Water Quality Initiative: Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3500	<Null>	Maximizing Freshwater Inflow Through Invasive Aquatic Vegetation Control	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3502	<Null>	Plant Species Mapping for Salt Marsh in Nueces River Delta via High Spatial Resolution Satellite Imagery	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3503	<Null>	Pollywog Pond Bird Sanctuary Restoration, Education, and Public Accessibility Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3504	<Null>	Shell Bank: Oyster Shell Recycling, Teacher Engagement, Environmental Stewardship, and Scientific Inq	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3505	<Null>	South Padre Island Dune Restoration Volunteer Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3506	<Null>	Tabbs Bay Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3507	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3508	<Null>	Walkover at The Pearl Beach Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3509	<Null>	Port Mansfield Land and Lease Management System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3510	<Null>	Prioritization of Critical Marsh Conservation and Restoration Areas based on Future Sea Level Rise Scen	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3511	<Null>	Quantifying Migratory Bird Activity Along the Lower Texas Coast - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3512	<Null>	San Antonio Bay Water Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3513	<Null>	WaterSmart Landscaping: Protecting the Future of Freshwater Inflows for Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3514	<Null>	Storm Water Wetland Partnership Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3515	<Null>	Surfside Lighthouse Learning Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3516	<Null>	Updating and Enhancing the Texas Public Access Inventory - Phase Three	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3517	<Null>	Use of Social Media Support Tools during Disaster Events	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3518	<Null>	Ward Island Hike and Bike Trail Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3520	<Null>	City of Houston Buffalo Bayou-Hidalgo Land Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3522	<Null>	City of Port Arthur's GIS Project that Identifies and Maps Hazardous Flood Areas and Community Infras	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3523	<Null>	Oiled Aquatic Bird Rehabilitation Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3524	<Null>	Pollywog Pond Bird Sanctuary Restoration and Construction Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3526	<Null>	Tabbs Bay Continuation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3527	<Null>	Texas Acoustic Array Network (TEXAAN): a Cooperative Large-scale Tracking Network for Mobile Marin	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3528	<Null>	Village of Surfside Emergency Revetment Repair	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3529	<Null>	Volunteer Water Quality Monitoring Program in Baffin Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3530	<Null>	Emergency Vehicle Beach Access Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3531	<Null>	Evaluating Groundwater Inflow and Nutrient Transport to Texas Coastal Embayments	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3532	<Null>	Evaluating the Importance of Nearshore Artificial Structures to Texas Fisheries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3533	<Null>	Habitat Mapping of West Galveston Bay and Christmas Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3534	<Null>	Hilltop Nature Park Enhancements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3535	<Null>	How Does Small Plastic Debris Affect Commercially Important Fisheries in Coastal Bend Bays?	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3536	<Null>	Identification of Harmful Algal Bloom	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3537	<Null>	South Padre Island Dune Restoration Volunteer Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3538	<Null>	Teachers on the Mission-Aransas Estuary	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3539	<Null>	Texas A&M University Corpus Christi Oso Bay Hike and Bike Trail Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3540	<Null>	Texas Beaches: The New Management Paradigm	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3541	<Null>	Texas Acoustic Array Network (TEXAAN): a Cooperative Large-scale Tracking Network for Mobile Marin	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3542	<Null>	Will Opening Cedar Bayou Tidal Inlet Improve Texas' Inshore Fisheries?	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3543	<Null>	Rockport Harbor Restroom Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3544	<Null>	A New Management Paradigm for Texas Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3546	<Null>	Assessment of the Brevetoxin Load in Beached Sargassum, A Novel Carrier to Coastal Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3547	<Null>	Assessment of the Trophic Response of Primary and Secondary Producers to Timed Freshwater Release	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3548	<Null>	Automated Detection of Harmful (and/or Toxic) Algae Blooms (HABs) in Galveston Bay.	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3549	<Null>	Bay Day Festival: Highlighting Galveston Bay and Coastal Resources	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3550	<Null>	Bolivar Peninsula Signage for Beach Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3551	<Null>	Cameron County Public Beach Access #4 Enhancements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3552	<Null>	Captain Crab's Clean Beach Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3553	<Null>	Cedar Bayou/Vinson Slough Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3554	<Null>	Chambers County Greenprint Implementation - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3555	<Null>	Decision Support Tool for Assessing Shoreline Vulnerability	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3556	<Null>	Drive and Discover Coastal Corpus Christi	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3557	<Null>	East End Lagoon Park & Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3558	<Null>	Effects of Pesticide on Mortality and Behavior of Blue Crabs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3559	<Null>	Engineering Analysis of Optimal Beach Dune Configuration for Coastal Protection on Texas Barrier Islan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3560	<Null>	Floating Wetlands for Stormwater Quality Improvement in Harris County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3561	<Null>	Galveston Bay Area Water Efficiency Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3562	<Null>	Geological Framework Study for Folletts Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3563	<Null>	GIS Mapping of Stormwater Runoff from the City of Harlingen to the Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3564	<Null>	Glass to Sand Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3565	<Null>	Impact of Drought/Flood Oscillation on the Water Quality of Estuaries and Bays along the South Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3566	<Null>	Improving Marsh Restoration by Studying Planting Techniques	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3567	<Null>	Land Use Change, Flood Vulnerability, and Coastal Hazard Policy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3568	<Null>	Nueces River High Salinity Source Evaluation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3569	<Null>	Rapid Response Capabilities for Harmful Algal Bloom (HAB) species in Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3570	<Null>	SEAS- Sargassum Early Advisory System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3571	<Null>	Shamrock Island Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3572	<Null>	Storm Risk Calculator for Coastal Counties	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3573	<Null>	Upgrading the Texas Coastal Wave Forecasting System (For Galveston Bay)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3574	<Null>	Video Promotions of Port Isabel; its ecotourism; and hurricane preparedness for residents and tourists	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3575	<Null>	Water Quality Factors Contributing to Fish Kills in Baffin Bay & Upper Laguna Madre	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3576	<Null>	Wetland Functional and Valuation Assessment to Determine Sustainability and Resiliency	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3577	<Null>	Baseline Mapping for Mangrove Monitoring in the Coastal Bend, Texas Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

3578	<Null>	Boater Waste Education Campaign: Communicating Environmental Impact and Facilitating Enforcemen	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3579	<Null>	East End Lagoon Nature Preserve Trails, Trail heads, & Signage	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3580	<Null>	Dickinson Bayou Wetland Restoration Project - Phase II Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3581	<Null>	Earth Day Bay Day Celebration 2014	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3582	<Null>	Galveston Bay Seafood Advisory Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3583	<Null>	Gulf Boulevard Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3584	<Null>	Henderson Street Nature Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3585	<Null>	Increasing Water Quality and Quantity through Watershed Experiential Education in Texas Estuaries (W	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3586	<Null>	Maximizing the Ecological Value of Coastal Wetland Restoration: Comparisons Among Restoration Tech	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3587	<Null>	Modeled Inflow Validation & Nutrient Loading Estimation in Two Subwatersheds of the Lower Laguna	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3588	<Null>	Mustang Island Habitat Protection and Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3589	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3590	<Null>	Restoration of Multiple Wetlands in the Magnolia Beach Area, Calhoun County: Phase I Planning	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3591	<Null>	Shell Bank Improving Oyster Reef Restoration Through Oyster Shell Recycling, Education, and Scientific	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3592	<Null>	Texas Students Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3593	<Null>	Acquiring Nearshore Bathymetric and Topographic Elevation Data as well as Aerial Imagery of the Texa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3594	<Null>	Assessment of E. Coli pollution from failing OSSFs to Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3595	<Null>	Assessment of Mercury in selected game fish food webs in the Texas Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3596	<Null>	Bay Day: An Day of Education about Galveston Bay and Coastal Resources	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3597	<Null>	Boater Waste Education Campaign Educating Boaters and the Community About Water Quality	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3598	<Null>	Cascade Park Coastal Wetlands Enhancement and Education	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3599	<Null>	Derry Waterfront Park Living Shoreline	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3600	<Null>	Evaluation of factors contributing to water quality degradation in an urbanizing estuary (Oso Bay, Texa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3601	<Null>	Galveston Bay Oyster Shell Recycling Program Reclaiming the Resource	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3602	<Null>	Jaime J. Zapata Memorial Boat Ramp Fishing Pier & Kayak Lauching Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3603	<Null>	Residential Storm Surge Damage Assessment for Galveston County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3604	<Null>	San Luis Pass County Park Dune Walkover	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3605	<Null>	Science-based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay system	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3606	<Null>	Seagrass and Epiphyte Hyperspectral Imaging for Efficient Integrated Measurement of Water Quality	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3607	<Null>	Shell Bank An oyster shell recycling, habitat selection, and outreach program for the Texas Coastal Ben	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3608	<Null>	South Padre Island Dune Restoration Volunteer Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3609	<Null>	Tabbs Bay Continuation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3610	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3611	<Null>	Upper Oso Watershed Water Quality Improvement and Habitat Education Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3612	<Null>	Coastal Marine Spatial Planning Effort for FY13 (Marmillion)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3613	<Null>	A Physical Biogeochemical Modeling Study of Harmful Algal Blooms	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3614	<Null>	Assessing Bird Migration Along the Lower Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3615	<Null>	Bringing Visitors and Stewards to the Bays of the Upper Texas Gulf Coast Region	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3616	<Null>	Captain Crab Clean Beach Media Education Campaign and Puppet Show	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3617	<Null>	Coastal Bend Environmental Education - Learning on the Edge Program Expansion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3618	<Null>	Distribution of Rangia Clams in Galveston Bay Historical Decline and Defining a Response	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3619	<Null>	Dolphin Park Master Site Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3620	<Null>	East End Lagoon Trail Restoration and Sinage	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3621	<Null>	Economy Ecology and Culture of the Texas Coast Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3622	<Null>	Educating children about human impacts on coastal environments	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3623	<Null>	Educational Public Service Announcement for the Coastal Bend of Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3624	<Null>	Emergency Vehicle Access South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3625	<Null>	Expanding Local Funding Capacity for Shoreline Management Projects & Model SPI Beach Funding Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3626	<Null>	Recommendations Development for Improved Habitat Restoration Technologies	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3627	<Null>	Would new information on hurricane related wind and flood risk estimates reduce noncompliant beha	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3628	<Null>	A Wetland Education and Outreach Center in Rio Hondo, Texas Phase 1: Site Assessment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3629	<Null>	An Evaluation of Habitat Impacts and Recovery Associated with Utility Line Construction in the Laguna	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3630	<Null>	Arroyo Colorado Assessment of Tidal Stream Communities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3631	<Null>	Cameron County Coastal Region Watershed Protection Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3632	<Null>	Dolphin Park Specific Implementation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3633	<Null>	Headwaters to Ocean	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3634	<Null>	Improving Water Quality in the Tidal Segment of the Arroyo Colorado Using Energy-Conserving Solar P	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3635	<Null>	Laguna Madre Neighborhood Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3637	<Null>	Lower Rio Grande Valley Coastal Region - Structural Stormwater BMP inventory	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3638	<Null>	Lower Rio Grande Valley Mobile Coastal Management O&E Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3639	<Null>	Lower Rio Grande Valley Utility Bill Inserts	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3640	<Null>	Marinas and Fisheries: Impact of Small and Medium Sized Businesses Development on Galveston Coun	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3641	<Null>	Paradise Landing and Observation Deck	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3642	<Null>	Protecting Diamondback Terrapin: Education, Outreach, and Study of Ecology and Crab Trap Bycatch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3643	<Null>	Public Access and Environmental Enhancements at the Hans and Pat Suter Wildlife Refuge	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3644	<Null>	Structural Storm Surge Damage Assessment for Houston-Galveston Region	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3645	<Null>	Texas Coastal Regional Strategy Coordinating Committee - Houston/Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3646	<Null>	Updating Shoreline Change Rates and Environmental Sensitivity Index of Galveston Bay System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3647	<Null>	Upper Texas Gulf Coast National Recreation Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3648	<Null>	Washington Park Renovation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3649	<Null>	Beach & Bay Access Website	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3650	<Null>	Geological Framework Study of Follet's Island- Data Processing and Modelling	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3651	<Null>	Coastal Resources Data Gathering and Assessment - Year 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3652	<Null>	Coordination of GOMA's Ecosystems Integration & Assessment Priority Issue Team	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3653	<Null>	Environmental Sensitivity Mapping	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3654	<Null>	Beach and Bay Access Guide - Phase 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3655	<Null>	Recycling Glass into Sand Feasibility Study South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3656	<Null>	Regional Coastal Coordinating Committee - Houston/Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3657	<Null>	Riverine Suspended Sediment Study of Texas Coastal Plain	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3658	<Null>	Status and Trends of Wetland and Aquatic Habitats of the Galveston Bay Area 1950s to 2010	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3659	<Null>	Structural Stormwater BMP inventory	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3660	<Null>	Surfside Park Master Site Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3661	<Null>	The Brazos River Mouth A Renewable Sand Resource	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3662	<Null>	The City of Aransas Pass Waterfront Revitalization Debris Removal from Conn Brown Harbor Waterfron	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3663	<Null>	Tools for oyster reef management and optimization of oyster reef restoration the Copano Aransas Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3664	<Null>	What Natural and Human Features Influence Housing Damage During Hurricanes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3665	<Null>	Coastal Data: Collection, Mapping, Analysis and Evaluation -Year 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3666	<Null>	Texas Coastal Resiliency Plan Project Management Services	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

3667	<Null>	Support for Resource Management Codes Revision	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3668	<Null>	Texas Coastal Resiliency Plan Education and Outreach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3669	<Null>	Texas Coastal Management Program Section 309 Assessment &Strategies Report, 2016 to 2020 Enhanc	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3670	<Null>	Armand Bayou Watershed Plan - Phase IV Implementation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3671	<Null>	Boater Waste Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3672	<Null>	Anuran Use of Coastal Freshwater Wetlands along the Upper Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3673	<Null>	Bay Day Festival	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3674	<Null>	Willacy County Coastal Heritage and Ecotourism Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3675	<Null>	Brazoria County Hazard Mitigation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3676	<Null>	Wetlands Enhancement and Educational Signage at South Padre Island Birding and Nature Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3677	<Null>	Cameron County Parks 4x4 6 Cubic Yards Garbage Compactor	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3678	<Null>	Upper Oso Watershed Water Quality Improvement and Habitat Education Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3679	<Null>	Captain Crab Clean Beach Media/Education Campaign and Puppet Show	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3680	<Null>	Training Program for Certifying Nesting Sea Turtle Monitors	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3681	<Null>	The Texas General Land Office Adopt-A-Beach Marine Debris Public Relations Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3682	<Null>	The Live Oak Nature and Education Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3683	<Null>	Development and Implementation of a Sanitary Survey Program for Texas Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3684	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3685	<Null>	Coastal Enhancement & Education	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3686	<Null>	Coastal Expo	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3688	<Null>	Developing Native Texas Coastal Groundcovers and Shrubs As Alternatives To Invasive Exotic Species	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3689	<Null>	Development of an Algorithm to Automate the 3D Visualization and Morphologic change Analysis using	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3690	<Null>	Tabbs Bay Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3691	<Null>	Shell Bank: An Oyster Shell Recycling, Reef Planning, and Education Program for the Texas Coastal Bend	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3692	<Null>	Diamondback Terrapin Protection in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3693	<Null>	Texas Beach Sand-Sediments-Potential Health Risks at Reservoirs of Bacteria	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3694	<Null>	Dredge Disposal Capacity & Future Use of Placement Area 08	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3695	<Null>	State Highway 48 Boat Ramp Fishing Pier and Kayak Launching Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3696	<Null>	Expected Effect of Climate Change on Tidal-Influenced Coastal Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3697	<Null>	Sapphire Circle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3698	<Null>	Evolution and Rates of Transgression of the South Padre Island Barrier and Beach/dune System Using R	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3699	<Null>	Habitat Restoration at the Oso Bay Wetlands Preserve - Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3700	<Null>	San Antonio Bay Watershed Protection Plan - Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3701	<Null>	Prairie Rising- A Grassroots Restoration Partnership	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3702	<Null>	Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3704	<Null>	San Luis Pass County Parks Dune Walkovers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3705	<Null>	Identifying Active Coastal Surface Faults and Assessing Their Potential Impact on Wetlands and Infrastr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3706	<Null>	Improving water quality of the effluent from Cattail Marsh wetland treatment system	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3707	<Null>	It's All Connected: The Science & Spanish Club Network Coastal Environmental Education Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3708	<Null>	Lower Rio Grande/Rio Bravo Water Quality Initiative: Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3709	<Null>	Nueces Bay Marsh Restoration (Phase 2)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3710	<Null>	Nueces Delta Freshwater Inflow Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3711	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3712	<Null>	Phase 2: Swan Lake Study - Utilizing Processed Industrial Wastewater to Manage Salinity for Oysters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3713	<Null>	Tourism and Quality of Life on the Texas Coast in a Time of Change	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3714	<Null>	Best Practices Dune Restoration Guide and Manual for the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3715	<Null>	Seagrass Monitoring and Assessment in Texas Coastal Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3716	<Null>	Coastal and Marine Spatial Planning (Shaw-Year-1)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3717	<Null>	Coastal Resources Data Gathering and Assessment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3718	<Null>	Coastal Marine Spatial Planning Effort for FY13 (Marmillion)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3719	<Null>	Updating and Enhancing the Texas Public Access Inventory – Phase Two	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3720	<Null>	City of Houston Buffalo Bayou-Hidalgo Greenway Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3721	<Null>	City of South Padre Island Marina Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3722	<Null>	Coastal and Migratory Birds as Indicators of Texas Coastal and Coastal Wetlands' Integrity/Health	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3723	<Null>	Derry Waterfront Park and Mitigation Bank	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3724	<Null>	Engaging stakeholders in Texas coastal tourism in a time of change	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3725	<Null>	Factors affecting Anuran use of partially isolated coastal wetlands along the upper Gulf coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3726	<Null>	Pelican Island Beneficial Use Marsh Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3727	<Null>	Science + Action = Gulf Coast Literacy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3728	<Null>	Shoreface and antecedent geological controls erosional hotspots and dune stability on South Padre Isla	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3729	<Null>	Upper Texas Coast Dune Outreach Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3730	<Null>	Washington Park Reconstruction Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3731	<Null>	Application of Small Rapid Deploy UAS to Expand Monitoring Capabilities at Bayside and Gulf CEPRA Be	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3733	<Null>	Artifical reef habitat to enhance fisheries and harden sediments	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3734	<Null>	Assessing the fate of plastic debris in the marine environment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3735	<Null>	Beach Access 4 Parking Lot and Infrastructure Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3736	<Null>	Beach Access and Dune Protection Manual	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3737	<Null>	Boater Waste Education Campaign: Improving Awareness and Engagement Based on Lessons Learned	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3738	<Null>	Bucket Brigade	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3739	<Null>	Causeway Rookery Island - Protection and Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3740	<Null>	Cease the Grease Campaign: Expanding Marketing, Outreach, and Cooking Oil Recycling	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3741	<Null>	Closing the Gap: Completion and Gap Analysis of Texas Coastal Species Interaction Data	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3743	<Null>	Construction and Enhancement of Artificial Reefs in the Western Gulf of Mexico	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3744	<Null>	Coordination of Gulf of Mexico Alliance Priority Issue Team: Wildlife and Fisheries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3745	<Null>	Development of Control Strategies and Modeling Framework for Managing Stormwater Runoff in the C	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3746	<Null>	Dune Volunteer Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3747	<Null>	Earth Day Bay Day Celebration 2016	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3748	<Null>	East End Lagoon	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3749	<Null>	Ecosystem Services Studies along the Galveston Bay System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3750	<Null>	Evaluating Groundwater Exported Acidity in Copano Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3751	<Null>	Evaluation of changes including nutrient and sediment loading, in water quality and their implications f	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3752	<Null>	Evaluation of UAS remote sensing for modeling mangrove habitats 3D structure on the Texas Gulf Coas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3753	<Null>	Exploration Green Public Access Development and Ecosystem Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3754	<Null>	Fred Stone County Park Fishing Pier improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3755	<Null>	Galveston Bay Oyster Shell Recycling Program - Restaurants to Reefs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3756	<Null>	Harbor Circle Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3757	<Null>	Holiday Beach Birding Site	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3758	<Null>	How do obligate crab parasites find their host? A proposed survey and study of the parasitic crab castr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed

3760	<Null>	If we lose Sargents Beach and eastern Matagorda Peninsula we lose the Intracoastal Waterway and Eas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3761	<Null>	Impacts of Temporal and Spatial Variation of Submarine Groundwater Discharge on Nutrient Fluxes to	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3762	<Null>	Improving Dissolved Oxygen in a Detention Pond to Support Fish Abundance and Biodiversity using Sol	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3763	<Null>	Isla Blanca Park Public Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3764	<Null>	Japhet Creek Land Acquisition II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3765	<Null>	Laguna Madre Estuary Program Environmental Strategic Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3766	<Null>	Long-term water quality trends in central-south Texas estuaries: relationships with climatic variability a	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3767	<Null>	Mangrove and salt marsh restoration in Galveston Bay: identifying strategies for the enhancement of c	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3768	<Null>	Pesticide Release into south Texas estuaries- speciation, timing, and potential impact	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3769	<Null>	Poinsetta Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3770	<Null>	Port Lavaca Improvements for Shoreline Access and Waterfront Revitalization and Ecotourism Develop	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3771	<Null>	Powderhorn Ranch Geoenvironmental Atlas: Geology, Wetlands, and Coastal Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3772	<Null>	Predicting Land Cover Change to Foster Hazard Resiliency	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3773	<Null>	Rehabilitation of Fulton Harbor Lift Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3774	<Null>	San Benito Wetlands Project Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3775	<Null>	Shell Bank: Oyster shell recycling, community involvement, student institute, and oyster response to e	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3776	<Null>	SPI Beach Access and Parking Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3777	<Null>	Texas Gulf Region Cooperative Weed Management Area: Controlling the Brazilian Peppertree	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3778	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3779	<Null>	TMF3- a flash flood forecasting system based on satellite soil moisture mapping, multi-unmanned aircr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3780	<Null>	Tracking the fate and transformation of groundwater organic and inorganic nutrients discharge in Oso	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3781	<Null>	Unmanned Aircraft Systems for Enhanced Situational Awareness during Coastal Natural Hazards Events	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3782	<Null>	Updating and improving the Galveston Island Geohazards Map	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3783	<Null>	Trematode parasites as monitoring tools for Texas marshes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3784	<Null>	Utilizing the isotopic composition of dissolved organic nitrogen to trace the sources and processing of	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3785	<Null>	WaterIQWet	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3786	<Null>	LagunaH2O: Using ships-of-opportunity to monitor the water quality health of the Laguna Madre	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3787	<Null>	Land Cover Change & Coastal Resiliency in Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3789	<Null>	TAP: The Atlantis Project- Operation Green Ferry	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3790	<Null>	TAP: The Atlantis Project- Operation: Light the Way	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3791	<Null>	The Atlantis Project: Operation Big Kahuna	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3792	<Null>	The Atlantis Project: Operation Revitalize and Beautify JFK	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3793	<Null>	The Padre Island Peregrine Falcon Survey	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3794	<Null>	Tracking Microbial Evolution in the Age of Plastics	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3795	<Null>	Bolivar Beaches Public Access and Education Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3796	<Null>	Captain Crab Water Quality Education & Outreach (CCWQEO)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3797	<Null>	Cameron County Public Beaches Access #4 Enhancements - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3798	<Null>	Feasibility assessment of nonstructural coastal erosion protection in Lower Laguna Madre	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3799	<Null>	Aransas Channel Waterfront Improvement in Nueces County Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3800	<Null>	Boater Waste Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3801	<Null>	Captain Crab Clean Beach Media/Education Campaign and Puppet Show	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3802	<Null>	Corpus Christi Beach Kayak Launch Site - WITHDRAWN	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3803	<Null>	Corpus Christi Beach: ADA Water Access Improvements and Promenade Expansion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3804	<Null>	Harris County Seafood Consumption Advisory Public Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3805	<Null>	Henderson Tract Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3806	<Null>	Identifying Ecologically Effective Wetland Restoration Techniques in Coastal Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3807	<Null>	Laguna Point Park Improvements - Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3808	<Null>	Nueces Bay Causeway Marsh Restoration - Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3809	<Null>	Oyster Restoration Through Community Participation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3810	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3811	<Null>	Public Education and Outreach for Clean Beaches - WITHDRAWN	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3812	<Null>	Rain Gardens: Mitigating Runoff Pollution for Coastal Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3813	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3814	<Null>	Science & Spanish Club Network: The Only Barriers Along the Texas Coast are Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3815	<Null>	Shell Bank: An Oyster Shell Recycling Program for the Texas Coastal Bend	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3816	<Null>	To Construct a Salt-Water Barrier to Protect Bayou in Chambers County, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3817	<Null>	Volunteer Marsh Planting and Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3818	<Null>	City of Houston Buffalo Bayou-Hidalgo Greenway Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3819	<Null>	Brazoria Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3820	<Null>	Calhoun County Master Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3821	<Null>	South Padre Island Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3822	<Null>	Status and Trends of Coastal Vulnerability to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3823	<Null>	Status and Trends of Inland Wetalnd and Aquatic Habitats of the Brownsville-Harlingen Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3824	<Null>	Texas Coastal Management Program Section 309 Assessment and Strategies Report 2011-2015	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3825	<Null>	Reassessment of Seagrass Distribution and Biomass in the Lower Laguna Madre, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3826	<Null>	Updating and Enhancing the Texas Public Access Inventory - Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3827	<Null>	Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3828	<Null>	Education and Outreach to Seafood Consumers within the state of Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3829	<Null>	Effects of Climate Change on Coastal Floodplains	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3830	<Null>	Establishing the Junior Ridley Rider Program - A New Program to Protect Sea Turtles and Piping Plovers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3831	<Null>	Gay Dawn Circle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3832	<Null>	Gulf Beach Maintenance & Management Education Workshops for Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3833	<Null>	Improving Water Quality of Padre Island Canal Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3834	<Null>	Improving Water Quality of the Effluent from Cattail Marsh Wetland Treatment System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3835	<Null>	Kemah 6th Street Bay Front Palapa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3836	<Null>	Port Mansfield Coastal Conservation, Ecotourism and Water Access Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3837	<Null>	Quantifying Coastal Evolution along McFaddin National Wildlife Refuge Using Digital Photogrammetry	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3838	<Null>	Land Acquisition and Parking Lot Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3839	<Null>	Sapphire Circle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3840	<Null>	Scenic Resouces Impact of Wind Turbine Projects in the Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3841	<Null>	Study of Beach Maintenance Practices	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3842	<Null>	Transport of Biota, Pollutants and Debris by Wave-induced Currents in Texas Bays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3843	<Null>	MPS Farms Columbia Bottomlands Farmland Protection Partnership	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3844	<Null>	A Regional Analysis of Food Web Structure and Nutrient Sources in Coastal Texas Marshes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3845	<Null>	Chambers County Greenprint Implementation – Year 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3846	<Null>	Creating a Volunteer Corps in the Coastal Bend for On-the-Ground Conservation Activities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3847	<Null>	Earth Day-Bay Day, 2011	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3848	<Null>	Geological Framework Investigation of the Innershelf of Brazoria County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed

3849	<Null>	Swath Surf Zone Mapping and Development of Emergency Response Capabilities -- Using X-Band Radar	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3851	<Null>	UTB/TSC Port Isabel Birding Palapa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3852	<Null>	Adolph Thomae, Jr. County Park Educational Kiosk and Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3853	<Null>	Hazel Bazemore Park Habitat and Waterfront Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3854	<Null>	Port Arthur Waterfront Tourism Development Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3855	<Null>	Water Quality Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3856	<Null>	Assessment of Flooding and Erosion in Sabine-Neches Waterway Caused by Hurricanes and Tropical St	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3857	<Null>	Assessment of Salt Marsh Restoration in Nueces Bay, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3859	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3860	<Null>	Boater Waste Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3861	<Null>	Boca Chica Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3862	<Null>	Brazilian Peppertree Treatment and Control on Galveston Island - Year 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3864	<Null>	Briscoe King Pavilion Dune Walkover Relocation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3865	<Null>	Captain Crab Clean Beach Media/Education Campaign and Puppet Show	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3866	<Null>	Celebrating Earth Day-Bay Day in the Coastal Bend, 2010	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3868	<Null>	Conn Brown Harbor Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3869	<Null>	Connecting Children with Nature on the Texas Gulf Coast: The Science & Spanish Club Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3870	<Null>	Copano Canoe and Kayak Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3871	<Null>	Cove Harbor Drainage and Stormwater Management Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3872	<Null>	Education Enhancement at Fennessey Ranch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3873	<Null>	Educational Videos and Complementing Guide Brochures: Conservation Success Stories of the Laguna I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3874	<Null>	Effect of Freshwater Inflows on Nutrient Exchange Along an Estuarine Gradient in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3875	<Null>	Enhancing Water Quality and Dredged Material for the Port of Harlingen	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3876	<Null>	Goose Island Marsh Walkway	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3877	<Null>	Habitat Alterations in East and West Galveston Bay Due to Hurricane Ike	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3878	<Null>	Incorporating Wave Effects in Trajectory Models for the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3879	<Null>	Integration of the Texas Coastal Erosion Data Network into the Coastal Planning Atlas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3880	<Null>	Intracoastal Canoe and Kayak Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3881	<Null>	Mapping and Analyzing Risk and Vulnerability of the Upper Texas Gulf Coast to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3882	<Null>	Modeling Salinity and Water Level Effects on Intertidal Wetlands of South Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3883	<Null>	Non-Toxic Mosquito Abatement Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3884	<Null>	Nueces Bay Portland Causeway - Marsh Restoration and Public Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3885	<Null>	Optimum Propagation Strategy for Planting/Replanting Black Mangrove	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3886	<Null>	Packery Channel Nature Preserve Improvements Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3887	<Null>	Port Isabel Bird Palapa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3888	<Null>	Port of Houston Ship Channel Model	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3889	<Null>	Post Hurricane Ike Choice Model Survey to Investigate Public Perceptions about Coastal Issues Demogr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3890	<Null>	Quantification of Hurricane Surge Damage in Coastal Bays as a function of Dune and Wetland Characte	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3891	<Null>	Real Time and Historical Wave Information from Texas Water Level Monitoring Stations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3892	<Null>	Rio Hondo Wetland Education & Outreach Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3893	<Null>	Seadrift Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3894	<Null>	Seagrass Response to Wastewater Inputs: Implementation of a Seagrass Monitoring Program in Two Te	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3895	<Null>	Shell Bank: An Oyster Shell Reclamation, Storage, and Recycling Program for Oyster Reef Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3896	<Null>	Smith Point Community Wastewater Treatment Service - INELIGIBLE	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3897	<Null>	Surfside Jetty Park Waterfront Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3898	<Null>	TCOON Leveling and Surveying Campaigns	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3899	<Null>	Texas Coastal Post-Storm Aerial Photography and LIDAR Evaluation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3900	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3901	<Null>	Texas Shoreline Change Project Web-Based GIS	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3902	<Null>	Wetland and Barrier Island Ecosystem Services: Development of a Decision Support Tool for Coastal M	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3903	<Null>	Oso Bay Wetland Preserve - Property Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3904	<Null>	Quintana County Park Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3905	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3906	<Null>	Assessment of Sea Level and Salinity Effects on Wetlands Productivity of South Bay, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3908	<Null>	Charlie's Pasture Fishing Pier Reconstruction and Accessibility Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3909	<Null>	Evolution of Transgressive Beach/Dune System Along S. Padre Island: Remote Sensing	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3910	<Null>	Implementation of a Seagrass Monitoring Program in the Coastal Bay Bends and Estuaries Program (CB	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3911	<Null>	Incorporation of Social Vulnerability into Economic Cost-Benefit Analysis for Coastal Resiliency	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3912	<Null>	Japhet Creek	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3914	<Null>	Matagorda Island Beach Abandoned Container Cleanup Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3915	<Null>	Oyster Reef and Bay Bottom Mapping and Habitat Assessment of Aransas Bay, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3916	<Null>	Port Mansfield Shoreline Access Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3917	<Null>	Public Access Boat Ramp Repairs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3918	<Null>	Shoreline Change along Bayhead Deltas: Causes and Impacts to Estuaries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3919	<Null>	Swath Surf Zone Mapping and Development of Emergency Response Capabilities Using X-Band Radar t	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3920	<Null>	Texas Beach Conditions	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3921	<Null>	Washington Park Shoreline Stabilization and Recreation Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3922	<Null>	Updating Long-Term Change Rates of the Texas Gulf Shoreline	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3923	<Null>	Recovery of the Coastal Ecosystem of Southern Jefferson County, Texas from the Storm Surge of Hurric	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3924	<Null>	Seadbed Mapping of the Lower Shoreface and Inner Shelf of Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3925	<Null>	Brazoria County Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3926	<Null>	Follets Beach Access Point	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3927	<Null>	Chambers County Greenprint	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3928	<Null>	Status and Trends of Coastal Vulnerability to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3929	<Null>	Status and Trends of Inland Wetlands and Aquatic Habitats of the Freeport and San Antonio Bay Areas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3930	<Null>	Texas Coastal Management Program Section 309 Assessment & Strategies Report 2011-2015	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3931	<Null>	Public Service Announcements for the Arroyo Colorado Watershed	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3932	<Null>	City of Port Aransas Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3933	<Null>	Inventory of On-Site Sewage Facilities to Support Watershed Planning in the Lower Nueces River Wate	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3934	<Null>	Nautical Landings Marina Sewage Pump-Out Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3935	<Null>	GLO Coastal Program Rules Revisions	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3936	<Null>	Assessment of Streamflow and Nutrient and Sediment Loads in Petronila Creek, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3937	<Null>	Assessment of the Water Quality and Circulation in Little Bay, Rockport, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3938	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3939	<Null>	Baytown Nature Center - Crystal Bay Shoreline Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3940	<Null>	Boater Waste Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3941	<Null>	Brazilian Pepper Treatment and Control on Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3942	<Null>	Brazos River Sand For Beach Nourishment: Quantifying Channel Storage and Shoreface Export	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed

3943	<Null>	Cameron County Flag Advisory System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3944	<Null>	Captain Crab Clean Beach Media/Education Campaign and Puppet Show	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3945	<Null>	Coastal Bend Regional Park - Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3946	<Null>	Construct Public Educational Facilities and Public Access for the Smith Point Community and Visitors	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3947	<Null>	Gay Dawn Circle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3948	<Null>	Cove Harbor Drainage and Stormwater Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3949	<Null>	Cove Wetlands Sanctuary Walkway Extension	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3950	<Null>	Crossing Texas Barrier Island: The Science & Spanish Club Network Coastal Environmental Education Pr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3951	<Null>	Development of an Arroyo Colorado Education and Outreach Center at Rio Hondo, Texas (Phase 1)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3952	<Null>	Endangered Sea Turtle Nesting Activity on Upper Texas Coast Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3953	<Null>	Exploration and Access to the Upper Texas Coast's Natural Resources Area via Kayak and Media Outlets	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3954	<Null>	Freshwater Inflows and the Health of Galveston Bay: Characterizing the Nature of the Nutrient and Sed	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3955	<Null>	Galveston County Pocket Park #4 Shoreline Protection and Habitat Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3956	<Null>	Historic use of Public Beaches on South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3957	<Null>	Identification of Galveston Bay Estuary Shoreline at Risk from Vessel Generated Waves	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3958	<Null>	Implementing the West Galveston Bay Habitat Initiative	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3959	<Null>	Inventory and Mapping of Ecosystem Services in the Texas Coastal Management Program Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3960	<Null>	Isla Blanca County Park Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3961	<Null>	Management Implication for Colonial Waterbirds in the Laguna Madre	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3962	<Null>	Matagorda County Public Restroom and Sheriff Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3963	<Null>	Matagorda County Sargent Park Beach Restroom	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
3964	<Null>	Memorial Park Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3965	<Null>	Monitoring of the Brazos River Plume to Assess its Role in Delivery of Sand to the Shelf and Potential fo	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3966	<Null>	Orange County Water Quality Improvement #1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3967	<Null>	Orange County Water Quality Improvement #2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
3968	<Null>	Packery Channel Park Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3969	<Null>	Port Aransas Beach Sanitation Pilot Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3970	<Null>	Pesticide Education in the Coastal Zone of the Arroyo Colorado Watershed	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3971	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3972	<Null>	Portland Causeway - Marsh Restoration and Public Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3973	<Null>	Quintana County Park Beach Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3974	<Null>	Promoting the Community Emergency Response Team Program In Support of Coastal Hazard Mitigatio	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3975	<Null>	Regional Constructed Wetland Site Suitability Evaluation for Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3976	<Null>	Restoration and Management of Coastal Wetlands-Tallgrass Prairie and Tidal Marsh	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3977	<Null>	Salt Marsh Restoration Assessment on Matagorda Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3978	<Null>	Scenic Impact of Wind Turbine Projects for the Texas Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3979	<Null>	Seabed Mapping of the Brazos Delta and Proximal Shelf	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3980	<Null>	Seasonal Abundance of Oyster and Barnacle Larvae Around Three Galveston Bay Oyster Reefs with Diff	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3981	<Null>	Shoreline Rehabilitation Project for Public Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3982	<Null>	Surfside Jetty Park Beach Access Camping Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
3983	<Null>	Swan Lake: Pilot Study Site Utilizing Processed Industrial Wastewater to Manage Salinity in Lower Galve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3984	<Null>	Tapley Tributary Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3985	<Null>	Texas Coastal Storm and Erosion Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
3986	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3987	<Null>	Willacy Coastal Natural Resources Educational Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3988	<Null>	Coast-wide Erosion Response Plan Update FY2010-2011 (Kimberly McKenna)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3989	<Null>	City of Clute Comprehensive Recreation, Conservation, and Economic Development Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3990	<Null>	Geohazards Mapping of South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3991	<Null>	Status and Trends of Coastal Vulnerability to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3992	<Null>	Status and Trends of Inland Wetland and Aquatic Habitats of the Matagorda Bay Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3993	<Null>	Educational Exhibits for the South Padre Island Birding & Nature Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3994	<Null>	Coast-wide Erosion Response Plan Update FY2010-2011 (Taylor Engineering)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3995	<Null>	Study to Detect Potential Human Fecal Contamination of Recreational Waters at Cole and Ropes Parks,	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3996	<Null>	Cameron County Beach Access #4	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3997	<Null>	Bay Education Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3998	<Null>	Cameron County Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
3999	<Null>	City of Corpus Christi Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4000	<Null>	Nueces County Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4001	<Null>	City of South Padre Island Public Access Improvements - Aquarius Circle & Good Hope Circle	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4002	<Null>	Treasure Island ADA Beach Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4004	<Null>	Oyster Reef and Bay Bottom Mapping and Habitat Assessment of Aransas Bay, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4005	<Null>	Investigation of the Sedimentary Record of Historic and Prehistoric Storm Surge	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4006	<Null>	Andy Bowie County Park Ranger Station w/ Public Restrooms	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4008	<Null>	4x4 Flatbed Stake Truck	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4009	<Null>	Acquisition of Swath Bathymetry System to be Used to Support Texas Natural Resource Management F	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4010	<Null>	Adolph Thomae Park Shaded Pavilion Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4011	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4013	<Null>	Boca Chica Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4014	<Null>	Buffalo Bend Nature Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4015	<Null>	Captain Crab Clean Beach Media & Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4016	<Null>	Circulation Study of Little Bay, Rockport, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4017	<Null>	Coastal Applied Research Review Team (CARRT) - Engaging the Texas Research Community in the Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4018	<Null>	Conn Brown Harbor Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4019	<Null>	Cove Harbor Drainage System Improvements and Stormwater Management Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4020	<Null>	Creating Migratory Bird Habitat Using Renewable Energy Sources	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4021	<Null>	Development of a Geographic Information System for Coastal South Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4022	<Null>	Expansion of Earth Day-Bay Day: Cultivating Multicultural Leadership and Environmental Stewardship i	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4023	<Null>	Exploration and Access to the Upper Texas Coast Natural Resource Areas via Kayak and Media Outlets	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4024	<Null>	Four Wheel Drive Tractor & Rake	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4025	<Null>	Freshwater Inflows and the Health of Galveston Bay: Influence of Nutrient and Sediment Loads on the	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4026	<Null>	How Much Critical Habitat Will Be Lost to Subsidence Faulting at the Matagorda Bay Nature Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4027	<Null>	Isla Blanca Park - Picnic Shelters Refurbishing Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4028	<Null>	Mad Island WMA Prairie and Wetland Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4029	<Null>	Matagorda County Sargent Park Public Beach Restroom	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4030	<Null>	South Padre Island Birding and Nature Center Interpretive Signage for Boardwalks	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4031	<Null>	Temporal Fluctuations in the Sources and Fate of Persistent Organic Pollutants and their Impact on Co	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4032	<Null>	Texas High School Coastal Monitoring Program: Port Isabel, Ball, & Port Aransas High Schools	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4033	<Null>	The Economic Value of Freshwater Inflows and Ecosystem Preservation in the Estuary and Coastal Wet	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed

4034	<Null>	The Only Barriers Along the Texas Coastline are Islands: The Science and Spanish Club Network Educati	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4035	<Null>	The Wetlands Educations Center: Exploration, Professional Development & Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4036	<Null>	Tule Lake Education and Outreach Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4037	<Null>	Use of the Upper Texas Coast by Nesting Sea Turtles	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4038	<Null>	WaterSmart Rain Gardens for the Upper Texas Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4039	<Null>	Wetland Habitat Restoration/Enhancement at the Whitmire Unit	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4040	<Null>	Wind, Waves, Erosion and Recovery from Sedimentation in Shallow Estuaries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4041	<Null>	Coastal Bend Regional Park Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4042	<Null>	Coastal Erosion Data Network and Oyster Reef Resource Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4043	<Null>	Coastal Habitat Restoration GIS (CHRGIS): Expansion, Population, Enhancement, Monitoring and Survey	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4044	<Null>	Coastal Scenic Resources Highway Mapping-Galveston Area Case Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4045	<Null>	Comparison of Wind-Flow Patterns and Magnitude of Sand Transport occurring within Stable and Unst	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4046	<Null>	Oyster Reef and Seabed Mapping in Copano Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4047	<Null>	Parameterization of Hurricane Surge for the State of Texas Coastline	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4049	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4050	<Null>	Preservation and Use of Historical Biological Databases for San Antonio Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4051	<Null>	Restoration of Sea Oats with Mycorrhizae on Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4052	<Null>	RIO 1 (Rising Water Intervention Operations)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4053	<Null>	Rockport Harbor Restroom Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4054	<Null>	Shoreline Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4055	<Null>	Shoreline Rehabilitation Project for Public Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4056	<Null>	Smith Harbor Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4057	<Null>	City of Galveston Public Beach Access Signage	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4058	<Null>	Geohazards Mapping of North Padre and Mustang Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4059	<Null>	Saving Our Coastal Heritage- Texas Rural County Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4060	<Null>	Status and Trends of Coastal Vulnerability to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4061	<Null>	Status and Trends of Inland Wetland and Aquatic Habitats of the Beaumont - Port Arthur Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4062	<Null>	Texas Coastal Management Performance Measurement System - Phase 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4063	<Null>	Water Quality Protection and Storage Characteristics of Freshwater Wetlands in the Galveston Bay Wat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4064	<Null>	Aerial Photography WITHDRAWN	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4065	<Null>	Ostermayer Bayou Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4066	<Null>	Adolph Thomae, Jr. County Park Educational Kiosk and Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4068	<Null>	Cooling Canal Closure	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4070	<Null>	Heron Park Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4071	<Null>	Taylor Lake Village Community Park Bathroom Rehabilitation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4072	<Null>	University Beach Marina Park Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4073	<Null>	Washington Park Shoreline Stabilization (Phase II)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4074	<Null>	Wastewater Collection System Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4075	<Null>	Water Quality and Nonpoint Source Nutrients as Triggers of Harmful Algal Blooms	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4076	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4077	<Null>	Beach Access 1-B	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4079	<Null>	Burnet Bay Wetlands Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4080	<Null>	Captain Crab Clean Beach Media & Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4081	<Null>	Cedar Bayou as a Potential Reference Site for Impacted Sites along the Houston Ship Channel	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4082	<Null>	Characterization of Sea Turtle Nesting Activity Along the Upper Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4083	<Null>	Coastal Bend Regional Park Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4084	<Null>	Coastal Erosion Data Network and Oyster Reef Resource Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4085	<Null>	Coastal Expos: Educating Texans about Coastal Wetlands and Freshwater Inflows	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4086	<Null>	Coastal Habitat Restoration GIS (CHRGIS). An Interactive Visualization Tool	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4087	<Null>	Coastal Water Quality and Circulation Prediction/Forecast System for Coastal Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4088	<Null>	Compilation and Analysis of Historical Biological Databases for San Antonio Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4089	<Null>	Conn Brown Harbor - Marina Park and City Dock Relocation and Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4090	<Null>	Corpus Christi Beach Promenade	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4091	<Null>	Cove Harbor Drainage System Improvements and Stormwater Management Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4092	<Null>	Development and Implementation of Impaired Coastal Waters Curriculum for Grades 7-12	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4093	<Null>	Development of a Research Plan for the Coastal Waters of South Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4094	<Null>	Development of Offshore Wind Energy Along the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4095	<Null>	Electronic Enhancements to the Texas Coastal Ocean Observation Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4096	<Null>	Expansion of Earth Day-Bay Day: Cultivating Multicultural Leadership & Environmental Stewardship in t	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4097	<Null>	Flatbed Stake Truck	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4098	<Null>	Four Wheel Drive Tractor & Rake	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4099	<Null>	Further Expansion Dermowatch Program to Include four south Texas Bays: Aransas, Copano, Corpus Ch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4100	<Null>	Goose Island Marsh Restoration in Aransas Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4101	<Null>	Great Texas Birding Classic	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4102	<Null>	Gulf Beaches of Nueces County Wave Gauge	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4103	<Null>	Implementation of the Vision for the Oso Creek Corridor	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4104	<Null>	Improving the Ecology of Marinas & Developed Bayous	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4105	<Null>	Initiative to Improve Water Quality and Reduce Litter in Impaired Coastal Watersheds	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4106	<Null>	Isla Blanca Park - Picnic Shelters Refurbishing Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4107	<Null>	Land Acquisition for Shoreline Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4108	<Null>	Making the Floating Classroom Program Available and affordable to Texas Teachers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4109	<Null>	Marsh accretion rates at restored and natural sites in Galveston Bay: Will sea-level rise drown them?	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4110	<Null>	Matagorda Bay Nature Park Trail, Wetlands Boardwalk, & Kayak Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4111	<Null>	Oyster Reef Mapping in Copano Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4112	<Null>	Port Lavaca Causeway Fishing Pier Renovations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4113	<Null>	Public Input Meetings and Coastal Water Management Resource Guide	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4114	<Null>	Regional Ecological and Cultural Tourism Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4115	<Null>	Rockport Beach Restroom Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4116	<Null>	Role of Sea Grasses as Habitat for Blue Crab	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4117	<Null>	Sargassum: Erosion and Biodiversity at the Beach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4118	<Null>	Science-Based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4120	<Null>	Smith Point Constructed Wetland	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4121	<Null>	South Padre Island Birding and Nature Center Boardwalks	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4122	<Null>	Stage II: Continued Evaluation of the Impacts of Dredging Activities on the Fate of Dioxin in the Housto	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4124	<Null>	Elevated Bacterial Levels Education and Prediction for Coastal Communities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4125	<Null>	Orange Riverfront Park Canoe Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4127	<Null>	Taylor Bayou Wetlands Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4128	<Null>	Texas Coastal Stormwater Treatment Wetland Design Manual	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4129	<Null>	Texas High School Coastal Monitoring Program: Port Isabel, Ball, & Port Aransas High Schools	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4130	<Null>	Tule Lake Education and Outreach Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4131	<Null>	University Beach Marina Park Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4132	<Null>	Washington Park Shoreline Stabilization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4133	<Null>	Wastewater Treatment on the Bolivar Peninsula	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4134	<Null>	Wind, Waves, Erosion, and Recovery form Sedimentation in Shallow Estuaries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4135	<Null>	Village of Surfside Shoreline Stabilization Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4136	<Null>	Saving Our Coastal Heritage Texas Rural County Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4137	<Null>	Status and Trends of Coastal Vulnerability to Natural Hazards	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4138	<Null>	Status and Trends of Dune Volume, Morphology, and Vegetative Cover along the Texas Gulf Shoreline	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4139	<Null>	Status and Trends of Inland Wetland and Aquatic Habitats of the Corpus Christi Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4140	<Null>	Water Quality Protection and Storage Characteristics of Freshwater Wetlands in the Galveston Bay Wat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4141	<Null>	Phase 2 Texas Coastal Management Performance Measurement System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4142	<Null>	Cameron County Beach Maintenance Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4143	<Null>	Upper Texas Coast Wetland Education Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4144	<Null>	Small Construction for the Environmental Learning and Research Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4145	<Null>	Research Needs on Freshwater Inflow to the Nueces River Delta and Applicability to other Estuaries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4146	<Null>	Charlie's Pasture Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4147	<Null>	Anahuac Harbor Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4148	<Null>	Archeological Survey of the Fort Hebert Site	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4149	<Null>	Bolivar Peninsula Sand Resources and Seabed Mapping	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4151	<Null>	Dickinson Bayou Boat Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4152	<Null>	Drive and Discover Galveston Bay Trail Marker Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4153	<Null>	Eco-Art Workshops and Adventures on the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4154	<Null>	Master Drainage Plan Upgrade for the City of League City	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4155	<Null>	Oleander Point Windsport Park Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4157	<Null>	Status and Trends of Beach and Dune Habitats - Upper Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4158	<Null>	Suitability and Benefit Analysis of the Utilization of Treated Municipal Effluent for Coastal Wetland Hab	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4159	<Null>	Texas Coastal Protection Task Force	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4160	<Null>	Sand Source Investigation Database	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4161	<Null>	Accounting for Sea Oats: Where Are They on the Upper Texas Coast?	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4162	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4163	<Null>	Bayfront Peninsula Bulkhead Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4164	<Null>	Beachfront Pocket Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4165	<Null>	Biological Erosion Control: Experimentation and Dissemination to Stakeholders	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4166	<Null>	Captain Clean Crab Beach Media and Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4167	<Null>	Changes in Freshwater Inflows and How They Affect Texas Bays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4168	<Null>	Cheval Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate Project
4170	<Null>	Coastal Prairie Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4171	<Null>	Development of Facilities Master Plan for the Environmental Learning and Research Center on the Nec	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4172	<Null>	Double Bayou Park Canoe & Kayak Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4173	<Null>	Drive and Discover Galveston Bay Interpretive Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4175	<Null>	Education & Outreach to Coastal Users	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4176	<Null>	Erosion Control and Sediment Loading Watershed Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4177	<Null>	Erosion Control Enigineering/Permitting	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4178	<Null>	Evaluation of Economic Development on the Natural Resources	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4179	<Null>	Expanding Dermowatch Website to Include Three Central Texas Bays: Lavaca, Matagorda and San Anto	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4180	<Null>	Expanding the Floating Classroom Program from Coast to Classroom-Moving Upstream	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4181	<Null>	Fulton Fishing Pier Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4183	<Null>	Galveston Island Sand Resources and Beach Accretion Part IV: Pirates Beach to San Luis Pass	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4184	<Null>	Hugo Point Walkway & Observation Platform	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4185	<Null>	Identification of Seagrass Restoration Projects in Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4187	<Null>	Matagorda Bay Nature Park and Preserve Baseline Vegetation Inventory and Mapping	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4188	<Null>	Mission Lake Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4190	<Null>	Pathways 2000	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4191	<Null>	Point Comfort Shoreline Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4192	<Null>	Pollution Prevention Through Community Education and Neighborhood Planning	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4193	<Null>	Preliminary Evaluation of the Impacts of Dredging Activities on the Fate of Dioxin in the Houston Ship (	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4194	<Null>	Restoration of Cedar Bayou/Vincent Slough	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4195	<Null>	Robbins Park Birding Tower & Boat Ramp Rehabilitation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4196	<Null>	Rockport Harbor Bayfront Improvement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4197	<Null>	Sargassum & Beach Erosion: Potential Costs and Benefits for Coastal Managers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4198	<Null>	Scenic Resources Design Guidelines for the Texas Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4199	<Null>	Sparkle Patrol	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4200	<Null>	Spessard-McGregor Birding and Wildlife Habitat Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4201	<Null>	Storm Resistant Water Level Data Collection Platforms for the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4202	<Null>	Storm Water BMP Demonstration Using Phytoremediation Techniques	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4203	<Null>	Surface Wave and Current Measurements in Galveston Bay - A Study of Wind-Wave Development for N	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4204	<Null>	Texas High School Coastal Monitoring Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4205	<Null>	Texas Sand & Oyster Reef Resource Network (TSORRN)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4206	<Null>	The Wetland Restoration Team	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4207	<Null>	University Beach Marina Park Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4208	<Null>	Victoria County Aerial Photography Update	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4209	<Null>	Washington Park Interpretive Fishing Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4210	<Null>	Water Quality Monitoring and Analysis in Offats Bayou	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4211	<Null>	Wave Prediction/Forecast System for Coastal Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4212	<Null>	Bayshore Park Interpretive Trails	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4213	<Null>	Beach/Dune Rule Compliant ADA Pedestrian Beach Access for Gilchrist, TX	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4214	<Null>	Whitney Lake Public Access Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4215	<Null>	Winnie Stowell Park Restroom Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4216	<Null>	Port Lavaca Causeway Fishing Pier Renovations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4217	<Null>	Enhancing ADA access from the Seawall to the Beach in Galveston, TX	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4218	<Null>	Wetlands Park Expansion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4219	<Null>	Cedar Lakes Oyster Water Use Assessment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4220	<Null>	Tres Palacios Bay Dissolved Oxygen TMDL Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4221	<Null>	Monitoring Design Criteria and Biological Indicators for Seagrass Monitoring in the CBBEP Study Area -	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4222	<Null>	Sediment Monitoring in Galveston Bay - Final Phase	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4223	<Null>	Spotted Seatrout/Seafood Consumption Safety Study for Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4224	<Null>	Status and Trends of Barrier Wetlands, Padre Island National Seashore (Lower Coast) and the Chenier P	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4225	<Null>	Mad Island Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4226	<Null>	Wetlands for Dickinson Bayou	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4227	<Null>	Cost/Benefit Analysis of Building Setbacks from the Shoreline for Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4228	<Null>	Matagorda Island Cleanup Effort	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4229	<Null>	Colliers Ferry Park Wetlands Urban Impact Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4230	<Null>	Drainage System Improvements and Stormwater Management Plan Project for Cove Harbor, Rockport,	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4231	<Null>	Educators Program for Teaching Nonpoint Source Pollution in Southeast Texas Schools	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4232	<Null>	GIS Database Enhancement and Habitat Database - Port Aransas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4233	<Null>	Hurricane Storm Surge Modeling for the State of Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4234	<Null>	Implementation of Erosion and Sediment Control drop structures along drainage ditches in San Patricio	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4235	<Null>	Industry-Focused Pollution Prevention Program – Houston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4236	<Null>	Jefferson County Floodplan Map Modernization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4237	<Null>	Historic Use of Public Beaches On South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4238	<Null>	Texas CMP 10th Anniversary Program Review	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4239	<Null>	Aerial Photography 2 - P2ES	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4240	<Null>	Aerial Photography 1 - Lanmon Aerial	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4241	<Null>	Modeling Tools for Marina Water Quality Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4242	<Null>	Oyster Reef Mapping in Copano Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
4243	<Null>	Pervious Paving Parking Facility Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4245	<Null>	Storm Drain to Bay/ Keep It Clean	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4246	<Null>	Potential Impacts of Changes in Sediment Input to Tidal Marshes Surrounding Sabine Lake	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4247	<Null>	Potential Impacts to Sabine Lake Wetlands due to changes in Fluvial Inputs from the Neches River	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4248	<Null>	Potential Impacts to Sabine Lake Wetlands due to changes in Fluvial Inputs from the Sabine River	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4249	<Null>	Potential Impacts to Sabine Lake Wetlands due to changes in Sabine River Flow Regime	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4250	<Null>	Rapid Assessment of Primary Productivity and Phytoplankton Community Structure Using PHYTO-PAM	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4251	<Null>	Terry Gully #1 Detention System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4252	<Null>	Texas Coastal Community Health and Resource Management (CHARM) Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4254	<Null>	Adolph Thomae Park Shaded Pavilion Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4255	<Null>	Atkinson Island Interpretive Canoe Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4256	<Null>	Bayshore Park Interpretive Trails	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4257	<Null>	Bayside Pier Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4258	<Null>	Beach Monitoring and Storm Analysis on Treasure Island Galveston Island and Bolivar Peninsula	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4259	<Null>	Beach Restroom Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4261	<Null>	Big Slough Discovery Center Equipment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4262	<Null>	Bottles to Beaches: An Alternative Sand Source	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4263	<Null>	Cameron County Parks, Recreation, and Open Space Master Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4264	<Null>	Captain Clean Crab Clean Beach Media and Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4265	<Null>	Coastal Abandoned Well Plugging Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4266	<Null>	Charlie's Pasture Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4267	<Null>	Charlie's Pasture Park Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate Project
4269	<Null>	Clear Creek Erosion Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4270	<Null>	Coastal Prairie and Wetland Habitat Enhancement in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4271	<Null>	Conn Brown Harbor Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4272	<Null>	Connecting Underserved Populations to Coastal Ecology	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4273	<Null>	Handicapped Accessible Restroom Facility at Rockport Harbor	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4274	<Null>	Corpus Christi Beach Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4275	<Null>	Cove Harbor South Waterfront Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4276	<Null>	Creek Design for the Beneficial Use Marsh on Atkinson Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4277	<Null>	Dickinson Bayou Debris Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4278	<Null>	Double Bayou Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate Project
4279	<Null>	Drainage Mapping and Exploration Project for City of Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4280	<Null>	Educational/Informative Signs on Turtle Nesting on West Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4281	<Null>	Evaluation of Land Use Related to Public Land and Economic Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4282	<Null>	Fort Travis Interpretive Nautical Playground	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4283	<Null>	Galveston Island Sand Resources and Beach Accretion Part III: End of the Seawall to Pirates Beach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4284	<Null>	Fulton Park Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4285	<Null>	Hugo Point Walking/Hiking Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4286	<Null>	Improve the Picnic Area at Rockport Harbor	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4287	<Null>	James H. Robbins Memorial Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4288	<Null>	Jarboe Bayou Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4289	<Null>	Job Beason Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4290	<Null>	Laguna Heights Recreational Park Pavilion Learning Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4291	<Null>	Matagorda Bay Nature Park Public Restroom and Sheriff/Ranger Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4292	<Null>	Mapping of the Galveston Bay Inlet	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4293	<Null>	Matagorda County Jetty Park Picnic Pavilions and Interpretive/Directional Kiosk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4294	<Null>	Oak Motte Habitat Acquisition and Public Access Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4295	<Null>	Pathways 2000	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4296	<Null>	Paul Hopkins Coastal Ecological Interpretive Playground	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4297	<Null>	Pirates' Beach Area Drainage Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4298	<Null>	Port Arthur Waterfront Revitalization	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4300	<Null>	Port Lavaca Bayfront Peninsula Walkway Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4301	<Null>	Port Lavaca Causeway Fishing Pier Renovations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4302	<Null>	Quantification of Sediment Sources of the Nueces-Corpus Christi Estuary System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4303	<Null>	Replacement of Texas Historical Commission's Arecheological Research Vessel	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4304	<Null>	Restoration of Cedar Bayou/Vincent Slough	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4305	<Null>	Saving Our Coastal Heritage	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4306	<Null>	Scenic Resources Design and Planning Guidelines for the Texas Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4307	<Null>	Shoreline Stabilization at Adolph Thomae Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4308	<Null>	Texas Coastal Erosion Data Network and Data Repository	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4309	<Null>	Texas High School Coastal Monitoring Program: Ball High School, Galveston, Year 8	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4310	<Null>	Texas High School Coastal monitoring Program: Port Aransas High School, Year 6	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4311	<Null>	Texas High School Coastal Monitoring Program: Port Isabel High School, Year 6	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4312	<Null>	Texas Refuge's Invasive Species Control	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4313	<Null>	The Economic Value of Water and Ecosystem Preservation in the Estuary and Coastal Wetlands of San .	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4314	<Null>	The Relationship between the distribution of wading birds and their prey in southeast Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4315	<Null>	University Beach Marina Park Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4316	<Null>	Walter Hall Park Restroom Renovations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals

4317	<Null>	Washington Park Interpretive Fishing Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4318	<Null>	Water Quality in Texas City: Illicit Discharge Detection and Elimination	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4319	<Null>	WaterSmart Landscaping for the Upper Texas Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4320	<Null>	Wetland Park Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4321	<Null>	Winnie Park Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4322	<Null>	Canal Walk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4323	<Null>	City of Nassau Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4325	<Null>	Historic Battlefield Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4326	<Null>	Multicultural Seafood Safety Assessment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4327	<Null>	Nueces County Island Park Hike and Bike Nature Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4328	<Null>	Old River Cove Fishing Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4329	<Null>	Port Aransas Beach Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4330	<Null>	Port Mansfield Aquarium and Historical Displays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4331	<Null>	Renovation of Sea Rim Headquarters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4332	<Null>	Restoration Projects Database	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4333	<Null>	Dickinson Bayou Boat Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4334	<Null>	Galveston Bay Community-Based Habitat Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4335	<Null>	Storm Resistant Water Level Data Collection Platforms for the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4336	<Null>	Quantifying Oyster Habitat in Galveston Bay, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4337	<Null>	Development/Implementation of Water Quality Management Plans - Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4338	<Null>	Development/Implementation of Water Quality Management Plans - Chambers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4339	<Null>	Development/Implementation of Water Quality Management Plans - Jefferson	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4340	<Null>	Development/Implementation of Water Quality Management Plans - Kleberg/Kenedy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4341	<Null>	Development/Implementation of Water Quality Management Plans - Matagorda	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4342	<Null>	Development/Implementation of Water Quality Management Plans - Orange	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4343	<Null>	Development/Implementation of Water Quality Management Plans - San Patricio	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4344	<Null>	Development/Implementation of Water Quality Management Plans - Victoria	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4345	<Null>	Development/Implementation of Water Quality Management Plans - Willacy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4346	<Null>	Coastal Native Prairie and Wetlands Demonstration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4347	<Null>	GIS Development, Identification & Mapping of the Port Aransas Stormwater System & Watershed Reso	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4348	<Null>	Bay Debris Feasibility Study in Corpus Christi, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4349	<Null>	Sanitary Pumpout Station at Cove Harbor, Rockport, TX	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4350	<Null>	Aransas Pass Harbor Management Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4351	<Null>	Monitoring Design Criteria and Biological Indicators for Seagrass Monitoring in the CBBEP Study Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4352	<Null>	Status and Trends of Barrier Wetlands along the Coastal Bend including San Jose, Mustang, and North P	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4353	<Null>	Feasibility Study for Habitat Restoration/Modification in the Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4354	<Null>	Nueces Bay/Inner Harbor Zinc Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4361	<Null>	Investigation of Vibrio Vulnificus in Estuarine Waters of the Coastal Bend Region of Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4367	<Null>	Biological Study of San Antonio Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4368	<Null>	Adolph Thomae Park Shoreline Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4369	<Null>	Shoreline Change and Beach/Dune Morphodynamics	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4370	<Null>	Plugging of Abandoned Oil & Gas Wells in Coastal State Waters - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4371	<Null>	Digital Aerial Photography of the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4372	<Null>	Construction of Artificial Reefs in Gulf of Mexico	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4373	<Null>	Goose Island Shoreline Stabilization and Marsh Restoration, Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4374	<Null>	Texas Digital Aerial Photography Archive	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4377	<Null>	Sediment Sources Investigations Along the Texas Coast-GLO	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4378	<Null>	Mad Island Protection and Ecosystem Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4386	<Null>	San Luis Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4388	<Null>	Texas Coastal Ocean Observation Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4392	<Null>	Land Protection for Whooping Cranes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4393	<Null>	Habitat Restoration & Conservation at Packery Channel	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4394	<Null>	Living Shorelines	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4396	<Null>	San Jacinto Battleground Seawall Replacement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4403	<Null>	Nueces River Delta Habitat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4442	<Null>	Daisetta Sink Hole Impact Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4450	<Null>	Virginia Point Wetland Protection & Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4452	<Null>	Land Protection for Whooping Crane	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4453	<Null>	Lower Laguna Madre Regional Treatment Wetland System - Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4455	<Null>	Measurement & Characterization of Bay Shoreline Changes	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4476	<Null>	West Galveston Island Bayside Marsh Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4506	<Null>	Bahia Grande Restoration Final Phase	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4508	<Null>	Bolivar Peninsula Beach and Dune Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4512	<Null>	Cedar Bayou/Vinson Slough Hydraulic Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4514	<Null>	City of Houston Natural Approach to Aquatic Management Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
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4516	<Null>	Coastal gravity observations for accurate sea level elevations using GPS	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4517	<Null>	Coastal Habitat Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
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4523	<Null>	Conservation of Coastal Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
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4529	<Null>	Educational Walk Through A Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4530	<Null>	Enhancement and Protection of Galveston Bay Waterbird Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4532	<Null>	Feasibility Study for Beach Nourishment along Galveston Seawall between 61st and 103rd Streets	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4536	<Null>	Galveston Bay System and Houston Ship Channel PCBs and Dioxin TMDLs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4537	<Null>	Goose Island State Park Shoreline Revetment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4538	<Null>	Hazel Bazemore Park Critical Habitat Debris Removal and Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4540	<Null>	Mobile water quality testing laboratory for the Texas coastal region	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed

4541	<Null>	Linking Shoreline Changes to Nearshore Bathymetry and Beach Dune Morphodynamics	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4542	<Null>	Identifying onshore and offshore surface faults and assessing associated threats to wetlands and infras	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4543	<Null>	Implementation of Beach Monitoring and Maintenance Plan: Monitoring Tasks	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4544	<Null>	Investigation of Bacteria Concerns at Corpus Christi Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
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4553	<Null>	Matagorda County Park Gulf Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4555	<Null>	Measuring Community Air Toxics Benefits from Port Emission Reduction Strategies	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4556	<Null>	Modification of Keith Lake Fish Pass to Reduce Salt Water Intrusion into Keith Lake	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4557	<Null>	Nearshore Oil Detection in Nueces County Gulf Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4560	<Null>	Upper Oso Creek Watershed Stormwater Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4561	<Null>	Palacios Pavilion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4562	<Null>	Port Lavaca Marshview Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4563	<Null>	Procurement of a New Generation Airborne Lidar System for Coastal-Zone Mapping and Monitoring alo	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4565	<Null>	Riverine Suspended Sediment Study of Texas Coastal Plain	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4567	<Null>	Scientific Research Restoration of an Oyster Reef in Middle Reef, East Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4569	<Null>	Sea-Level Rise on the Texas Coast: Impacts and Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4570	<Null>	Seabrook Marsh Island Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4571	<Null>	Sediment Management and Beach Nourishment Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4572	<Null>	Shoreline Management Plan for Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4573	<Null>	Shoreline Stabilization of Dagger and Ransom Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4574	<Null>	South Padre Island Beach and Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4575	<Null>	South Padre Island Marine Life & Native Plant Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4576	<Null>	Support of Kemp's Ridley Sea Turtle Recovery Project at Padre Island National Seashore	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4577	<Null>	Surfside Beach Nourishment and Dune Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4578	<Null>	The Only Barriers Along the Texas Coastaline are Islands:The Science & and Spanish Club Network and	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4579	<Null>	Updating the Texas Oyster Fishery Management Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4580	<Null>	Virginia Point Wetland Protection and Restoration, Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4582	<Null>	West End of Galveston Island Dune Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4583	<Null>	Willow Waterhole Greenway Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4584	<Null>	Guadalupe River Assessment and Modeling Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4586	<Null>	Pre and Post- Storm Monitoring of CEPRA Beach Restoration/Renourishment and Expansion of CHRGIS	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4587	<Null>	Assessment and Remediation of Contamination at an Abandoned Oilfield Pits in the Mid-Coastal Regio	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project or more information needed
4588	<Null>	GIWW-Rollover Bay Reach Beneficial Use of Dredged Material FY2017 Event	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4589	<Null>	Economic-Natural Resource Benefit-Cost Study of CEPRA Projects	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4590	<Null>	Port Arthur Public Dock	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4591	<Null>	Shoreline Stabilization and Sedimentation Reduction Measures in the Vicinity of Piper Channel, Corpus	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4592	<Null>	Laguna Madre-South Padre Island High Adventure Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4593	<Null>	Construction and Development of Padre Balli/Briscoe King Pavilion and Packery Channel Oakmotte Sta	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4594	<Null>	Corpus Christi Beach Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4595	<Null>	Acquisition and Expansion of Blucher Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4596	<Null>	Shoreline Erosion Control in Nueces Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4597	<Null>	Erosion Protection and Wetlands Enhancement of North Fulton Beach Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4598	<Null>	Port Lavaca Bayfront Master Plan Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4599	<Null>	A Comprehensive Development Plan to Revitalize the Beachfront, Enhance Public Access, and Encourag	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4600	<Null>	Long Range Plan for Improvements to Matagorda County Navigation District Property and Adjacent or	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4601	<Null>	New Beach Cabana Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4602	<Null>	Jarboe Bayou Park and Refuge Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4603	<Null>	Dune Restoration Demonstration at Pirate's Beach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4604	<Null>	Caplen Beach Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4605	<Null>	Port Lavaca Emergency Response Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4606	<Null>	Installation of a Pumpout Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4607	<Null>	Aransas Pass Nature Park (A Wetlands Enhancement/Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4608	<Null>	Bayshore Park Erosion Control Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4609	<Null>	Dune Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4611	<Null>	Interpretive Walkway	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4612	<Null>	Port Aransas Bathhouse/Restroom Facility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4613	<Null>	Public Access Improvements Project, Bayside Public Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4614	<Null>	Public Park and Beach Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4615	<Null>	San Jacinto Point Marsh Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4616	<Null>	Texas Bays and Estuaries Exhibit	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4617	<Null>	Treasure Island Erosion Response	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4618	<Null>	Reconnaissance - Level Assessment of Erosion Mitigation Options, Magnolia Beach Area, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4619	<Null>	51st Street Marsh Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4620	<Null>	Bolivar Flats Shorebird Sanctuary Addition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4621	<Null>	Dune and Beach Dynamics in Galveston County: Critical Information for Coastal Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4622	<Null>	High School Beach Monitoring Program: A Pilot Project in Education, Public Awareness, and Coastal Ma	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4623	<Null>	Acquisition of Public Beach Access on Mustang Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4624	<Null>	Corpus Christi Beach Action Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4625	<Null>	Nueces County Coastal Parks Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4626	<Null>	Orange County Drainage District Cadastral Mapping Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4627	<Null>	Aerial Photography for Orange Co. Master Drainage Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4628	<Null>	Galveston Bay Habitat Conservation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4629	<Null>	Survey and Analysis of Texas Coastal Accretionary Areas for Suitability as Beach Nourishment Material	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4630	<Null>	An Analysis of the Economic Impact of Coastal Erosion on the Upper Texas Coast, Mitigation Costs, and	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4631	<Null>	Development of Standardized Soil Test Extractant for Phosphorus	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4632	<Null>	Creating a Wetlands Education Center: A Planning Grant	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4633	<Null>	Coastal Hazards Atlas for Texas: A Tool for Hurricane Preparedness and Coastal Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4634	<Null>	Wetland Education and Outreach Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4635	<Null>	Sunset Lake Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4636	<Null>	Oso Creek Planning	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4637	<Null>	Acquisition on South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4638	<Null>	Bay Access Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4639	<Null>	Beach Access Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4640	<Null>	Erosion Control and Reclamation of Copano Bay Coastline of Aransas County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4641	<Null>	Cameron County Clean Beach Media Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4642	<Null>	Hurricane and Flood Emergency Response	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4643	<Null>	Port Mansfield Community Pavillion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4644	<Null>	Corpus Christi Botanical Society Wetland Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4645	<Null>	University Marina Beach Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4646	<Null>	Beach and Dune Erosion on a South Texas Barrier Island Beach Since 1979	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4647	<Null>	Big Bay Debris Cleanup	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4648	<Null>	Wildlife/Migratory Bird Habitat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4649	<Null>	Bayside Facultative Lagoon & Constructed Wetlands Sewer Treatment Plant	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4652	<Null>	Pirates Beach Dune Monitoring and Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4653	<Null>	High School Beach Monitoring Program, Year 2: A Pilot Project in Education, Public Awareness, and Coa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4654	<Null>	Public Beach Improvements for Bolivar Peninsula, Galveston County, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4655	<Null>	GIS Mapping of Texas City Dike, Port , and Shoal Point	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4656	<Null>	Clear Creek Drainage District Aerial/GIS Data Base Mapping Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4657	<Null>	Remembering and Restoring (Marsh and Sea Grass Restoration Plan #2)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4658	<Null>	Gulf Coast Scow Schooner	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4659	<Null>	Galveston Bay Adopt-A-Marsh Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4660	<Null>	Judge Oscar Nelson Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4661	<Null>	High Island Conservation Partnership Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4662	<Null>	Coastal Hazards Atlas of Texas V. 2: A Tool for Hurricane Preparedness and Coastal Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4663	<Null>	Port Arthur Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4664	<Null>	Beach Cabana Construction Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4665	<Null>	City Harbor Entrance Channel	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4666	<Null>	Chambers County Fort Anahuac Park Levee Road Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4667	<Null>	Guidebook to Texas Coastal Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4668	<Null>	Protecting Colonial Waterbirds: An Environmental and Economic Resource for the Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4669	<Null>	Port Arthur Public Dock	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4670	<Null>	Beach Access Improvement #1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4674	<Null>	Education Website and Newsletter	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4677	<Null>	Water Quality in the Lower San Bernard River	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4679	<Null>	Coastal Hazards Atlas of Texas V.3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4680	<Null>	Guadalupe Delta Mapping and Modeling	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4683	<Null>	Recent Changes in Gulf Shoreline Position, Mustang & North Padre Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4684	<Null>	High School Coastal Monitoring Program (Point Isabel)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4690	<Null>	Anahuac Harbor Improvements in Support of the Water-Borne Education Service Projec	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4691	<Null>	Bayfront Peninsula Improvement: A Waterfront Revitalization and Ecotourism Development Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4692	<Null>	Engineering of Retaining Wall for Neches River Shoreline Erosion Protection	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4693	<Null>	Boca Chica Shoreline Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4694	<Null>	Newport Pass Beach Access Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4696	<Null>	Port Aransas Beach Showers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4699	<Null>	Oyster Reef Construction/Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4704	<Null>	Coastwide Conservation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4713	<Null>	Nueces County Park Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4714	<Null>	Coastal Bays and Estuaries Youth Ambassador Outreach Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4715	<Null>	Emergency Plotter and System Development of Wastewater Treatment and Disposal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4716	<Null>	Development of a Wastewater Treatment and Disposal Plan for Gilchrist and Canal City	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4717	<Null>	Engineering Design for Erosion Response Structure	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4718	<Null>	Shower Improvements to Beach Access Rd 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4719	<Null>	Side Scan Sonar and CHIRP System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4720	<Null>	Remedial Action Study - Pocket Park 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4721	<Null>	BEG-Geotube Monitoring-Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4722	<Null>	Equipment Purchases	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4724	<Null>	McCollum Parks Amenties	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4725	<Null>	Expansion of Oily Bilge Facility and Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4726	<Null>	Wetland Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4727	<Null>	Facultative Lagoon and Constructed Wetlands Sewer Treatment Plant	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4728	<Null>	Sediment Source Study - WO# A103	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4729	<Null>	Palacios Pavillion Pier Renovation and Expansion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4730	<Null>	Padre Balli Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4731	<Null>	Shoreline Change in West and Christmas Bays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4732	<Null>	Texas High School Coastal Monitoring Program: Port Aransas High School, Year 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4733	<Null>	South Padre Island Beach Erosion Response Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4734	<Null>	Brazoria County Flood and Rainfall Gauges	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4735	<Null>	Summer 2001 Wetlands Eco-Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4736	<Null>	Sand Resources and Movement Off Galveston Island Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4737	<Null>	Down to Earth at Mustang Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4738	<Null>	Wetlands Interpretive Overlooks on Corpus Christi Beach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4739	<Null>	GIS Database of Hypoxia Conditions in Corpus Christi Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4740	<Null>	Bayfront Peninsula Improvement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4741	<Null>	Captain Clean Crab Clean beach Educational Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4742	<Null>	Galveston Bay Grass Carp Control Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4743	<Null>	Port Arthur Boardwalk Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4744	<Null>	Galveston Bay Marsh Mania	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4745	<Null>	Interpretive Picnic and Trail Area at Fort Travis Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4746	<Null>	Texas High School Coastal Monitoring Program: Port Isabel H.S. yr.2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4747	<Null>	Enhanced Litter Abatement on Bolivar Penninsula Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4748	<Null>	Coastal Hazards Atlas of Texas V. 4: A Tool for Hurricane Preparedness and Coastal Management	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4749	<Null>	Bayport Demonstration Marsh Circulation Improvement and Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4750	<Null>	Fort Anahuac Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4751	<Null>	Using Widgeon Grass to Restore Seagrass in the Armand Bayou Watershed	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4752	<Null>	Laguna Madre Comprehensive Conservation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4753	<Null>	Texas High School Monitoring Program: Ball High School, Year 4	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4754	<Null>	Beach Dune Walkover Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4755	<Null>	Effectiveness Evaluation of a Promising Storm Water	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4756	<Null>	Land Acquisition for Surfside Jetty Park Expansion Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4757	<Null>	Kaufer-Hubert Memorial Park Boat Ramp Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4758	<Null>	San Jacinto Marsh Restoration Project, Interpretation and Public Program Phase	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4759	<Null>	Monitoring and Evaluation of Geotubes During 2002/2003	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4761	<Null>	Seafood Composting Pilot Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4763	<Null>	Status and Trends of Wetlands on Texas Barrier Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4764	<Null>	Sewage Pumpout Station	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4765	<Null>	Seabrook Wetland Conservation Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4766	<Null>	Zinc in Nueces Bay-Phase I	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4767	<Null>	DNA Bacteria Fingerprinting	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4768	<Null>	Rangeland Rainfall and Runoff Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4769	<Null>	Advancement of Senate Bill 503	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4770	<Null>	Trace Metals Study in the Laguna Madre - Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4771	<Null>	Historical Scanning Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4772	<Null>	Study to Evaluate Sources of E. coli Isolates from Corpus Christi Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4773	<Null>	Evaluation of New Stormwater Technology	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4774	<Null>	Zinc in Nueces Bay-Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4775	<Null>	Texas Digital Aerial Photography Archive Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4776	<Null>	Evaluating The Use Of Biolog Microplates In The Study Of Fecal Matter Sources In Coastal Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4777	<Null>	An Effectiveness Evaluation of Vacuum-Assisted Surface Cleaning Technology as a Storm Water Best M	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4778	<Null>	Anahuac Harbor Pier Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4780	<Null>	Buffalo Bayou Hike and Bike Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4782	<Null>	City of Port Aransas Shower Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4783	<Null>	Clear Creek Waterfront Revitalization and Ecotourism Development Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4784	<Null>	Clear Creek Observatory	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4785	<Null>	Comprehensive "Specialty" Waste Product Collection/Disposal/Recycle Program for Galveston Bay Syst	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4786	<Null>	Corpus Christi Ecotourism Development Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4787	<Null>	Derry Waterfront Recreational Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4788	<Null>	Evaluation Study of Beach Bike and Hike Trail from Gulf Beach Recreation Area to GIWW	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4789	<Null>	Feathers and Fins : Audubon's Coastal Partnership Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4791	<Null>	Gulf Coast Prairies and Marshes Conservation Target Data Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4792	<Null>	Implementation of Coastal Environmental Management Strategy: Eco-efficiency Benchmark Model for	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4793	<Null>	Improving Public Access to Coastal Waters: Planning for the Texas Bays Kayak Trail System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4794	<Null>	Jobe Beason Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4795	<Null>	Kaufer-Hubert Memorial Park Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4796	<Null>	League City Master Drainage Plan Update	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4797	<Null>	Market Analysis and Parks, Recreation and Open Space Master Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4798	<Null>	Monitoring of Genetic Diversity and Physiological Performance of Coastal Fisheries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4799	<Null>	Pathways - Pedestrian and Bicycle Recreational Trails Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4800	<Null>	Pine Gully Environmental Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4801	<Null>	Research and Planning for World Class Sea Turtle Museum and Rescue Center on South Padre Island, T	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4802	<Null>	Riviera Beach Park - Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4804	<Null>	Seawall Beachfront Improvements and Enhancements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4805	<Null>	Study and Evaluation of Laguna Madre Water Improvement Method	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4806	<Null>	Texas High School Coastal Monitoring Program : Addition of One High School on the Upper Texas Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4807	<Null>	Texas High School Monitoring Program : King High School Corpus Christi, Year 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4808	<Null>	Tiki Islands Wetlands Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4810	<Null>	Matagorda County Sargent Beach Park Restroom	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4811	<Null>	Bay Education Center (CMP/GOMESA)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4812	<Null>	Cedar Bayou and Vinson Slough Hydraulic Restoration Non-construction Elements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4813	<Null>	Coastal Marine Spatial Planning Effort for FY13 (Marmillion)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4814	<Null>	Cameron County Shoreline Retreat Technical/Policy Analysis	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4815	<Null>	Texas Coastal Study - WO# A103	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4816	<Null>	Update of Beach Access Points and Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4817	<Null>	Technical Support to Enhance the State's Management of OSSFs in the TX Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4818	<Null>	Texas Coastal Resiliency Plan Project Management Services	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4819	<Null>	City of Jamaica Beach Erosion Response Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4820	<Null>	Coastal Current Monitoring Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4821	<Null>	Development of an interactive, animated web page for Texas Automated Buoy System(TABS) data	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4822	<Null>	Improving Hydrodynamic Predictions of Surface Currents Near the Texas Coast Used for Rapid Oil Spill	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4823	<Null>	Integration of High Frequency Radar and Autonaut Data to the General Land Office Texas Automated B	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4824	<Null>	Advancing Oil Spill Forecasts Using a High-Resolution Coupled Atmosphere-Ocean System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4825	<Null>	Tarball Classification and Similarity Index	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4826	<Null>	Reduction of Dispersed Oil Toxicity through the Synergistic Application of Hydrocarbon Digesting Micro	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4827	<Null>	Integrating next-generation models into the oil spill prediction system for Texas bays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4828	<Null>	Colonial Waterbird Rookery Island Geoenvironmental Mapping for Oil Spill Response	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4829	<Null>	Improving Oil Spill predictions near shore and across the bay/coastal interface	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4830	<Null>	Design of a modern web interface to Texas General Land Office Texas Automated Buoy System (TABS) r	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4831	<Null>	Open Coastal Ocean Connectivity through Bottom Boundary Layer Observations and LES Simulation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4832	<Null>	Swan Lake Marsh Restoration Planning	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4833	<Null>	Coastal Texas Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4834	<Null>	GIS Intern to Inventory Mitigation Sites and Living Shoreline Projects	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4835	<Null>	Assessment of Erosion Control Techniques (Geotubes on Galveston Island)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4836	<Null>	Buffalo Bayou Access Stairways for Historic Waterfront in Downtown Houston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4838	<Null>	Childers Road Terminal Upgrade	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4840	<Null>	Claiborne West Physically Challenged Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4841	<Null>	Coastal Bays and Esutaries Youth Ambassador Outreach Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4843	<Null>	Effects of Seismic Activity on Aquatic Organisms: Development of a Data Base	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4844	<Null>	Egert Bay Wetlands Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4845	<Null>	Enhanced Litter Abatement on Bolivar Peninsula Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4846	<Null>	Environmental Education	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4847	<Null>	Galveston Wharves (Port of Galveston) - Pelican Island Erosion Plan	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4848	<Null>	Interpretive Exhibits for "Surfside Jetty Park Expansion Project"	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4849	<Null>	Geographic Response Action Plans for Oil Spills in Coastal Bend Bays Estuaries	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4850	<Null>	Jobe Beason Park Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4851	<Null>	Lake Texana Ripariam Buffer Demonstration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4852	<Null>	Mapping of Municipal Drainage System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4853	<Null>	Palacios Pavilion Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4854	<Null>	Matagorda Dunes Environmental Learning Center and Natural Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4855	<Null>	Pine Gully Restroom Addition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4856	<Null>	Project 49, Bayshore Park Picnic and Interpretive Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4857	<Null>	Project 59, Beach Pocket Park 1 Remedial Action Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4858	<Null>	Public Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4859	<Null>	Public Education and Outreach Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4860	<Null>	Quantifying "Efforts" in the Economically Valuable Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4861	<Null>	Reconstruction of Historic Pavilion as part of the "Surfside Jetty"	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4862	<Null>	Redfish Bay Access Initiative	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4863	<Null>	Redfish Bay Access Site Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4864	<Null>	Repair Deteriorated Waterfront at Texas City Dike	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4865	<Null>	Riviera Beach Park Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4867	<Null>	Sabine River Downtown Enhancement Project - Phase one	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4868	<Null>	Shoreline Erosion Study Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4869	<Null>	The Relationship Between Shoalgrass Distribution and Freshwater Availability: Implications for Wetland	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4871	<Null>	Treasure Island Beach Access	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4872	<Null>	Treasure Island Shoreline Profiling	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4873	<Null>	Tres Palacios FM 521 River Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4874	<Null>	Using Native Plant Communities to Reduce Nutrient Loading from the Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4875	<Null>	Waste Busters II Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
4876	<Null>	Paradise Pond Access Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4877	<Null>	Wildlife Viewing Overlook at Falcon Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4878	<Null>	Galveston Bay Community-Based Habitat Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4879	<Null>	League City Drainage System Mapping	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4880	<Null>	Mapping Bottom Type and Anthropogenic Impacts on Sediments in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4881	<Null>	A Fundamental Upgrade of the Texas Coast Water Level Forecasting System	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4882	<Null>	Wave Climate Monitoring System for Coastal Users and Shoreline Erosion	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4883	<Null>	CLCND/ WBEC Community Outreach Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4884	<Null>	Captain Clean Crab Anti-litter Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4885	<Null>	Marsh MALLOW Project: A 4-H School Enrichment Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4886	<Null>	Wetlands Study Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4887	<Null>	Texas HS Coastal Monitoring Program: Port Aransas HS Yr. 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4888	<Null>	Texas HS Coastal Monitoring Program: Port Isabel HS Yr. 3	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4889	<Null>	Texas HS Coastal Monitoring Program: Ball HS Galveston, Yr. 5	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4890	<Null>	Pathways Pedestrian & Bicycle Paths and Walkways to Public Beaches & Coastal Waters	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4891	<Null>	Bayfront Peninsula Improvements - A Shoreline Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4892	<Null>	Park Restrooms and Pavilion Additions to West Chambers Boat Ramp and Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4893	<Null>	Padre Balli Park Interpretive Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4894	<Null>	Kaufer-Hubert Memorial Park Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4895	<Null>	Gambusia Nature Trail Boardwalk Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4896	<Null>	Restroom Facilities at Cove Harbor Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4897	<Null>	Renovation of Seawind Campground Recreation Hall and Bath House and Construction of New Bathho	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4898	<Null>	Fort Travis Interpretive Wetland Trail/Project 45	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4899	<Null>	Buffalo Bayou East Sector Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4900	<Null>	Sand Resources/Beach Accretion Along Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4901	<Null>	A Near Real-Time Currents Measurement System for the Galveston Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4902	<Null>	A Web-Based Real-Time Monitoring and Forecasting System for the Salinity Management of Nueces Ba	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4903	<Null>	ACND #1 Rockport Harbor/Aransas Bay Parking Project Phase 1	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate project
4904	<Null>	Armand Bayou Watershed Working Group	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4905	<Null>	Armand Bayou TMDL Development	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4906	<Null>	Nueces Bay Zinc in Oyster Tissue Total Maximum Daily Load Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4907	<Null>	Oyster Reef Mapping in Lavaca Bay - Phase I (TAMUG)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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4909	<Null>	Clean Texas Marina Program - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4910	<Null>	No La Riegues Public Service Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4911	<Null>	Advancement of Senate Bill 503 - San Patricio SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4912	<Null>	Advancement of Senate Bill 503 - Copano Bay SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4913	<Null>	Advancement of Senate Bill 503 - Nueces SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4914	<Null>	Advancement of Senate Bill 503 - Willacy SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4915	<Null>	Rangeland Rainfall and Runoff Study - Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4916	<Null>	Lake Whitney/McCampbell Slough	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4917	<Null>	Texas Coastal Erosion Data Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4918	<Null>	Beach Watch - Jefferson County (Lamar University)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4919	<Null>	Laguna Vista Marina Improvements (WITHDRAWN)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

4920	<Null>	Mitchell's Cut Management Plan, Phase I - Baseline Field Investigations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4921	<Null>	Whitecap Boulevard Hike & Bike Trail from Gulf Beach Recreation Area to GIWW (WITHDRAWN)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4922	<Null>	Pine Gully Park Shoreline restoration (WITHDRAWN)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4923	<Null>	City of Nassau Bay - Jeremy Davis Tract Acquisition (WITHDRAWN)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4924	<Null>	Challenger Seven Coastal Wetland Study Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4925	<Null>	Sediment Monitoring in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4926	<Null>	Beach Watch - Galveston County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4927	<Null>	Beach Watch - Brazoria County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4928	<Null>	Beach Watch - Matagorda County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4929	<Null>	Beach Watch - Nueces County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4930	<Null>	Beach Watch - Cameron County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4931	<Null>	Nitrogen & Phosphorus Concentrations in the Coastal-Bend Bays	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4932	<Null>	Construction of Cabanas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4933	<Null>	Cove Harbor Wetlands Sanctuary	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4934	<Null>	(Surfside Sand Source-#1150A) Corings of Possible Fluvial Channel for Sand Sources for Beach Nourishm	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4935	<Null>	Treasure Island Shoreline Profiling and Bathymetric Survey (#1150B)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4936	<Null>	Construction of Wildlife Viewing Overlook at Falcon Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4938	<Null>	Training for Local Governments on Best Management Practices	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4939	<Null>	Development/Implementation of Water Quality Management Plans	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4940	<Null>	Development/Implementation of Water Quality Management Plans - Kleberg/Kenedy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4941	<Null>	Sand Resources Equipment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4942	<Null>	A Near Real-Time Currents Measurement System for the Galveston Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4943	<Null>	Accessible Bayou Nature Trail on Dickinson Bayou in Paul Hopkins Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4944	<Null>	Aransas Pass Community Park and Nature Area Kayak Trail Facilities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4945	<Null>	Bay Day Celebration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4946	<Null>	Bayfront Peninsula Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4947	<Null>	Bayshore Park Picnic and Interpretive Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4948	<Null>	Bayside Shoreline Erosion Control and Habitat Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4949	<Null>	Captain Clean Crab Clean Beach Media and Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4950	<Null>	Chambers County Beach Clean-up Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4951	<Null>	Charlie's Pasture Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4952	<Null>	City of Pasadena Coastal Project Public Education and Outreach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4953	<Null>	Corpus Christi Beach Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4954	<Null>	Double Bayou Park Restrooms	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4955	<Null>	Drive and Discover Galveston Bay Interpretive Signs	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4956	<Null>	Fort Travis Park Trails - Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4957	<Null>	Fulton Park Seawall Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4958	<Null>	Isla Blanca County Park Additional Restrooms and Walkover for Restroom Accessibility	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4959	<Null>	Mapping Bottom type and Anthropogenic and Natural Impacts on Sediments in Galveston Bay, Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4960	<Null>	Nelson Park on Lake Anahuac	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4961	<Null>	Pathways 2000: Pedestrian, Bicycle Paths and Walkways to Public Beaches	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4962	<Null>	Port Aransas Park Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4963	<Null>	Port Arthur Boardwalk, Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4964	<Null>	Reaching Underserved Communities Along the Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4965	<Null>	Relationship b/w Shoalgrass Distribution & Freshwater Availability: Implications for Wetland Conservat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4966	<Null>	Riviera Beach Park Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4967	<Null>	San Jacinto Park (Fort San Jacinto Historical Point)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4968	<Null>	Sand Sources and Seabed Process of the Colorado River Delta	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4969	<Null>	Texas Coastal Erosion Data Network	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4970	<Null>	Texas High School Coastal Monitoring Program: Ball High School	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4971	<Null>	Texas High School Coastal Monitoring Program: Port Aransas High School	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4972	<Null>	Texas High School Coastal Monitoring Program: Port Isabel High School	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4973	<Null>	The Economic Value of Water and Ecosystem Preservation: Ecotourism in the Lower Rio Grande Valley	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4974	<Null>	University Marina Beach Park - Monitoring and Engineering Specifications	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4975	<Null>	Wetlands Study Center - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4976	<Null>	Oyster Reef Mapping in Lavaca Bay- Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4977	<Null>	Addressing Cumulative and Secondary Impacts through Development of Total Maximum Daily Loads	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
4978	<Null>	A New Look at Mustang Island Wetlands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4979	<Null>	Armand Bayou Coastal Preserve Education and Outreach	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4980	<Null>	Cove Harbor South Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4981	<Null>	Advancement of Senate Bill 503- Copano Bay SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4982	<Null>	Advancement of Senate Bill 503 - Southmost SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4983	<Null>	Advancement of Senate Bill 503- San Patricio SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4984	<Null>	Bolivar Flats and Big Reef Sand Survey	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4985	<Null>	Aransas Channel Waterfront Improvement in Nueces County	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4986	<Null>	Oso Bay/Laguna Madre Total Maximum Daily Loads - Phase III	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4987	<Null>	Advancement of Senate Bill 503- Lower Sabine-Neches SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4988	<Null>	Advancement of Senate Bill 503 - Coastal SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4989	<Null>	Oily Bilgewater Pumpout Units (Rockport, Fulton, Port Aransas Harbors)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4990	<Null>	Clean Texas Marina Program Completion Phase	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4991	<Null>	Texas Coastal Watershed Center- Linking Land Use to Water Quality	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4992	<Null>	Sediment Monitoring in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4993	<Null>	Status and Trends of Wetlands on Texas Barrier Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4994	<Null>	Bacteria Source Tracking in Copano Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4995	<Null>	Primer on Urban Growth	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4996	<Null>	Advancement of Senate Bill 503 - Trinity Bay SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4997	<Null>	Advancement of Senate Bill 503 - Willacy SWCD	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4998	<Null>	Accessible Nature Trail on Dickinson Bayou in Paul Hopkins Park (Phase II)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
4999	<Null>	Walter Hall Park Restrooms Renovations	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5000	<Null>	Captain Clean Crab Clean Beach Media and Education Campaign	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5001	<Null>	Charlie's Pasture Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5002	<Null>	Coastal Preservation and Public Access Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5003	<Null>	Ford F-450 4x4 w/Wayne 6 Yard Tom Cat	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5004	<Null>	Fulton Park Shoreline Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5005	<Null>	Impact of Devegetation and Dune Migration on the Texas Barrier Islands	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5006	<Null>	Installation of a Nearshore Directional Wave Gage/Current Meter on Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5007	<Null>	A Program to Test the Feasilbility of Using Texas Automated Buoy System to Measure Waves Impinging	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5008	<Null>	Interactive GIS Database for Restored Habitat on Corpus Christi Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

5009	<Null>	Land Acquisition Adjacent to Washington Park Boat Ramp & Fishing Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5010	<Null>	Litter Enforcement Officer	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5011	<Null>	M.A.P. (Mapping, Atlas, Public Outreach Project)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5012	<Null>	Mapping and Assessment of the Aquatic Habitats within South Bay Coastal Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5013	<Null>	Mapping of Cavallo Pass Inlet, Matagorda Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5014	<Null>	Matagorda Bay Jetty Park Public Bathrooms	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5015	<Null>	Matagorda Bay Nature Park Trail	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5016	<Null>	Orange Waterfront Park Pier	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5017	<Null>	Palacios Public Fishing Pier Construction	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5018	<Null>	Port Aransas Park Enhancement Project - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5019	<Null>	Port Lavaca Bayfront Peninsula Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5020	<Null>	Port Lavaca Causeway Fishing Pier Renovation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5021	<Null>	Renovate/Repair Beach Bathhouse and Enhance Waterfront	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5022	<Null>	Laguna Heights Walkway and Bird Blind	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5023	<Null>	Storm Water Quality Pond Performance Evaluation for Houston-Galveston Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5024	<Null>	Texas Coastal Erosion Data Network and Data Repository	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5025	<Null>	Texas High School Coastal Monitoring Program: Ball High School, Galveston	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5026	<Null>	Texas High School Coastal Monitoring Program: Port Isabel High School	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5027	<Null>	The Belle Shipwreck Conservation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5028	<Null>	The Economic Value of Water and Ecosystem Preservation (Part 2): Freshwater Inflows from the Rio Gr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5029	<Null>	Water Quality in Texas City	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5030	<Null>	Wetlands Study Center - Education Enhancement (Phase III)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5031	<Null>	Coastal Expos: Communicating about Coastal Ecosystems	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5032	<Null>	Environmental Impact Analysis of Scenic Resources for the Texas Coastal Zone	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5033	<Null>	Laguna Madre Dissolved Oxygen TMDL - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5034	<Null>	Nueces Bay/Inner Harbor Zinc Monitoring	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5035	<Null>	City of Galveston Public Access Enhancement	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5036	<Null>	Relative Importance of Fluvial and Non-Fluvial Sediment Sources in Galveston Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5037	<Null>	Status and Trends of Wetlands-Matagorda Bay to Christmas Bay	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5038	<Null>	Status and Trends of Wetlands on Texas Barrier Islands- South Padre Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5039	<Null>	Multicultrual Environmental Education Outreach Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5040	<Null>	Texas High School Coastal monitoring Program: Port Aransas High School	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5041	<Null>	Tidal Streams Use Attainability Analyses	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5042	<Null>	Development/Implemetation of Water Quality Management Plans - Arroyo Colorado	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5043	<Null>	Develoment/Implementation of Water Quality Management Plans - Chambers	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5044	<Null>	Bacteria Source Tracking in Copano Bay - Phase II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5045	<Null>	Town of South Padre Island Treasure Island Circle Beach Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5046	<Null>	A Dynamic, Mechanistic Water Quality Model of the Arroyo Colorado, Tidal, Based on Carbon and Nutr	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
5048	<Null>	Cove Harbor Wetlands Sanctuary	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Duplicate
5049	<Null>	Development/Implementation of Water Quality Management Plans - Nueces	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
5050	<Null>	Construction of Cabanas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
5051	<Null>	Cove Harbor South Waterfront Revitalization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
5052	<Null>	Development/Implementation of Water Quality Management Plans - Willacy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
5053	<Null>	EnviroFair	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
5054	<Null>	Environmental Education Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
5055	<Null>	Fort Anahuac Archeology, Part II	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project does not meet Resiliency Plan goals
5056	<Null>	Galveston Bay Spartina Alterniflora Seed-Based Propagation Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
5059	<Null>	Mercury Levels of Snook (Cenpropomus Undecimalis) Populations at the Port of Brownsville	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
5060	<Null>	Monitoring of Beach Profiles and Development of a Sediment Budget for Galveston Island	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project sufficiently addressed under other measures
5062	<Null>	Rehabilitation of Port of Port Arthur's Bulkhead Pilings	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5063	<Null>	Shoreline Habitation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		More information needed
5065	<Null>	San Luis Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5066	<Null>	Development/Implementation of Water Quality Management Plans - Jefferson	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5067	<Null>	Development/Implementation of Water Quality Management Plans - Kleberg/Kenedy	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5068	<Null>	Development/Implementation of Water Quality Management Plans - Orange	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
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5070	<Null>	Development/Implementation of Water Quality Management Plans - San Patricio	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5071	<Null>	Urban Wetland Education and Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5072	<Null>	Sediment Management Strategies For Accreting Gulf Beaches In Urban Areas City Of Port Aransas, Texa	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5073	<Null>	Orange Riverfront Park Canoe Launch	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5074	<Null>	Erickson Property - Clear Creek Riparian Habitat Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5075	<Null>	Katy Prairie Wetlands Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5076	<Null>	McCampbell Slough Wetland Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5077	<Null>	Nueces River Delta Wetlands Conservation Initiative	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5078	<Null>	Charlie's Pasture Land Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5079	<Null>	Oso Bay Access and Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5080	<Null>	Bilge Water Pumpout Stations to Improve Coastal Water Quality	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5081	<Null>	Virginia Point Acquisition East	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5082	<Null>	Buccaneer Cove Wildlife Preserve	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5083	<Null>	Goose Island Shoreline Stabilization and Restoration of Adjacent Habitats	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5084	<Null>	Pelican Island Sand Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5085	<Null>	Water-Borne Education Center Development Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5086	<Null>	East Bay Bayou-Elm Saltwater Barrier Restoration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5087	<Null>	Bayfront Seawall Stabilization Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5088	<Null>	Regional Outdoor Wetland Center	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5089	<Null>	Cove Harbor Wetlands Sanctuary & Boardwalk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5090	<Null>	Carl Park Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5091	<Null>	Quintana Community Dune Restoration Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5092	<Null>	Deats Road Storm Drain Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5093	<Null>	Flour Bluff Independent School District (FBISD) Environmental Education	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5094	<Null>	Coastal Enhancement Master Plan Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5095	<Null>	Coastal Wild Bird Trunk	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5096	<Null>	Terramar Walkover Dunes & Vegetation Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5097	<Null>	Port Lavaca Causeway Fishing Pier Improvements	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5098	<Null>	Cameron County Parks-Shoreline Accessibility and Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5099	<Null>	Shoreacres, Texas Wetlands Acquisition Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5100	<Null>	Coastline Restoration in Bayside Park	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5101	<Null>	Bermuda Beach Renourishment	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

5102	<Null>	Seascape Condominiums and Sunny Beach Renourishment-Project 1C	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5103	<Null>	Sea Isle Beach Renourishment-Project 1D	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5104	<Null>	Spanish Grant Beach Renourishment-Project 1E	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5105	<Null>	5500 Association Beach Renourishment-Project 1B	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5106	<Null>	Jackson County Native Prairie Demonstration	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5107	<Null>	Riparian Habitat Restoration Initiative	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5108	<Null>	Freshwater Wetland Restoration and Enhancement along Laguna Madre, Texas	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5109	<Null>	The Only Barriers Along the Texas Coastline are Islands: A Multicultural Approach to Environmental Edu	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5110	<Null>	EnviroFair 2003	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5111	<Null>	Galveston Bay Capacity Enhancement Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5112	<Null>	Texas Digital Aerial Photo Archive (TxDAPA)-Texas Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5113	<Null>	The Economic Contribution of Beach Recreation on the Texas Gulf Coast	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5114	<Null>	Beach Access Improvements (formerly Dune Walkover Construction)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5115	<Null>	LaSalle Odyssey	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5116	<Null>	Cove Harbor Wetlands Sanctuary & Boardwalk Phase 2	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5117	<Null>	Ash Avenue Storm Sewer Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5118	<Null>	Dickinson Bay/Tabbs Bay Debris Removal	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5119	<Null>	Austin's Woods Conservation Partnership	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5120	<Null>	Mad Island Marsh Wetlands Conservation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5121	<Null>	Whooping Crane Habitat Conservation	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5122	<Null>	Live Oak Peninsula Habitat Protection and Enhancement Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5123	<Null>	Mustang Island Critical Habitat Acquisition	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5124	<Null>	Port Mansfield Passenger Ferry Service to South Padre Island - WITHDRAWN	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5125	<Null>	Adolph Thomae Erosion Control Project (Formerly Boca Chica Beach)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5126	<Null>	Student Access to the Coastal Learning Experience: Serve all TX school children	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5127	<Null>	Ozone Science and Modeling Research Project: Greater Houston-Galveston Area	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5128	<Null>	Coastal Wetland Initiative Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5129	<Null>	Pleasure Island Marina Access Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5130	<Null>	Pleasure Island Erosion Control (Formerly Keith Lake Land Acquisition) Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5131	<Null>	Remedial Action/Clean-up of Beach Pocket Park 1 Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5132	<Null>	Acquisition and Conservation Easement Research Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5133	<Null>	Open Beaches Act Research Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5134	<Null>	Nest Site Selection of Kemp Ridley Sea Turtles	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5135	<Null>	Coastal Subsidence Conference	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5136	<Null>	Laguna Heights Recreational Park Pavilion & Restroom	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5137	<Null>	City Park Walkway & Terminal Structure	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5138	<Null>	Dune Walkovers (Surfside Vilalge)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5139	<Null>	San Luis Pass Inlet Management Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5140	<Null>	Master Plan and Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5141	<Null>	Pelican Island Sand Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5142	<Null>	West Galveston Island Beach Amenities	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5143	<Null>	Seaweed & Trash Management Program	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5144	<Null>	Dune Walkovers (Galveston County)	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5145	<Null>	Abandoned Well Plugging Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5146	<Null>	Bay Cleanup Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5147	<Null>	Beach Debris Cleanup Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5148	<Null>	Virginia Point Marshland Acquisition Project	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5149	<Null>	Surfside Beach Shoreline Stabilization Feasibility Study	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
5150	<Null>	Mapping & Creation of Significant Washover Features	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn
1231	<Null>	Bayou Greenways	Fail	<Null>	Project not evaluated by TAC	Project not evaluated by TAC		Project complete, ongoing or withdrawn

Appendices

Appendix A. Subregional Issue of Concern Assessment Results

ISSUES OF CONCERN RESULTS (TABULAR)

Average scores for TAC member responses to the online survey for IOCs by subregion.

Score Breakdown	
0-1	2-3
1-2	3-4

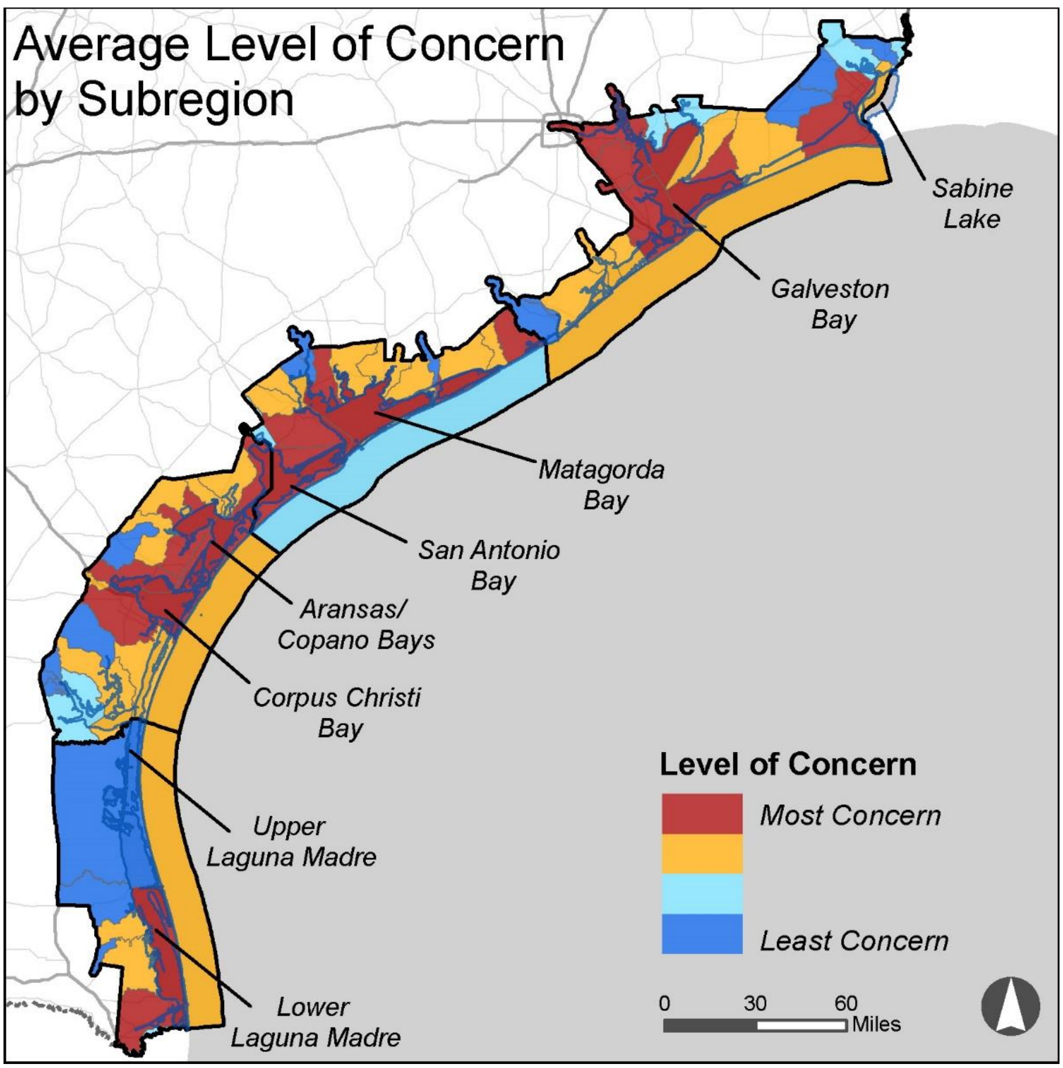
Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
R1	1.01	3.06	3.52		3.46	3.10	2.16	2.39	1.18
	1.02	3.04		2.20	3.03	2.73	2.82	2.53	1.02
	1.03	2.75		1.33	2.73	2.70	2.15	2.36	0.50
	1.04	2.33		1.13	2.21	2.31	2.38	2.27	0.43
	1.05	2.67		1.57	2.53	2.66	2.79	2.40	1.05
	1.06	3.41		2.52	3.09	2.83	2.75	2.91	0.91
	1.07	2.50		0.78	2.27	2.50	2.40	2.56	0.40
	1.08	2.36		0.50	1.67	2.10	2.00	2.22	0.20
	1.09	3.33		2.41	2.65	2.69	2.30	2.70	1.08
	1.10	2.98		2.40	2.66	2.52	2.61	2.82	1.14
	1.11	3.38		2.88	3.25	3.01	2.65	3.07	1.53
	1.12	3.01		1.80	2.28	2.21	2.93	2.71	1.09
	1.13	3.00		0.88	2.33	2.56	2.70	2.40	0.50
	1.14	2.63		1.68	3.41	3.11	3.40	2.57	1.28
	1.15	3.34		2.96	3.44	3.21	3.38	3.14	1.68
	1.16	3.11		2.48	2.61	2.79	3.19	2.93	1.72
	1.17	3.37		2.99	3.29	3.00	2.75	2.80	1.47
	1.18	3.35		3.00	2.93	2.58	2.53	2.78	1.02
	1.19	3.26		2.85	2.78	2.52	2.39	2.70	1.10

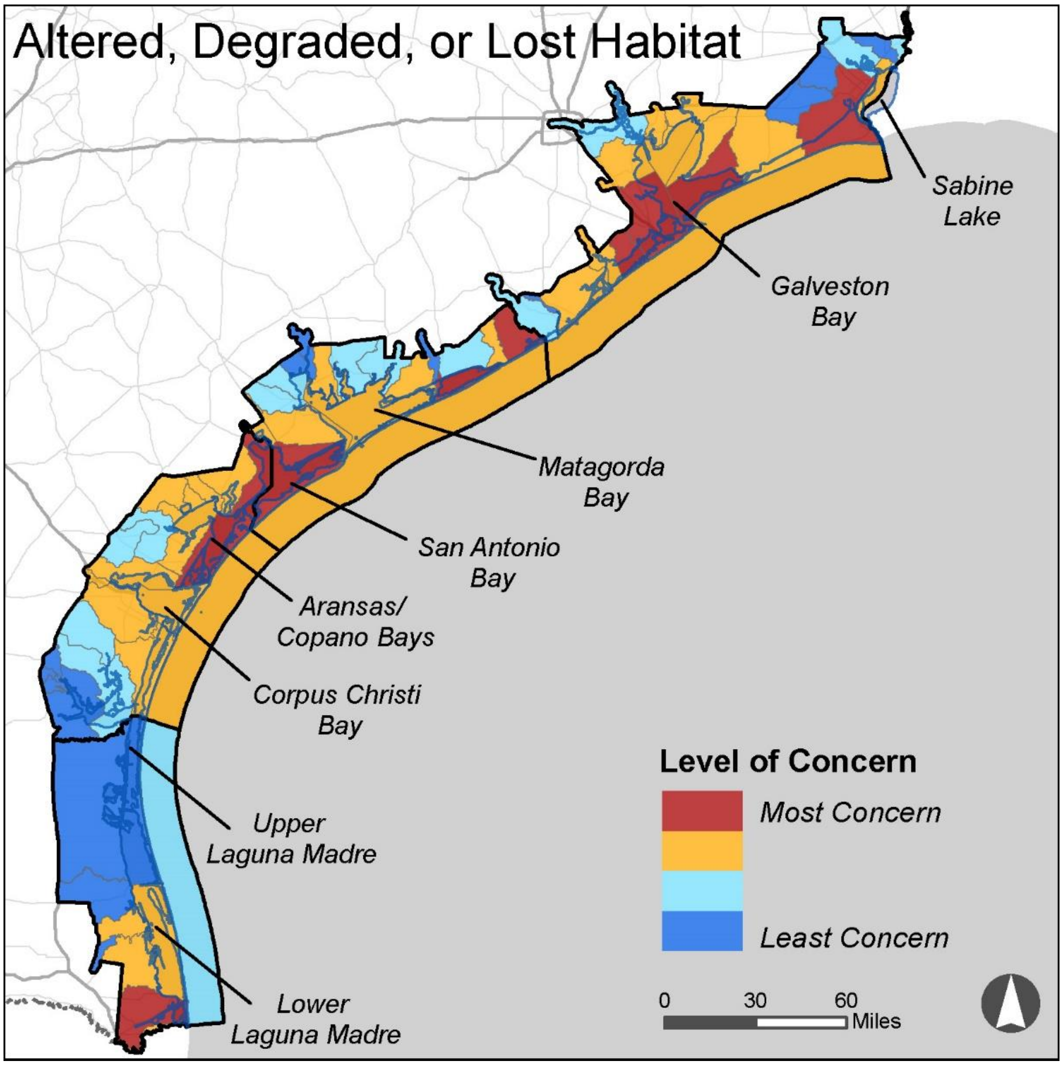
Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
	1.20	3.33		2.70	3.06	2.68	2.51	2.88	1.11
	1.21	2.08		1.27	2.17	2.33	2.08	1.85	1.00
	1.22	2.56		1.53	1.65	1.71	1.89	2.22	0.67
R2	2.01	2.84	2.58		2.28	2.06	2.05	2.23	0.96
	2.02	2.98		2.62	2.27	2.10	2.47	2.52	1.02
	2.03	2.77		2.47	2.20	2.13	2.23	2.27	0.96
	2.04	2.43		2.63	2.14	2.00	2.38	2.64	1.00
	2.05	2.23		0.91	1.58	1.85	2.25	2.15	1.00
	2.06	2.92		2.62	2.18	2.00	2.31	2.73	0.98
	2.07	2.91		2.59	2.35	2.11	2.87	2.89	0.96
	2.08	2.49		2.35	2.44	2.28	2.06	2.24	1.19
	2.09	2.67		2.55	2.26	2.09	2.34	2.57	0.97
	2.10	2.93		2.38	2.28	2.04	2.91	2.87	1.17
	2.11	2.10		0.80	1.30	1.10	1.90	1.64	0.86
	2.12	2.27		1.11	1.22	1.40	1.70	2.00	0.83
	2.13	2.68		2.07	2.08	2.08	2.82	2.66	1.35
	2.14	2.61		2.05	2.08	1.83	2.67	2.66	1.11
	2.15	2.85		2.55	1.72	1.63	2.25	2.40	0.95
	2.16	2.77		2.75	2.12	2.11	2.66	2.64	1.16
	2.17	3.14		2.81	2.18	1.96	2.61	2.86	1.27
R3	3.01	2.88	2.07		2.45	2.11	1.90	2.39	1.09
	3.02	3.27		2.81	2.15	2.05	2.90	2.90	1.27
	3.03	2.71		2.16	1.80	1.70	2.24	2.56	0.98
	3.04	2.60		2.01	1.81	1.86	1.83	2.38	0.91
	3.05	3.03		2.84	2.42	2.17	2.12	2.77	1.27

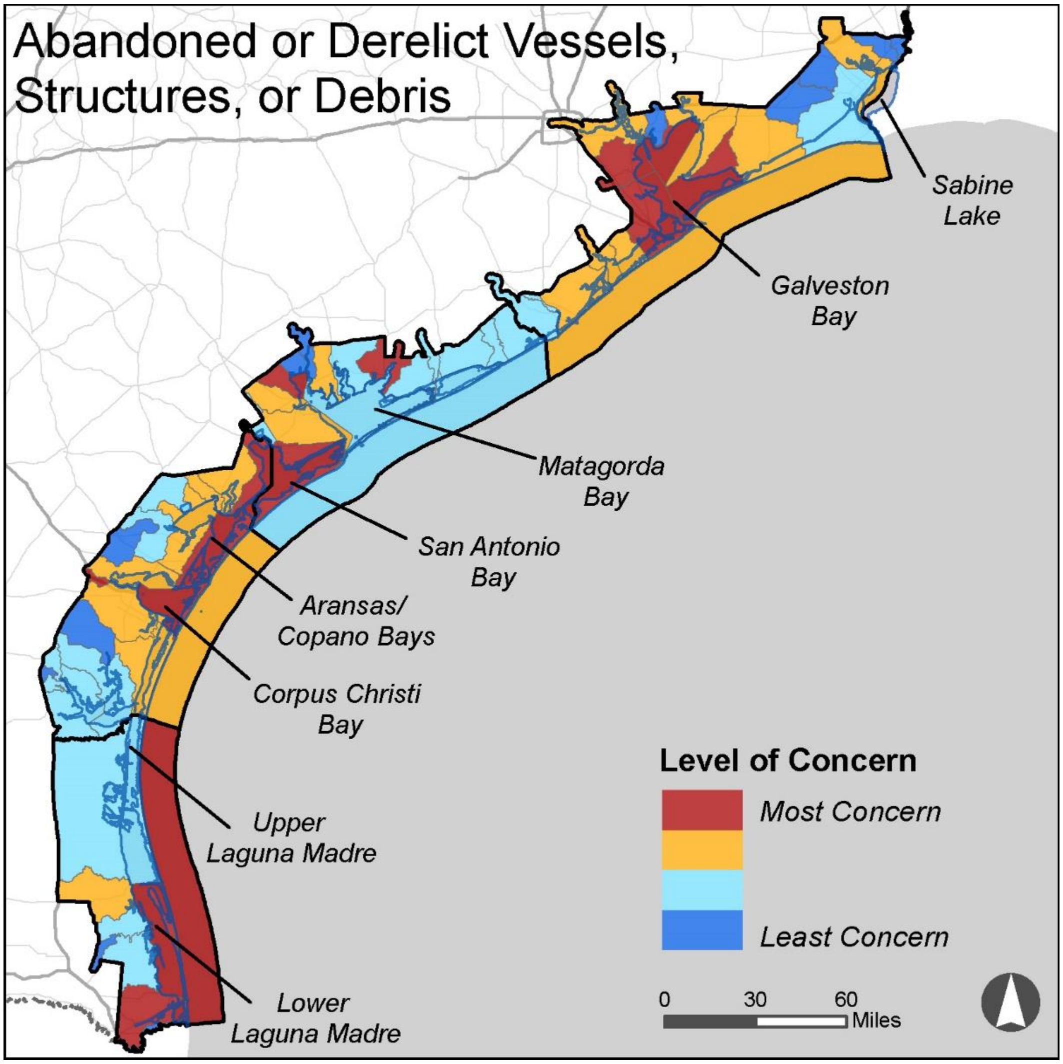
Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
	3.06	2.51		1.90	1.51	1.54	2.03	2.52	0.74
	3.07	2.86		2.75	2.33	2.28	2.12	2.44	1.12
	3.08	2.46		2.02	1.77	1.75	1.91	2.07	0.78
	3.09	2.22		0.44	0.63	1.25	1.11	1.44	0.25
	3.10	2.93		2.46	2.16	2.08	2.65	2.58	1.12
	3.11	2.94		2.63	2.37	2.24	2.31	2.69	1.38
	3.12	2.56		0.33	1.50	1.80	2.78	2.20	1.29
	3.13	2.78		2.04	2.57	2.37	2.90	2.49	0.90
	3.14	2.80		1.91	2.23	2.05	1.96	2.43	1.19
	3.15	2.14		0.13	0.63	1.25	1.50	1.50	0.25
	3.16	2.13		2.08	1.77	1.67	2.47	2.33	0.90
	3.17	1.75		0.29	1.14	1.29	1.75	1.50	0.67
	3.18	1.67		0.50	0.86	1.14	1.50	1.22	0.57
	3.19	1.50		0.33	0.71	0.57	1.13	1.00	0.67
	3.20	2.00		1.22	1.56	1.22	1.91	1.91	0.75
R4	4.01	2.56	3.04		2.64	2.31	1.66	2.17	1.18
	4.02	1.94		1.81	1.47	1.56	1.94	2.17	0.92
	4.03	1.88		1.43	1.85	1.79	2.20	2.06	1.09
	4.04	2.98		1.87	2.39	2.21	2.55	2.73	1.18
	4.05	2.95		2.37	2.00	1.93	2.50	2.69	0.97
	4.06	1.94		0.92	1.29	1.57	2.63	2.06	0.75
	4.07	2.79		2.02	2.12	2.06	2.58	2.78	0.89
	4.08	3.32		2.41	2.31	2.18	2.80	2.92	1.17
	4.09	2.82		1.34	1.69	1.76	3.11	2.35	0.68

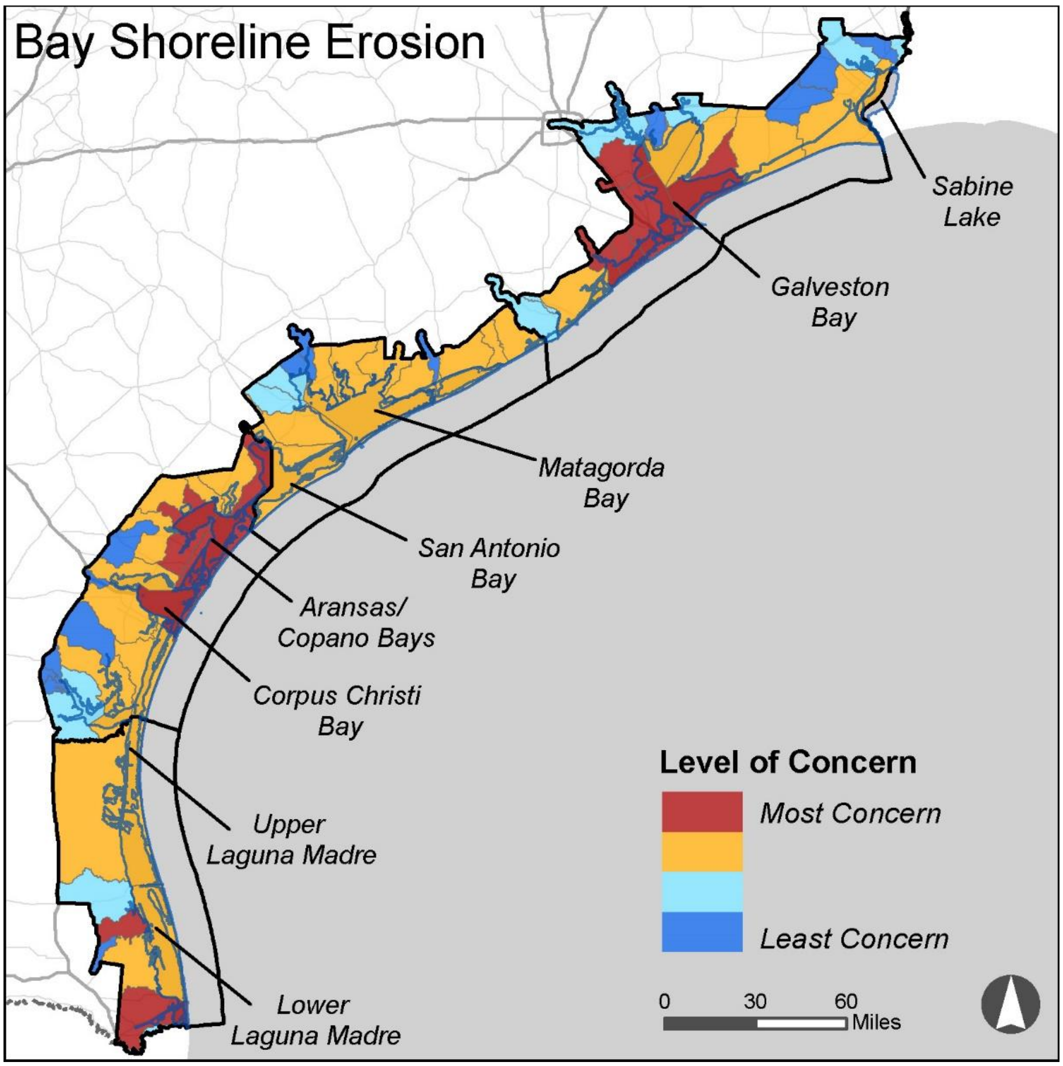
Issues of Concern Results (Maps)

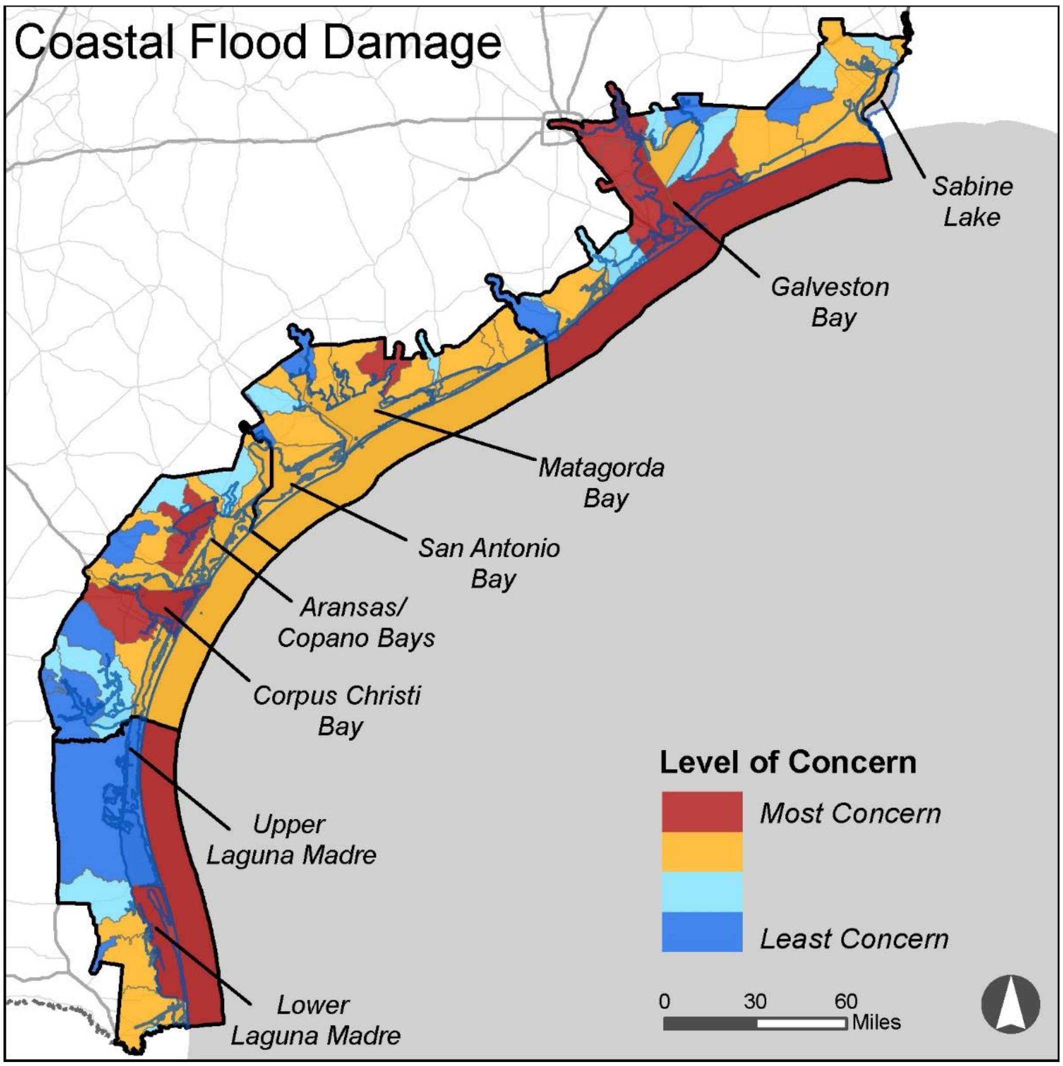
Issues of Concern were evaluated by the TAC in each of 68 subregions along the Texas coast on a scale from 0-4, zero being "not at all concerned," and 4 being "extremely concerned." All TAC responses were averaged, then scores were compared for each Issue of Concern among subregions within each region. A level of concern for a particular issue within a subregion that was greater than one standard deviation above the mean level of concern for that Issue with the region indicated "Most Concern" (dark red, below). A level of concern greater than one standard deviation below the mean level of concern for that issue within the region indicated "Least Concern" (dark blue, below). Levels of concern within one standard deviation above (orange) or below (light blue) the mean within the region indicated moderate concern. To develop an overall level of concern for each subregion, an average was taken of level of concern for each IOC (excluding ADVSD), then compared to the overall IOC mean for that region (excluding ADVSD). The level of concern was then applied as shown above.



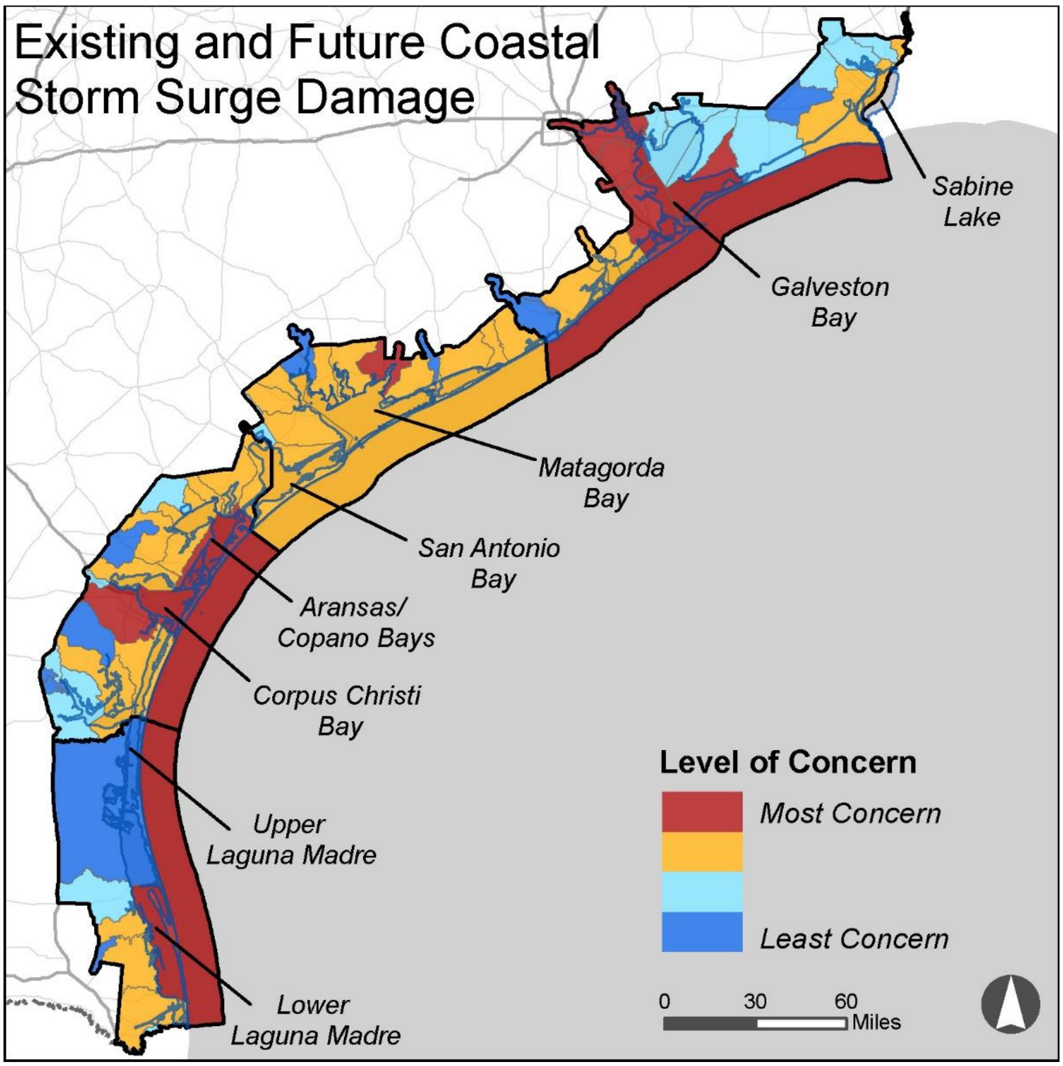

Altered, Degraded, or Lost Habitat
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0 30 60 Miles


Abandoned or Derelict Vessels, Structures, or Debris
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles

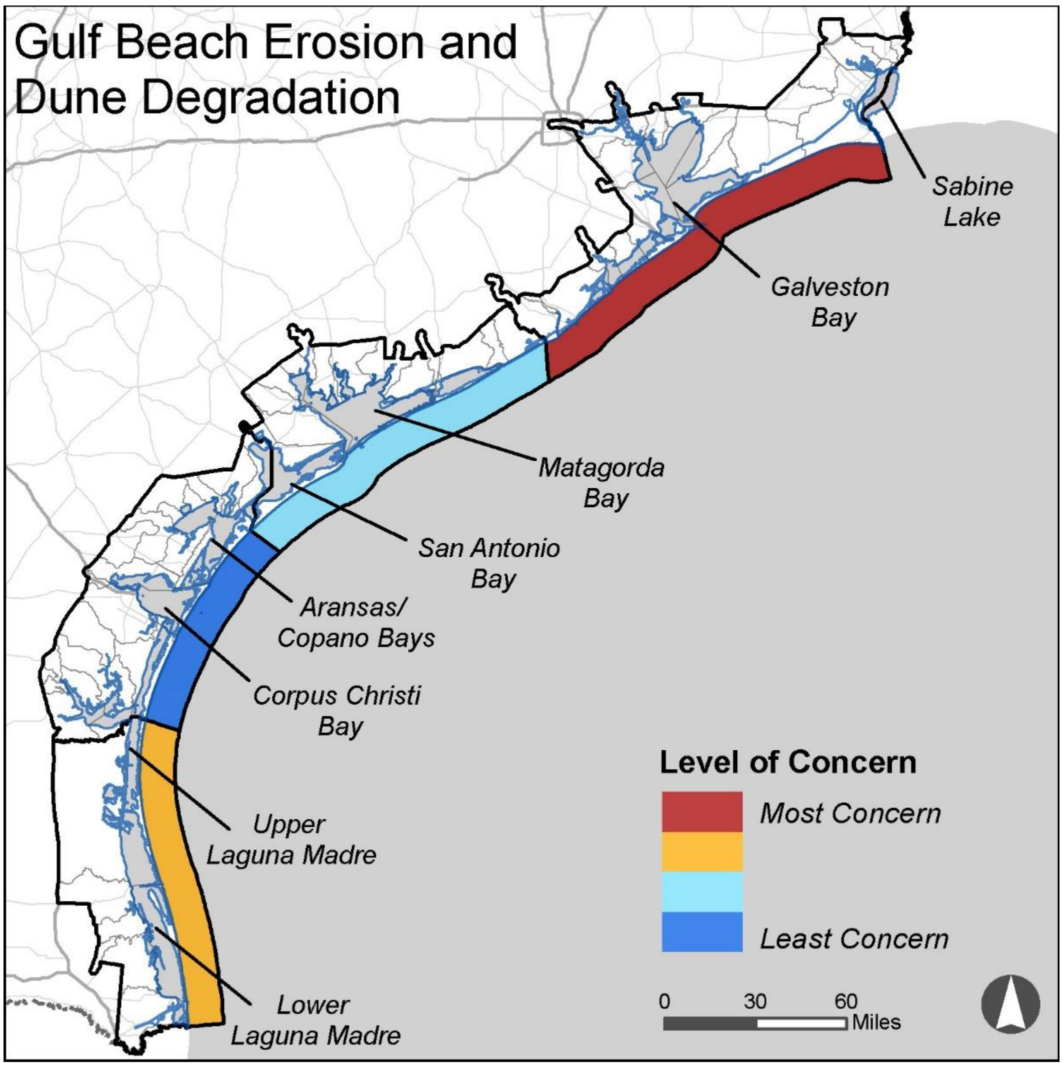

Bay Shoreline Erosion
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles

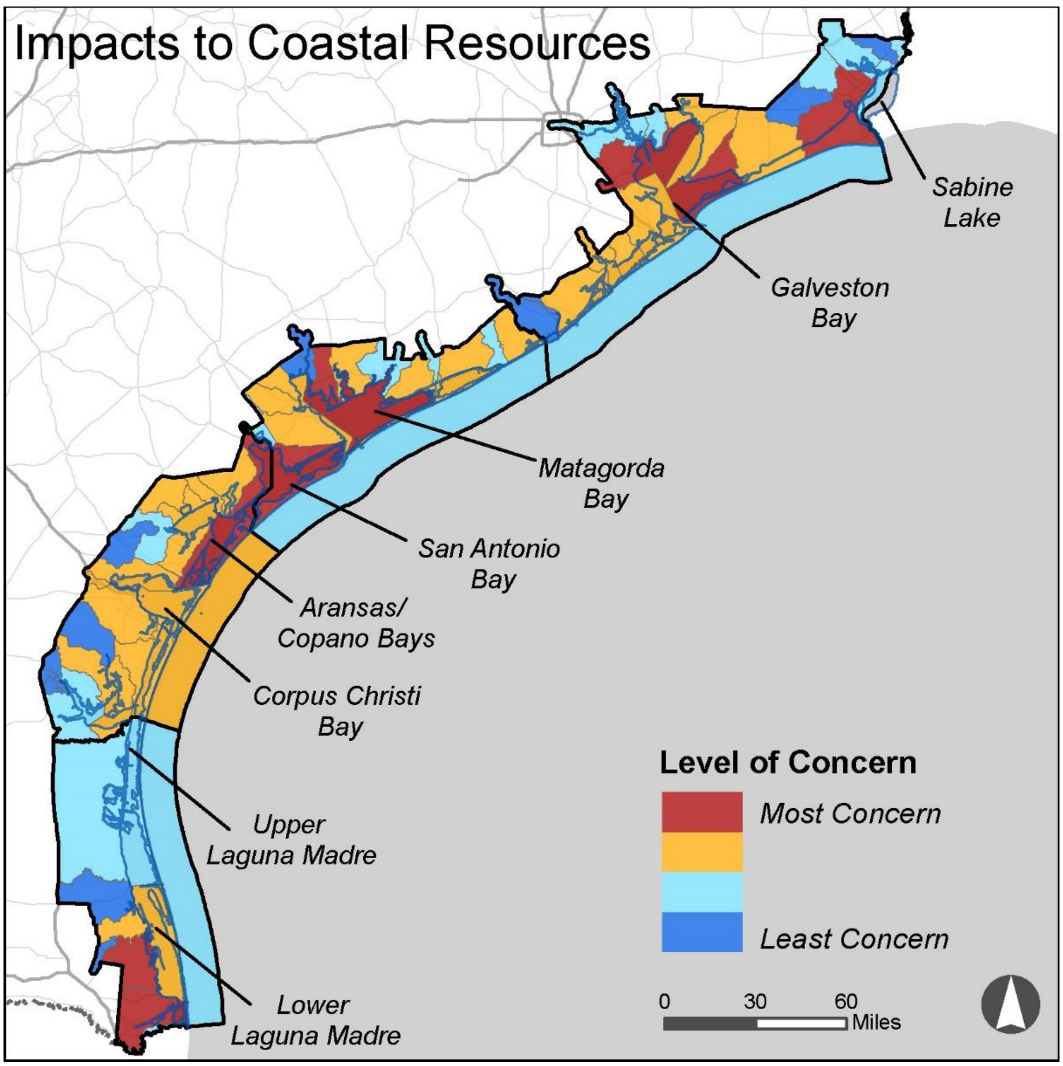


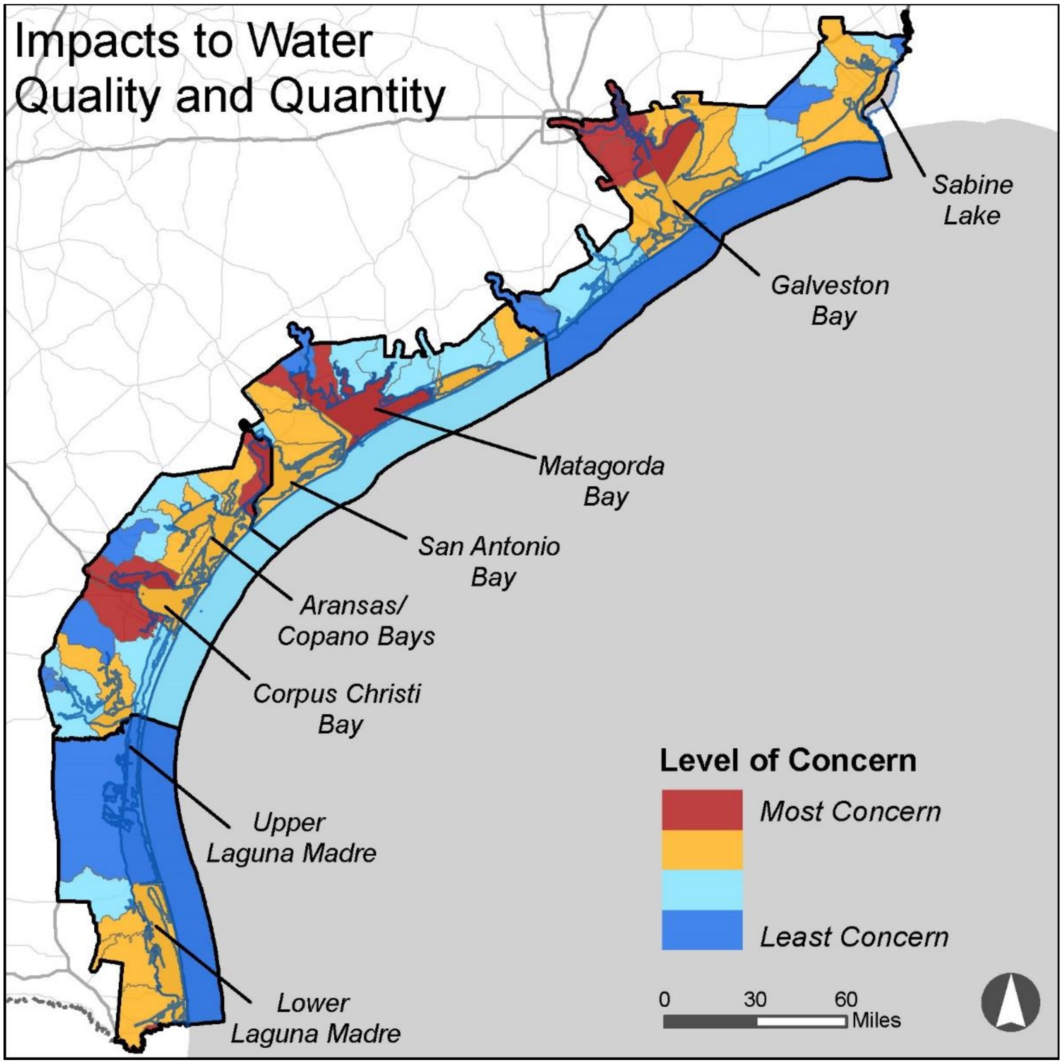
Coastal Flood Damage
Sabine
Lake
Galveston
Bay
Matagorda
Bay
San Antonio
Bay
Aransas/
Copano Bays
Corpus Christi
Bay
Upper
Laguna Madre
Lower
Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles



Existing and Future Coastal Storm Surge Damage
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles


Gulf Beach Erosion and Dune Degradation
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles


Impacts to Coastal Resources
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0 30 60
Miles



Impacts to Water Quality and Quantity
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles

Level of Concern for all Subregions

For individual IOCs for each subregion, the level of concern was determined by calculating the difference between each IOC score and the regional average for that IOC score, in terms of standard deviation. If the IOC score for subregion was greater than one standard deviation from the mean IOC score for the region, the highest level of concern, “Most Concern,” was assigned. If the IOC score was between zero and one standard deviation greater than the mean IOC score for the region, “Moderately High” concern was assigned. If the IOC scare for a particular subregion was between zero and one standard deviation below the mean for the region, a “Moderately Low” level of concern for that IOC was assigned. Any subregion IOC scores less than one standard deviation between the mean level of concern for the region was assigned “Least Concern.”

Level of concern	Standard Deviations from the Regional Mean
Most Concern	> 1
Moderately High	0 - 1
Moderately Low	-1 – 0
Least Concern	< -1

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
R1	1.01	0.28	1.34		1.45	1.33	-1.05	-0.69	0.44	0.75
	1.02	0.22		0.33	0.62	0.27	0.59	-0.22	0.04	0.50
	1.03	-0.50		-0.75	0.04	0.20	-1.06	-0.77	-1.24	-0.87
	1.04	-1.56		-1.01	-0.94	-0.92	-0.49	-1.06	-1.42	-1.80
	1.05	-0.71		-0.46	-0.33	0.09	0.52	-0.65	0.10	-0.49
	1.06	1.17		0.71	0.74	0.58	0.41	1.00	-0.23	1.32
	1.07	-1.14		-1.44	-0.83	-0.37	-0.45	-0.15	-1.49	-1.32
	1.08	-1.49		-1.79	-1.99	-1.51	-1.44	-1.23	-1.98	-2.82
	1.09	0.98		0.58	-0.10	0.18	-0.68	0.33	0.19	0.35
	1.10	0.08		0.57	-0.09	-0.31	0.08	0.72	0.34	0.27

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
	1.11	1.10		1.16	1.05	1.08	0.18	1.50	1.31	1.76
	1.12	0.17		-0.18	-0.81	-1.19	0.87	0.36	0.21	-0.27
	1.13	0.13		-1.32	-0.71	-0.21	0.29	-0.65	-1.24	-0.76
	1.14	-0.81		-0.33	1.35	1.37	2.03	-0.09	0.68	1.00
	1.15	1.00		1.26	1.41	1.66	1.98	1.74	1.67	2.63
	1.16	0.42		0.67	-0.19	0.45	1.51	1.08	1.78	1.12
	1.17	1.08		1.30	1.12	1.07	0.41	0.66	1.16	1.63
	1.18	1.03		1.31	0.43	-0.15	-0.13	0.57	0.04	0.87
	1.19	0.80		1.13	0.15	-0.30	-0.47	0.32	0.23	0.44
	1.20	0.97		0.94	0.69	0.14	-0.17	0.91	0.26	0.99
	1.21	-2.22		-0.83	-1.03	-0.84	-1.23	-2.45	-0.01	-2.57
	1.22	-1.00		-0.51	-2.03	-2.63	-1.71	-1.23	-0.83	-2.72
	2.01	0.58	-0.41		0.68	0.47	-1.00	-0.72	-0.59	-0.18
	2.02	1.06		0.70	0.64	0.59	0.28	0.15	-0.17	1.19
	2.03	0.30		0.49	0.46	0.71	-0.44	-0.59	-0.63	0.30
	2.04	-0.90		0.70	0.29	0.25	-0.02	0.51	-0.31	0.26
R2	2.05	-1.60		-1.60	-1.30	-0.28	-0.39	-0.95	-0.31	-2.24
	2.06	0.82		0.69	0.40	0.27	-0.21	0.78	-0.49	0.95
	2.07	0.82		0.66	0.89	0.63	1.45	1.27	-0.62	2.02
	2.08	-0.67		0.34	1.15	1.20	-0.96	-0.69	1.06	0.09
	2.09	-0.03		0.60	0.61	0.56	-0.13	0.30	-0.52	0.65

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
	2.10	0.86		0.38	0.68	0.38	1.57	1.21	0.93	1.79
	2.11	-2.06		-1.74	-2.11	-2.87	-1.44	-2.51	-1.35	-4.61
	2.12	-1.45		-1.33	-2.34	-1.83	-2.04	-1.41	-1.52	-3.77
	2.13	-0.02		-0.04	0.12	0.54	1.31	0.57	2.21	0.85
	2.14	-0.25		-0.07	0.12	-0.33	0.86	0.59	0.46	0.30
	2.15	0.60		0.60	-0.92	-1.02	-0.39	-0.19	-0.67	-0.51
	2.16	0.31		0.87	0.22	0.63	0.84	0.51	0.87	1.17
	2.17	1.64		0.95	0.40	0.10	0.70	1.18	1.64	1.75
R3	3.01	0.82	-1.36		1.17	0.83	-0.29	0.43	0.60	0.39
	3.02	1.63		1.30	0.69	0.71	1.66	1.37	1.15	1.79
	3.03	0.47		0.61	0.14	-0.04	0.37	0.74	0.22	0.55
	3.04	0.23		0.46	0.16	0.31	-0.44	0.40	0.00	0.27
	3.05	1.13		1.33	1.12	0.96	0.14	1.13	1.15	1.42
	3.06	0.04		0.35	-0.34	-0.38	-0.03	0.66	-0.51	0.07
	3.07	0.79		1.23	0.98	1.20	0.13	0.51	0.68	1.18
	3.08	-0.05		0.47	0.09	0.06	-0.28	-0.18	-0.40	0.02
	3.09	-0.55		-1.18	-1.75	-1.01	-1.85	-1.35	-2.07	-1.88
	3.10	0.92		0.93	0.71	0.78	1.19	0.77	0.68	1.29
	3.11	0.95		1.11	1.05	1.13	0.51	0.97	1.50	1.39
	3.12	0.14		-1.30	-0.35	0.17	1.43	0.06	1.21	0.04
	3.13	0.61		0.49	1.36	1.41	1.67	0.60	0.00	1.50

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
	3.14	0.65		0.35	0.82	0.71	-0.17	0.49	0.90	0.69
	3.15	-0.72		-1.51	-1.75	-1.01	-1.08	-1.24	-2.07	-1.79
	3.16	-0.74		0.53	0.08	-0.11	0.82	0.31	-0.01	0.21
	3.17	-1.54		-1.35	-0.92	-0.94	-0.59	-1.24	-0.75	-1.61
	3.18	-1.71		-1.12	-1.38	-1.24	-1.08	-1.76	-1.05	-2.03
	3.19	-2.06		-1.30	-1.61	-2.48	-1.82	-2.18	-0.75	-2.80
	3.20	-1.02		-0.37	-0.26	-1.07	-0.28	-0.48	-0.49	-0.85
	4.01	-0.03	0.44		1.59	1.46	-1.88	-0.83	1.13	0.15
	4.02	-1.26		0.32	-1.20	-1.40	-1.20	-0.83	-0.33	-1.89
	4.03	-1.40		-0.27	-0.30	-0.55	-0.57	-1.16	0.62	-1.46
	4.04	0.80		0.40	1.00	1.08	0.26	0.91	1.14	1.35
R4	4.05	0.76		1.16	0.07	0.02	0.15	0.79	-0.07	0.86
	4.06	-1.27		-1.04	-1.64	-1.37	0.45	-1.17	-1.31	-2.04
	4.07	0.43		0.63	0.35	0.49	0.33	1.07	-0.51	0.98
	4.08	1.48		1.23	0.80	0.94	0.88	1.49	1.04	2.11
	4.09	0.49		-0.39	-0.68	-0.67	1.60	-0.28	-1.70	-0.07

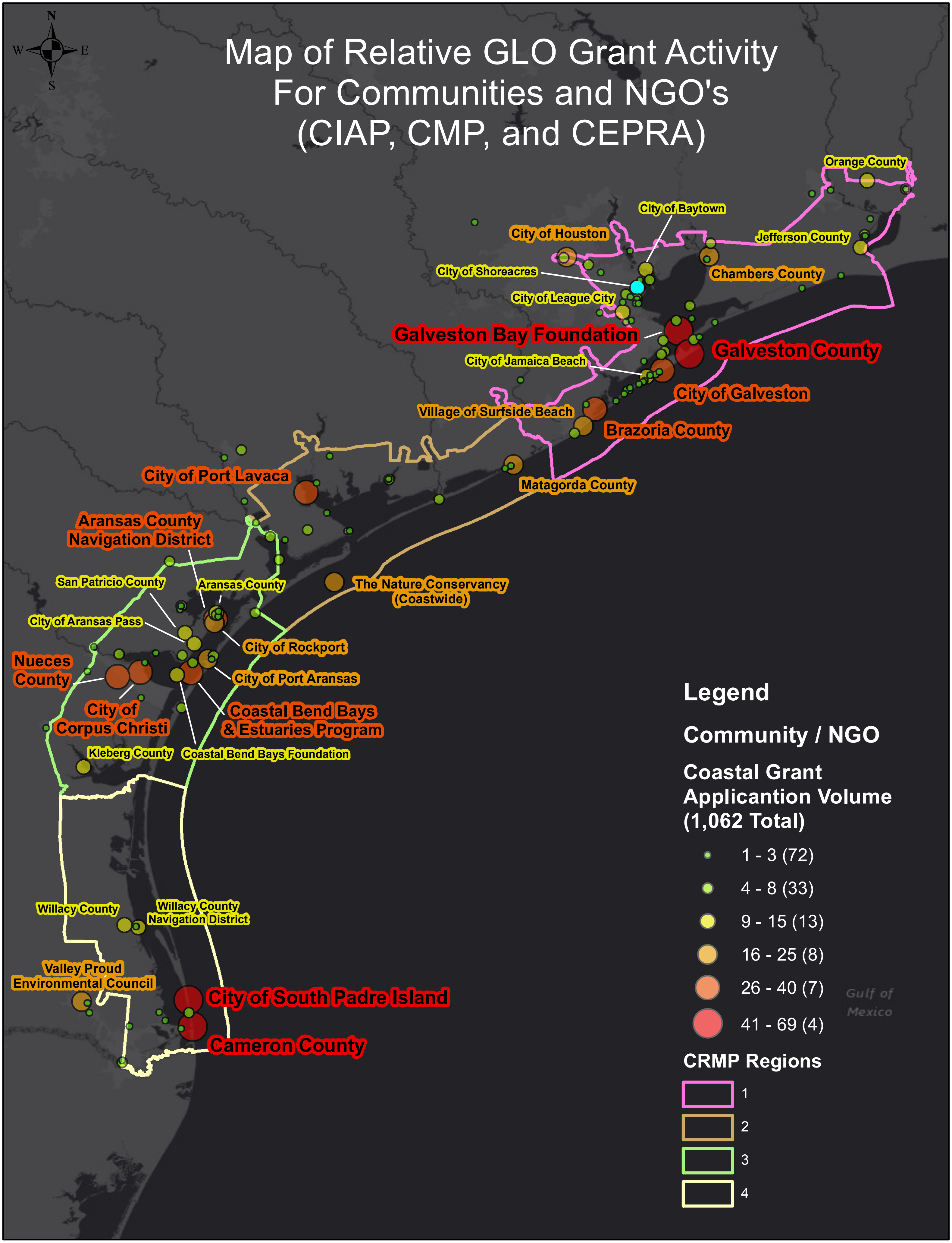
Appendix B. Literature Review

Literature Review Document List

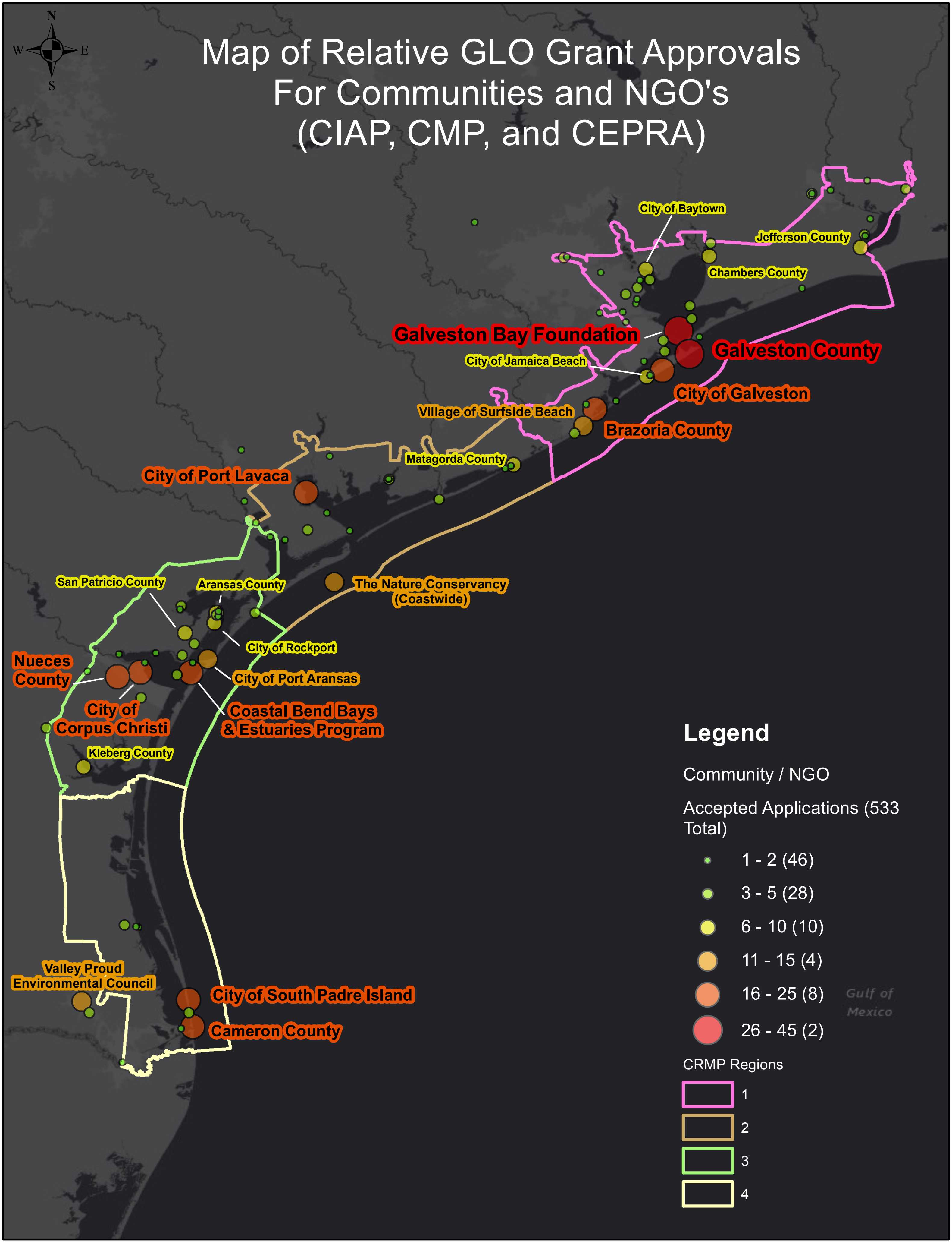
Provided in this appendix is a comprehensive list of documents reviewed during the literature review process, particularly as they relate to proposing prospective coastal resiliency projects in Texas. The list includes documents reviewed during the 2017 Resiliency Plan planning efforts, as well as those reviewed during development of the project list for the 2019 Resiliency Plan. Some sources listed in the Report and its appendices may not be included if they were reviewed for technical background, rather than individual projects, later in the planning process. Some sources were previously listed in the Technical Report to the 2017 Resiliency Plan and are not repeated here.

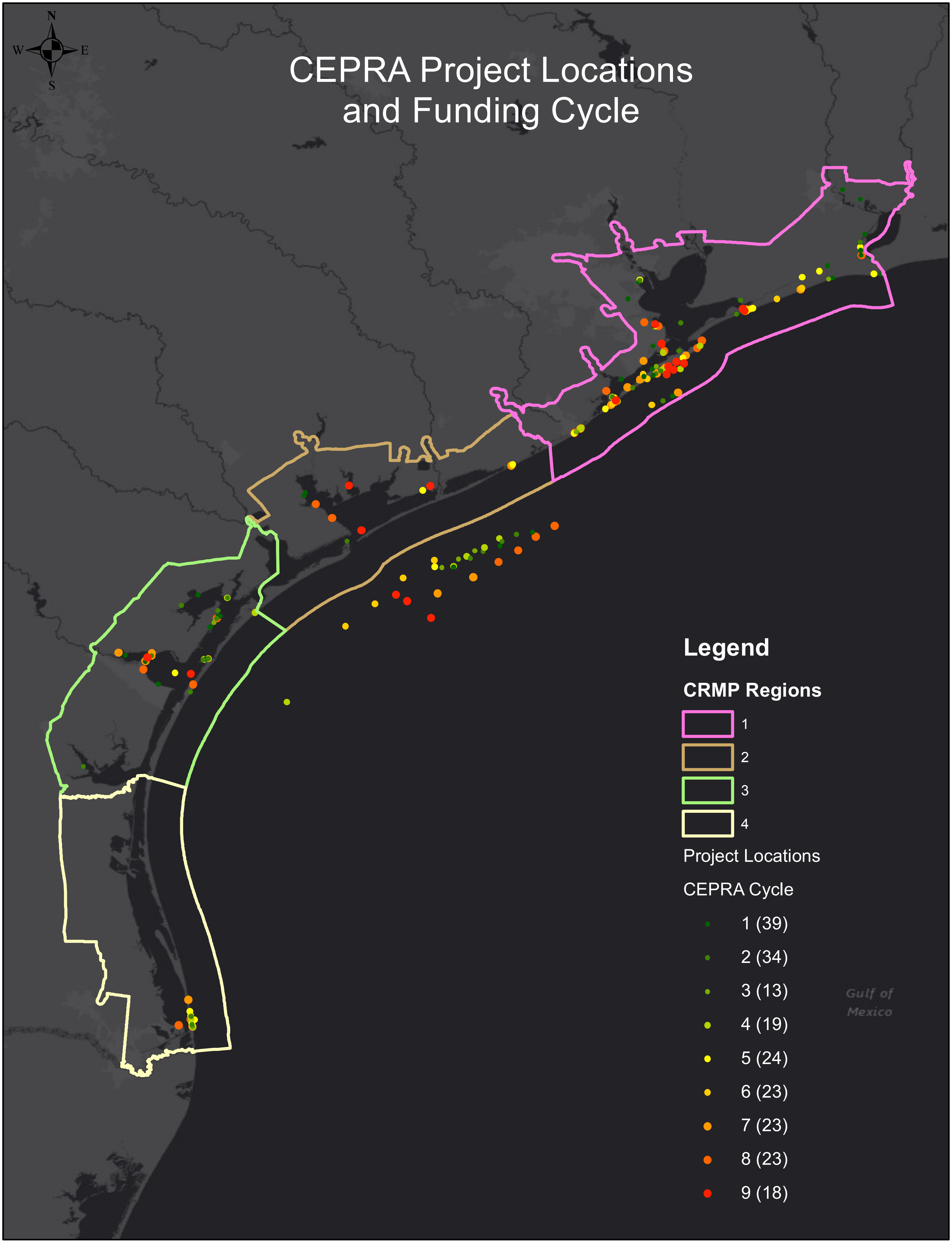
Document ID	Review Status	Document_Name	Author	Document Year	Publishing Location/Organization	Pages	Prepared For
215	Review	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration Final Integrated Feasibility Report - Environmental Impact Statement	United States Army Corps of Engineers	2017	USACE Galveston District, Southwest Division	278	
216	Review	CEPRA Cycle 10 Project Goal Summary (Excel dataset)	Texas General Land Office	2017	Texas General Land Office	n.p.	
217	Review	Texas GLO Coastal Grants and Projects (Excel dataset)	Texas General Land Office	2017	Texas General Land Offic	n.p.	
218	Review	Coastal Erosion Planning & Response Act: Report to the 85th Legislature	Texas General Land Office	2017	Austin, Texas: Texas General Land Office	34	
219	Review	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) Initial Funded Priorities List	<Null>	2016		275	
220	Review	RESTORE Act Direct Component Texas Multiyear Implementation Plan	Baker, Toby	2017		28	
221	Review	Texas Trustee Implementation Group Draft 2017 Restoration Plan/Environmental Assessment of Wetlands, Coastal, and Nearshore Habitats; and Oysters	TEXAS TRUSTEE IMPLEMENTATION GROUP	2017		398	
223	Review	Gulf Environmental Benefit Fund: Five Year Report 2013-2018	National Fish and Wildlife Foundation	2018	National Headquarters, Northeastern and Southern Regional Offices	33	
224	Review	Final Report - Evaluation of Freshwater Delivery Alternatives to East Matagorda Bay	Austin, B., Kennedy, A., Osting T. and C. Walker	2015	AquaStrategies	59	
225	Review	Clear Creek, TX: Draft General Reevaluation Report and Supplemental Environmental Impact Statement	U.S. Army Corps of Engineers	2012	USACE Galveston District, Southwest Division	29	Public Meeting - January 11, 2012
226	Review	Gulf-Houston Regional Conservation Plan Executive Summary - Key Initiatives	Gulf-Houston RCP	2016		19	
227	Review	Dr. Ned and Fay Dudney Clear Creek Nature Center Management Plan and Working List of Projects - Phase I	Dr. Ned and Fay Dudney Clear Creek Nature Center Management Plan	2016	League City, Texas	52	City of League City
228	Review	Salt Bayou Watershed Restoration Plan	Salt Bayou Marsh Workgroup	2013		40	
229	Review	Brazoria County RESTORE Act Projects	Brazoria County	2016	Brazoria County Commissioner's Court	22	
230	Review	Gulf Intracoastal Waterway Brazos River Floodgates and Colorado River Locks Systems Feasibility Study	U.S. Army Corps of Engineers	2017	USACE Galveston District, Southwest Division	29	
231	Review	Maintenance Material and Bird Island Restoration at Sundown/Chester Island, Matagorda Bay, Texas	Weber, C., Buzan, D., Dixon, T., Pena, I. and T. Wilkinson	2015	Proceedings of Western Dredging Association and Texas A&M University Center for Dredging Studies	8	Dredging Summit and Expo 2015
232	Review	Details of the Four Texas Rookery Islands: Phase IV Early Restoration Projects	Texas Parks and Wildlife Department	2015		2	
233	Review	City of Port Lavaca Shoreline Revitalization and Environmental Enhancement Strategy	City of Port Lavaca Shoreline Task Force	2016		20	City of Port Lavaca Department of Economic Development Meeting on 2/2/16
234	Review	Armand Bayou Watershed Plan	Armand Bayou Watershed Partnership	n.d.		128	Coastal Coordination Council
235	Review	McCollum Park Project: Draft Environmental Assessment FEMA-1791-DR-TX	Federal Emergency Management Program	2009	Chambers County, TX	36	
236	Review	Supplemental Environmental Project: Aquisition of Big Tree Ranch, Aransas County, Texas	Sweeny, R., Hollingsworth, T. and K. Keyes	2011	Texas Parks & Wildlife Department	30	Attorney General's Office of Texas
237	Review	Sea Rim State Park Improvements: Phase III Proposed Early Restoration Project	Rhodes, J.	2014	Texas Parks & Wildlife Department	2	Deepwater Horizon Oil Spill Natural Resource Damage Assessment
238	Review	Cycle 10 Project Goal Summary Forms Submitted for Funding Consideration (Excel dataset)	Texas General Land Office	2017		n.p.	
239	Review	Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters	Environmental Protection Agency	1993	Office of Water, Washington, DC	7	
240	Review	Regional Hurricane Recovery & Resiliency Initiatives	Port Corpus Christi	2017		12	
241	Information Only	Texas Coastal Bend Regional Climate Change Vulnerability Assessment	Murdock, M. and J. Brenner	2016	The Nature Conservancy, Arlington	44	Coastal Bend Bays and Estuaries Program
242	Information Only	Natural and Structural Measures for Shoreline Stabilization	SAGE	2015	SAGE	6	
243	Information Only	Texas Master Plan for Beneficial Use of Dredged Material: Proposal Project Description	Ducks Unlimited, Anchor QEA, Sarosdy Consulting, Inc. and Texas Department of Transportation	n.d.	Ducks Unlimited, Anchor QEA, Sarosdy Consulting, Inc. and Texas Department of Transportation	16	
244	Review	Texas Sea Grant College Program 2018-2021	Texas Seagrant at Texas A&M University	2017		20	
245	Review	Atlas of Sustainable Strategies for Galveston Island	Hight, C., Anderson, J., Robinson, M. and D. Wallace	2010	Rice School of Architecture	104	

Document ID	Review Status	Document_Name	Author	Document Year	Publishing Location/Organization	Pages	Prepared For
246	Review	Brazoria County Regional Plan for Public Parks and Sustainable Development: A Case Study	Atkins North America	2013		168	Houston-Galveston Area Council (H-GAC) Brazoria County Parks Department
247	Review	Chambers County Greenprint for Growth and Conservation: A Report by the Trust for Public Land	The Trust for Public Land Conserving Land for People	2009		52	
248	Review	Mission-Aransas National Estuarine Research Reserve Management Plan 2015-2020	University of Texas Marine Science Institute	2015		266	National Oceanic and Atmospheric Administration
249	Review	San Antonio Bay Partnership Strategic Plan 2018	San Antonio Bay Partnership	2018		13	
250	Review	The Galveston Bay Plan, 2nd Edition (Draft)	Galveston Bay Estuary Program	2018		175	Galveston Bay Council and Subcommittee Review
251	Information Only	Protecting Open Space & Ourselves: Reducing Flood Risk in the Gulf of Mexico Through Strategic Land Conservation	Shepard C, Majka D, Brody S, Highfield W and J Fargione	2016	Washington DC: The Nature Conservancy	12	
252	Information Only	Storm Surge Suppression Study: Phase I Report	The Gulf Coast Community Protection and Recovery District (GCCPRD)	2015		125	
253	Review	Update to the Arroyo Colorado Watershed Protection Plan	Arroyo Colorado Watershed Partnership	2017	College Station, Texas: Texas Water Resources Institue Technical Report - 504	157	



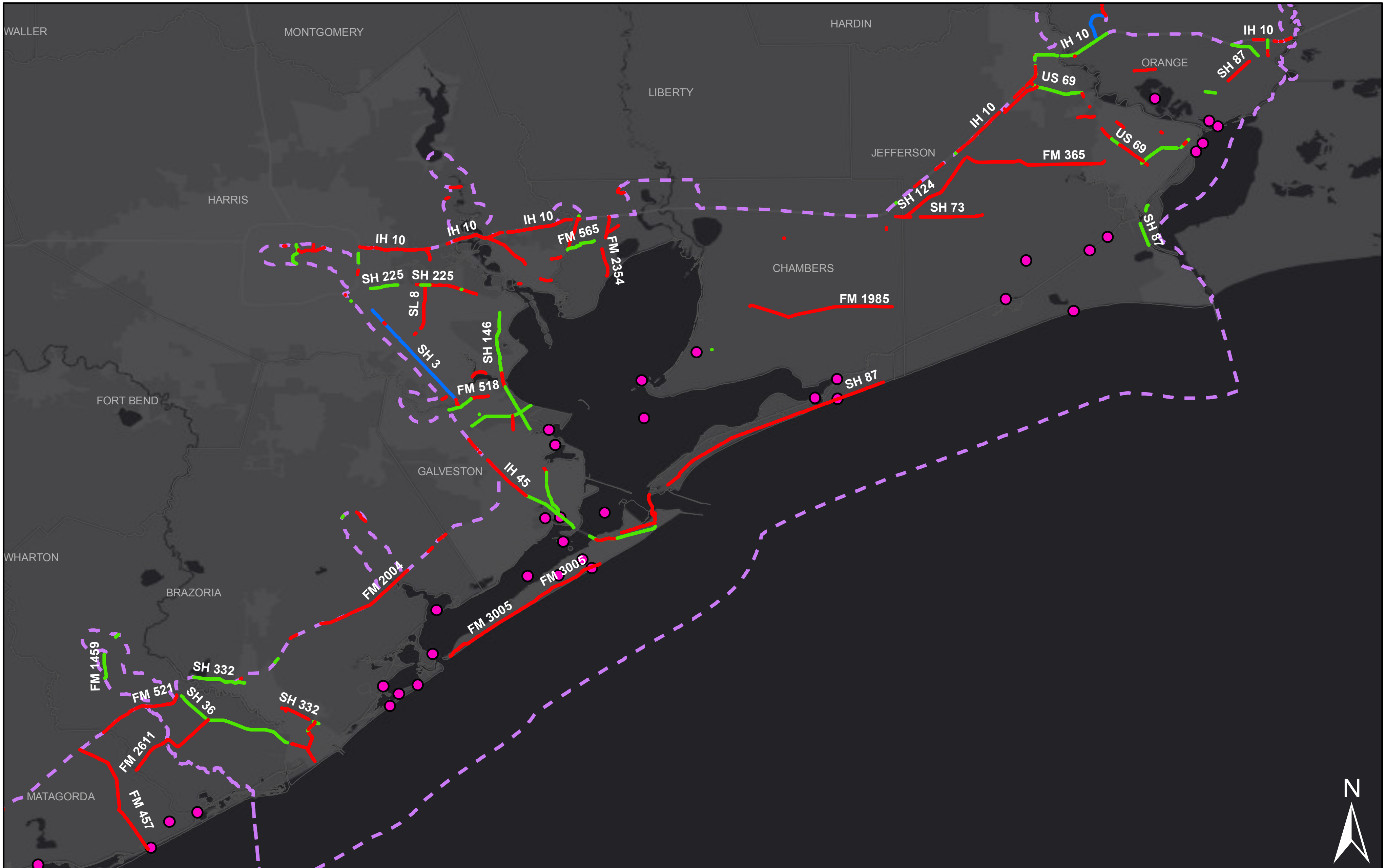
Map of Relative GLO Grant Activity
For Communities and NGO's
(CIAP, CMP, and CEPRA)
N
S
E
W
Orange County
City of Baytown
City of Houston
Jefferson County
City of Shoreacres
Chambers County
City of League City
Galveston Bay Foundation
Galveston County
City of Jamaica Beach
City of Galveston
Village of Surfside Beach
Brazoria County
City of Port Lavaca
Matagorda County
Aransas County
Navigation District
San Patricio County
Aransas County
The Nature Conservancy
(Coastwide)
City of Aransas Pass
City of Rockport
Nueces
County
City of Port Aransas
City of
Corpus Christi
Coastal Bend Bays
& Estuaries Program
Kleberg County
Coastal Bend Bays Foundation
Willacy County
Willacy County
Navigation District
Valley Proud
Environmental Council
City of South Padre Island
Cameron County
Gulf of
Mexico
Legend
Community / NGO
Coastal Grant
Applicantion Volume
(1,062 Total)
1 - 3 (72)
4 - 8 (33)
9 - 15 (13)
16 - 25 (8)
26 - 40 (7)
41 - 69 (4)
CRMP Regions
1
2
3
4


N
S
E
W
Map of Relative GLO Grant Approvals
For Communities and NGO's
(CIAP, CMP, and CEPRA)
City of Baytown
Jefferson County
Chambers County
Galveston Bay Foundation
Galveston County
City of Jamaica Beach
City of Galveston
Village of Surfside Beach
Brazoria County
Matagorda County
City of Port Lavaca
The Nature Conservancy
(Coastwide)
San Patricio County
Aransas County
City of Rockport
Nueces
County
City of Port Aransas
City of
Corpus Christi
Coastal Bend Bays
& Estuaries Program
Kleberg County
Valley Proud
Environmental Council
City of South Padre Island
Cameron County
Gulf of
Mexico
Legend
Community / NGO
Accepted Applications (533
Total)
1 - 2 (46)
3 - 5 (28)
6 - 10 (10)
11 - 15 (4)
16 - 25 (8)
26 - 45 (2)
CRMP Regions
1
2
3
4



N
W
E
S
CEPRA Project Locations
and Funding Cycle
Legend
CRMP Regions
1
2
3
4
Project Locations
CEPRA Cycle
1 (39)
2 (34)
3 (13)
4 (19)
5 (24)
6 (23)
7 (23)
8 (23)
9 (18)
Gulf of
Mexico

TxDOT Infrastructure Projects Reviewed for the 2019 Resiliency Plan



Legend

Region Boundary

Proposed Projects

TxDOT Project Status

Finalizing for Construction

Long Term Planning

Under Development

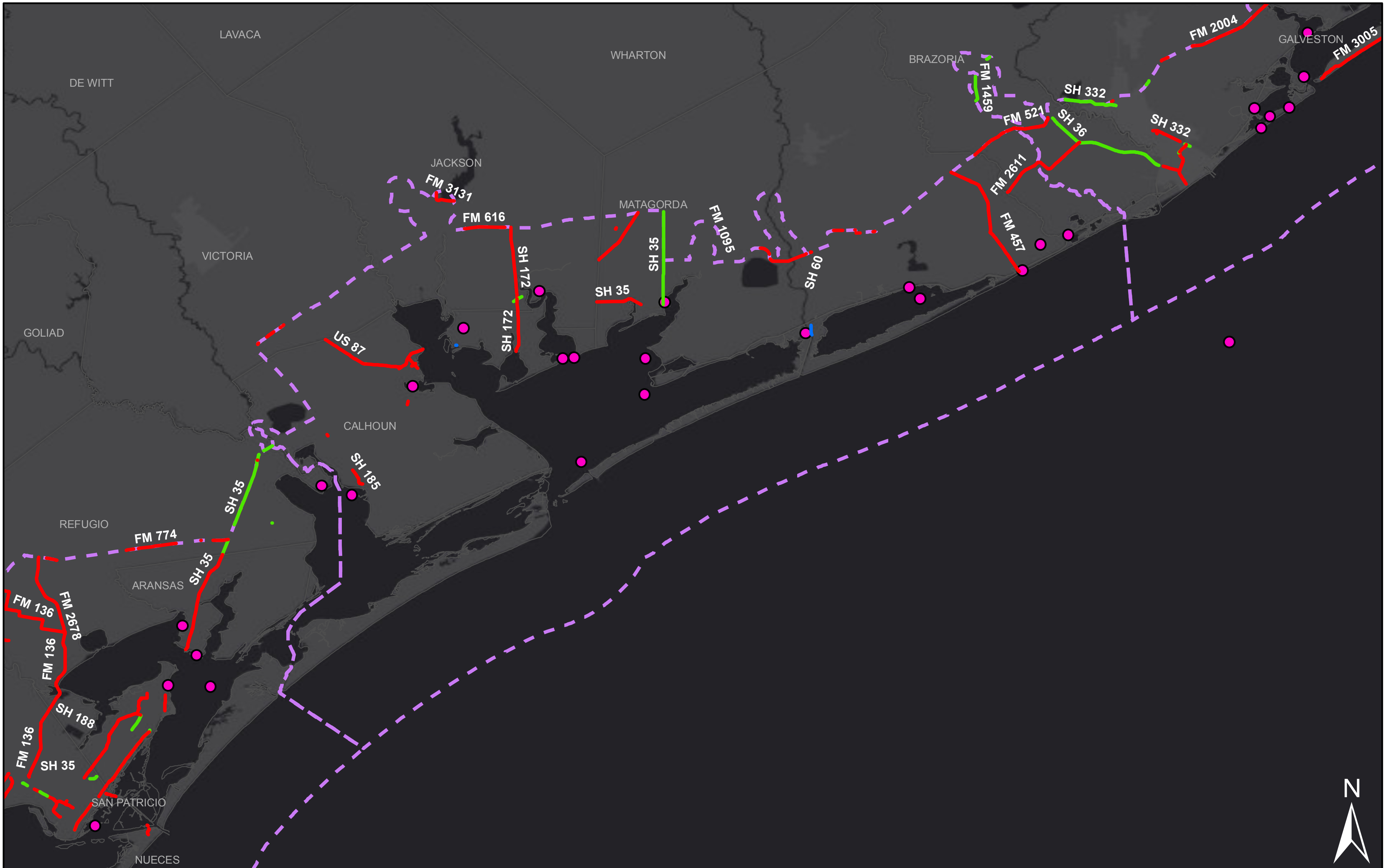
TXGLO

0 15 30 Miles

Texas Coastal Resiliency Master Plan

TxDOT Infrastructure Projects

Region 1



Legend

Region Boundary

Proposed Projects

TxDOT Project Status

Finalizing for Construction

Long Term Planning

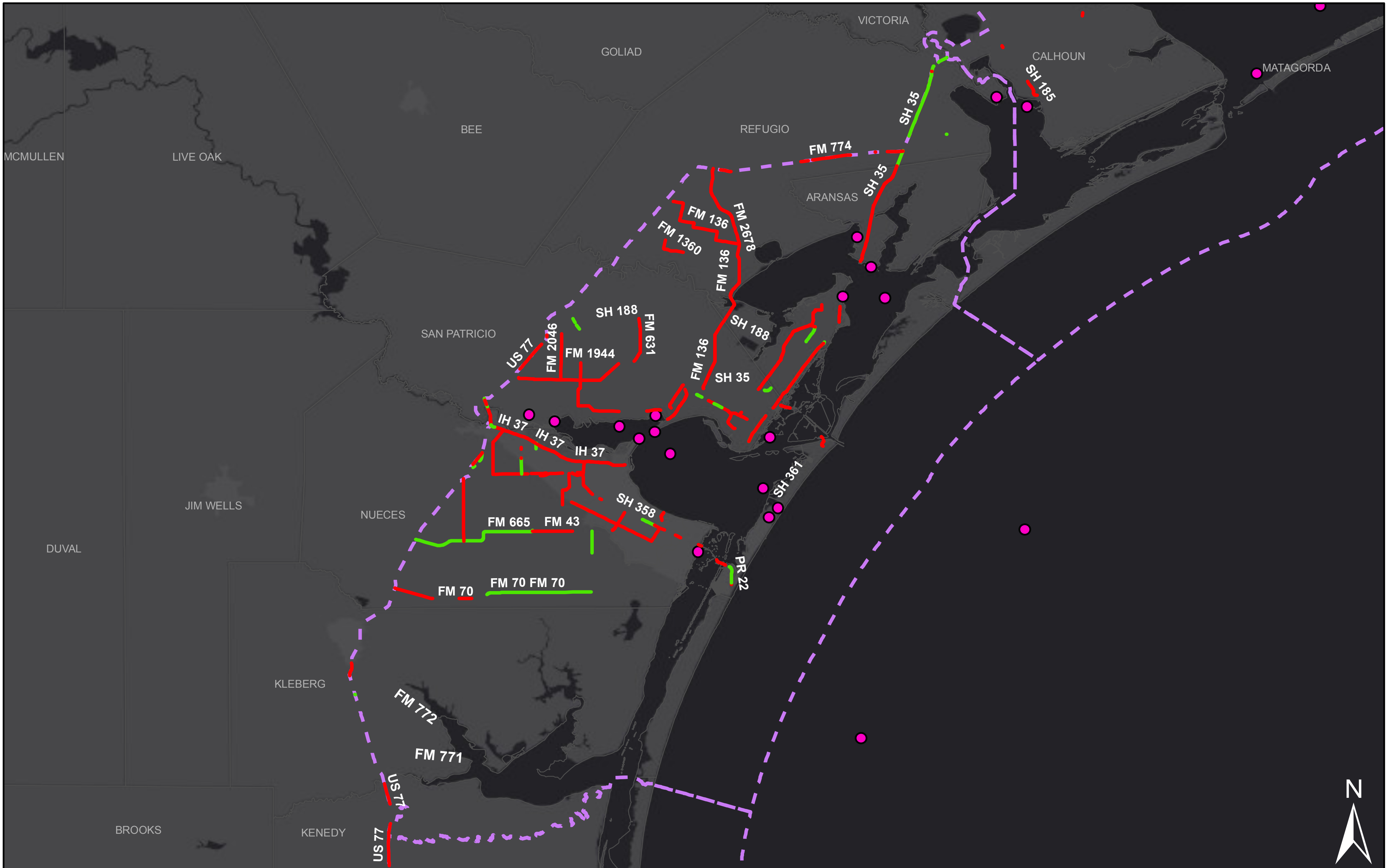
Under Development

0 15 30 Miles

Texas Coastal Resiliency Master Plan

TxDOT Infrastructure Projects

Region 2



Legend

Region Boundary

Proposed Projects

TxDOT Project Status

Finalizing for Construction

Long Term Planning

Under Development

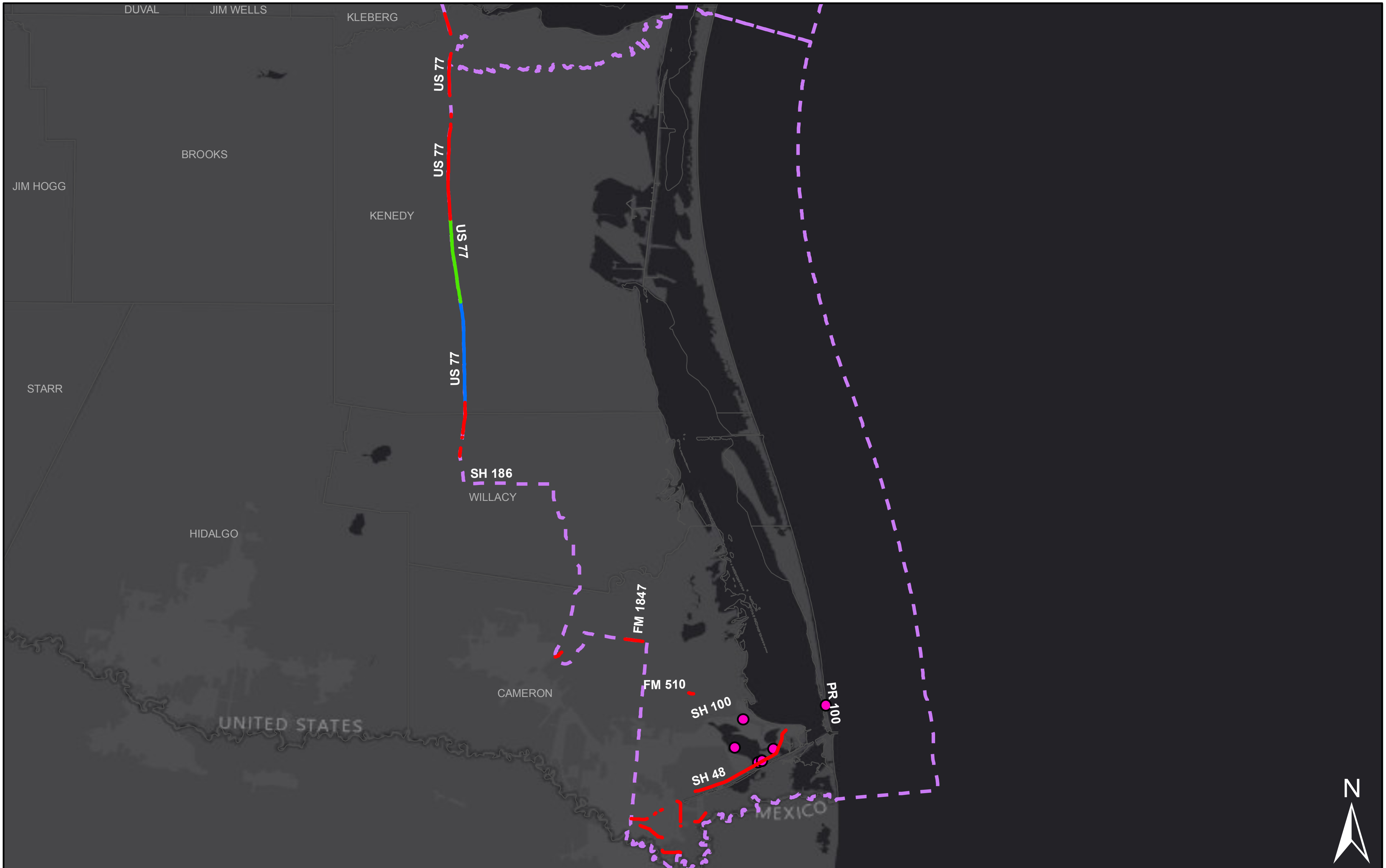
0 15 30 Miles

TXGLO

Texas Coastal Resiliency Master Plan

TxDOT Infrastructure Projects

Region 3



Legend

Region Boundary

Proposed Projects

TxDOT Project Status

Finalizing for Construction

Long Term Planning

Under Development

TXGLO

0 15 30 Miles

Texas Coastal Resiliency Master Plan

TxDOT Infrastructure Projects

Region 4

Appendix C. Modeling

Appendix C – Modeling

SLAMM

Coastwide Results All Land Cover Classes

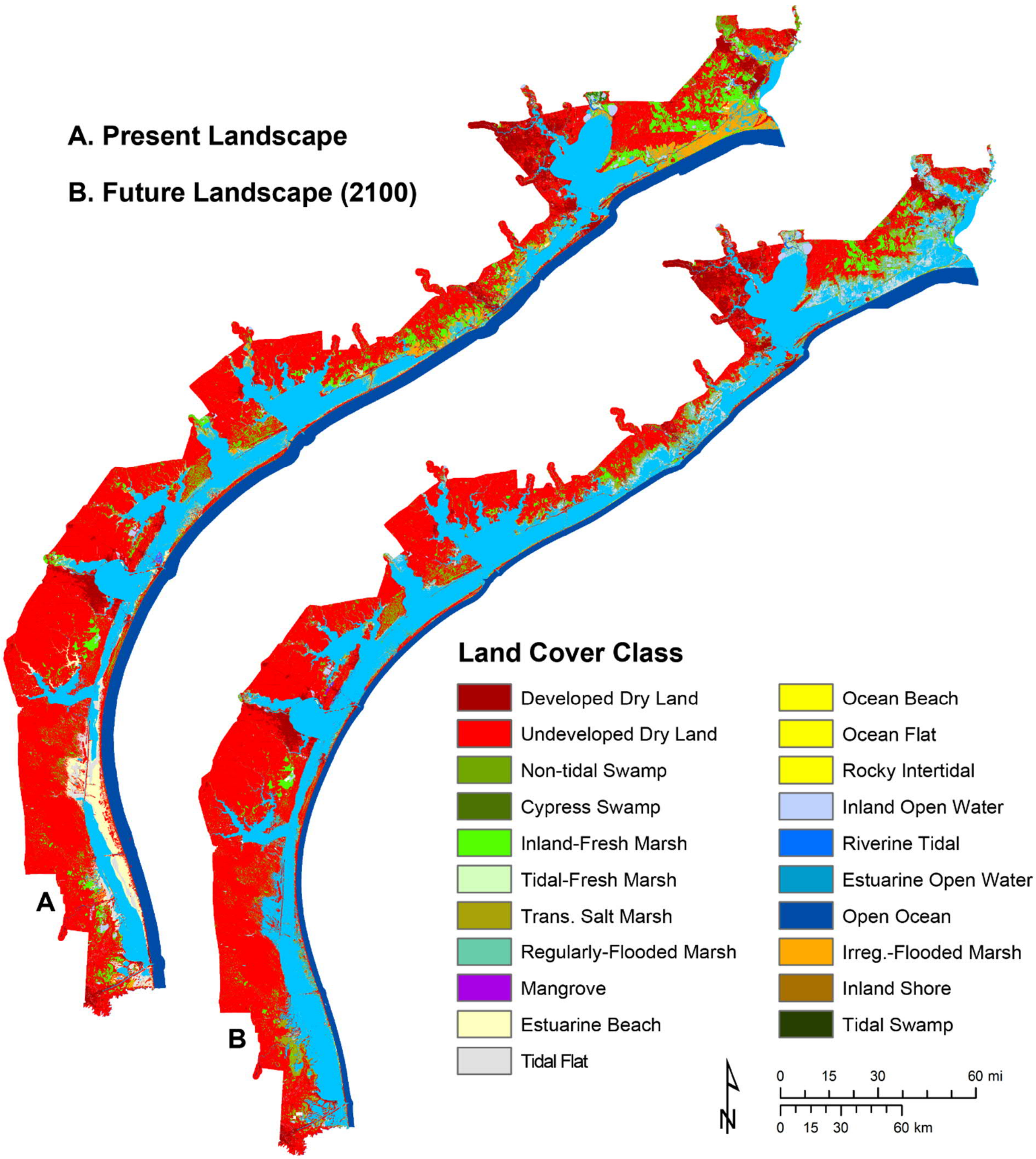


Figure 0-1: Present landscape vs. future landscape along the Texas coast for all SLAMM land cover classes. (A) Present Condition (2007) land cover data used by SLAMM. (B) Future Condition (2100) land cover output from SLAMM

Table 0-1: The difference in area between all SLAMM land cover types for the Texas coast in 2007 and 2100.

Name	2007 Area (sq. miles)	2100 Area (sq. miles)
Developed Dry Land	174.97	153.51
Undeveloped Dry Land	1680.09	1529.22
Non-tidal Swamp	42.46	22.62
Cypress Swamp	0.39	0.06
Inland-Fresh Marsh	243.72	113.60
Tidal-Fresh Marsh	7.13	1.51
Trans. Salt Marsh	0.03	132.80
Regularly-Flooded Marsh	55.65	95.14
Mangrove	1.72	1.40
Estuarine Beach	107.16	2.40
Tidal Flat	43.94	91.83
Ocean Beach	2.53	4.45
Ocean Flat	2.31	0.06
Rocky Intertidal	0.05	0.00
Inland Open Water	49.99	44.24
Riverine Tidal	5.57	4.28
Estuarine Open Water	788.13	1117.95
Open Ocean	446.80	245.78
Irreg.-Flooded Marsh	116.79	2.31
Inland Shore	10.35	5.28
Tidal Swamp	3.46	0.60

ADCIRC+SWAN

Validation

Region 1

Storm 466

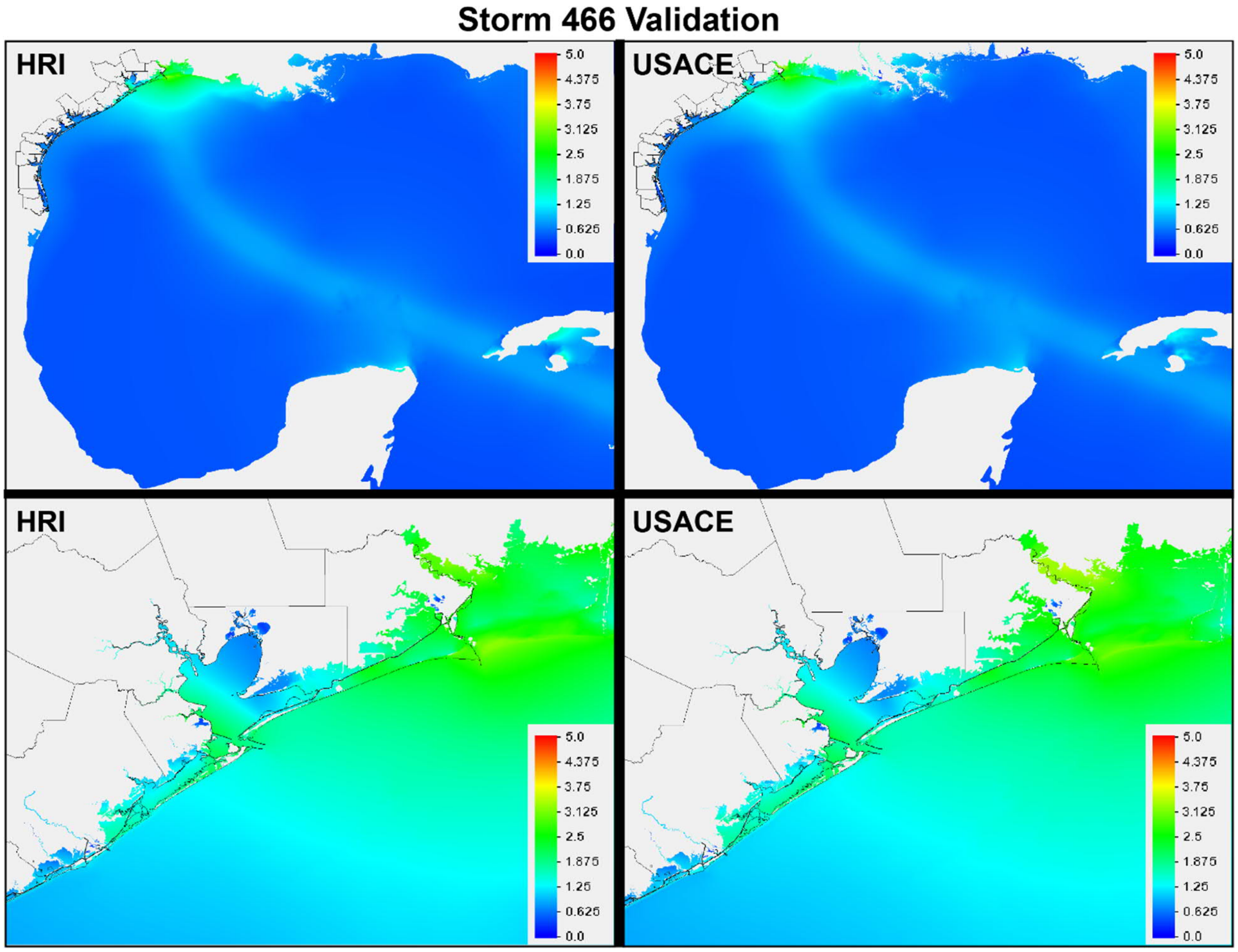


Figure 0-2: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 466. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Storm 154

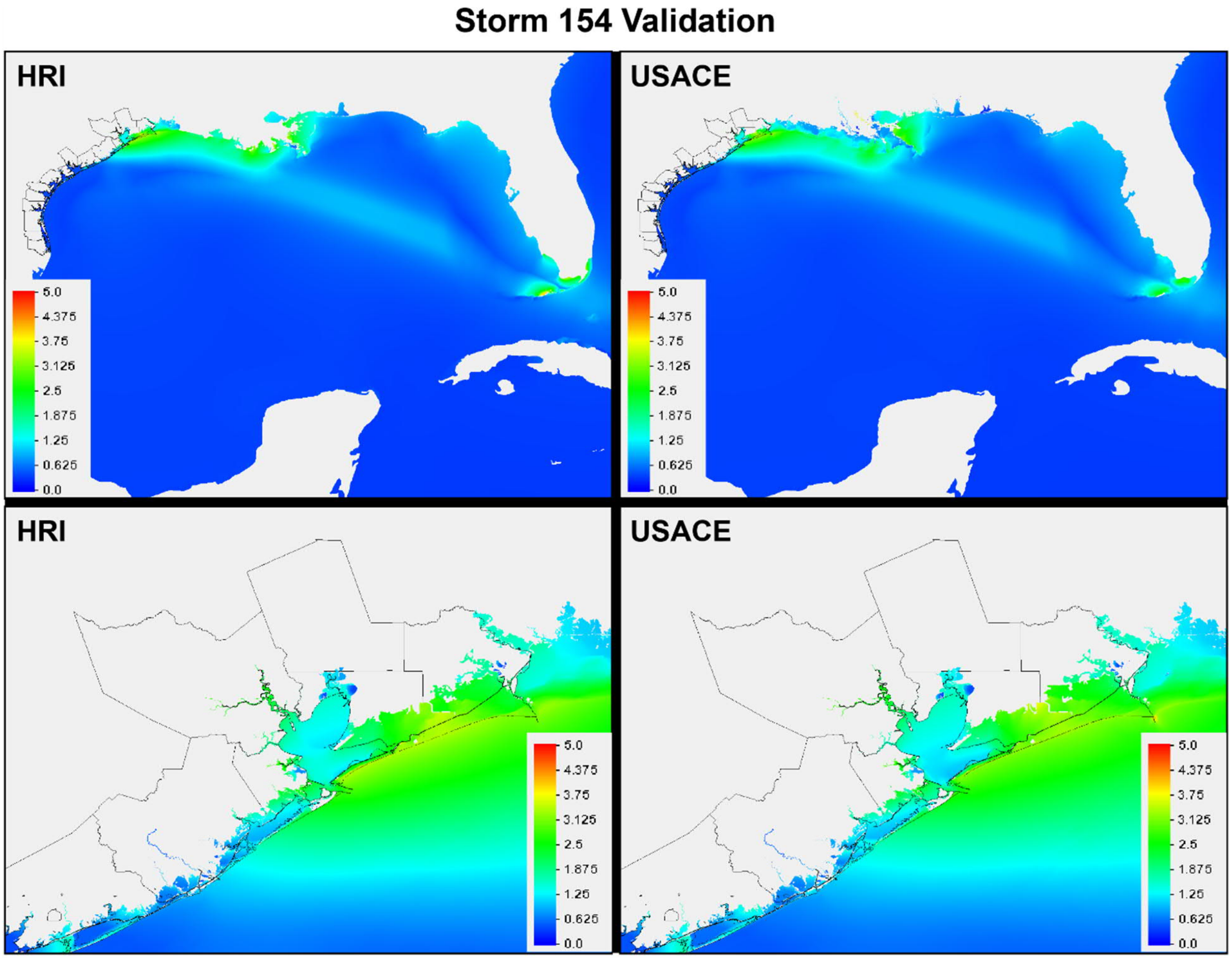


Figure 0-3: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 154. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Region 2

Storm 146

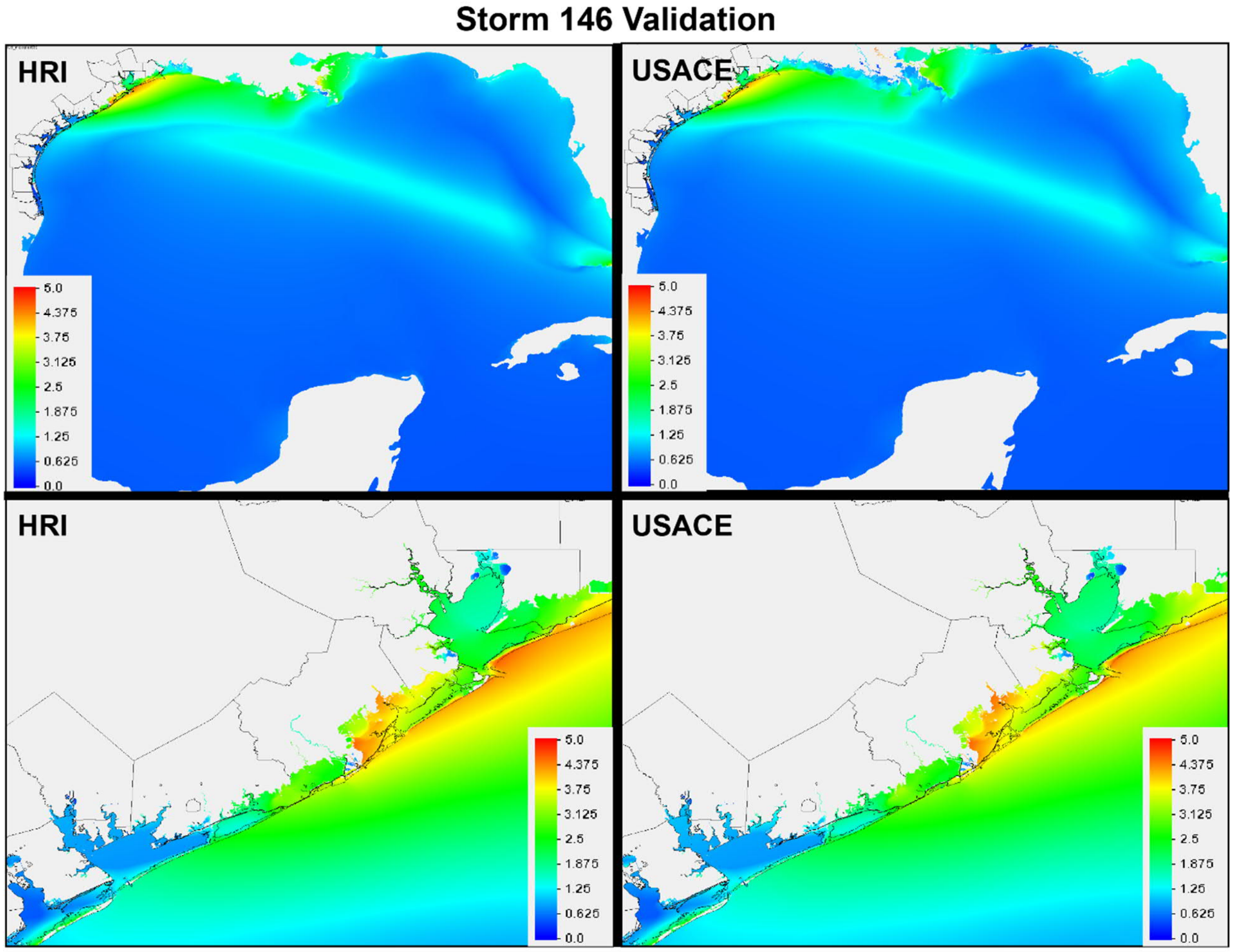


Figure 0-4: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 146. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Storm 240

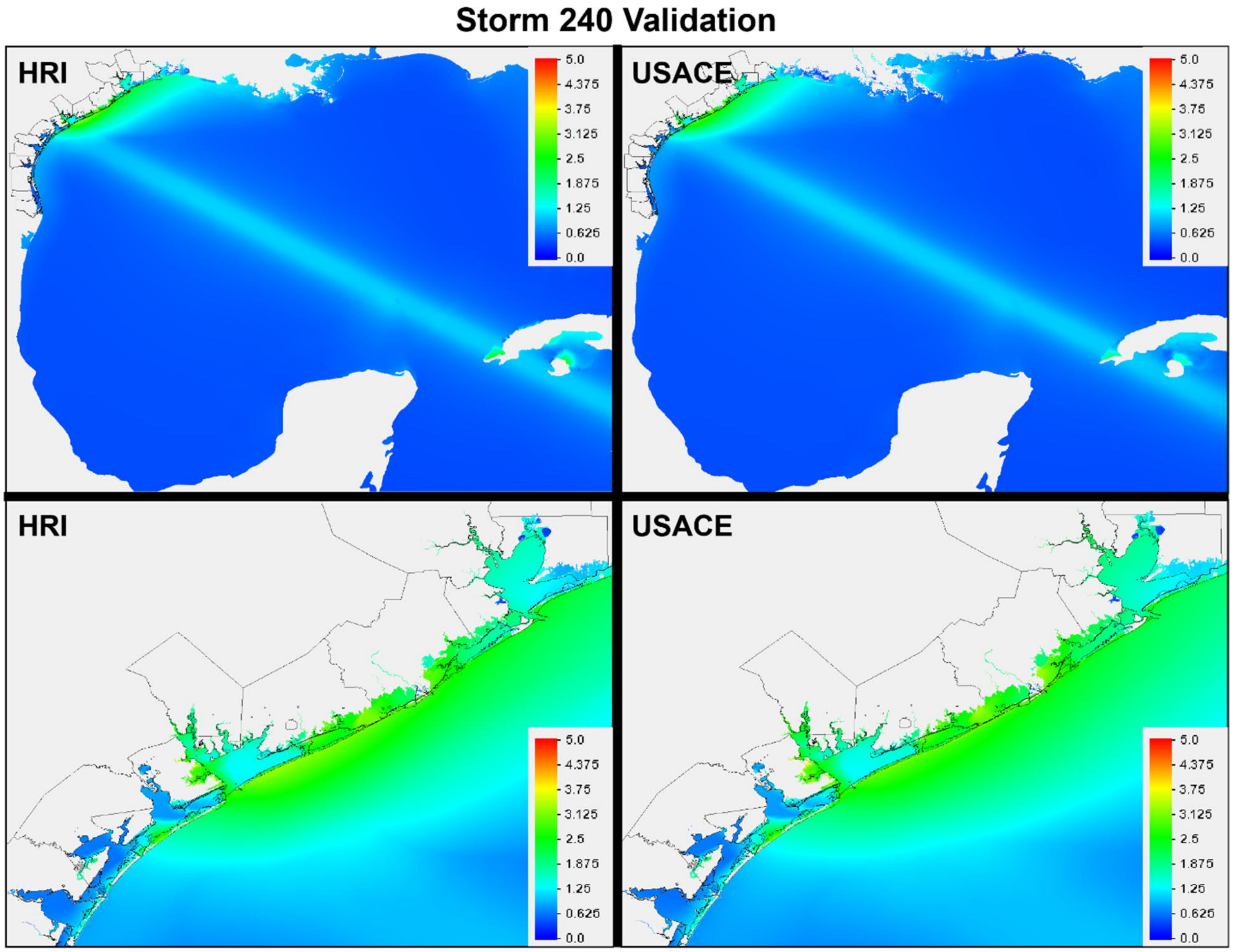


Figure 0-5: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 240. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Region 3

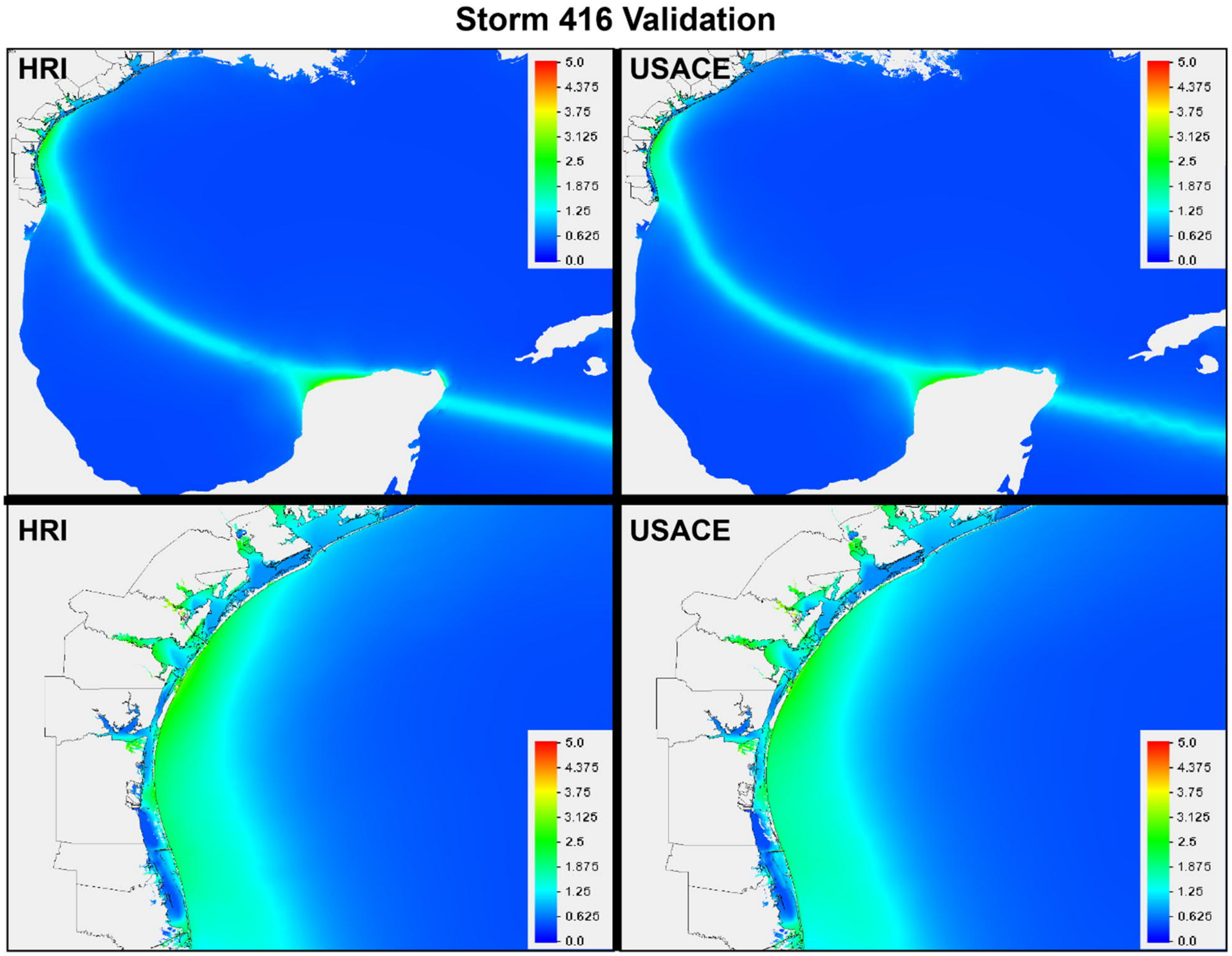


Figure 0-6: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 416. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Region 4

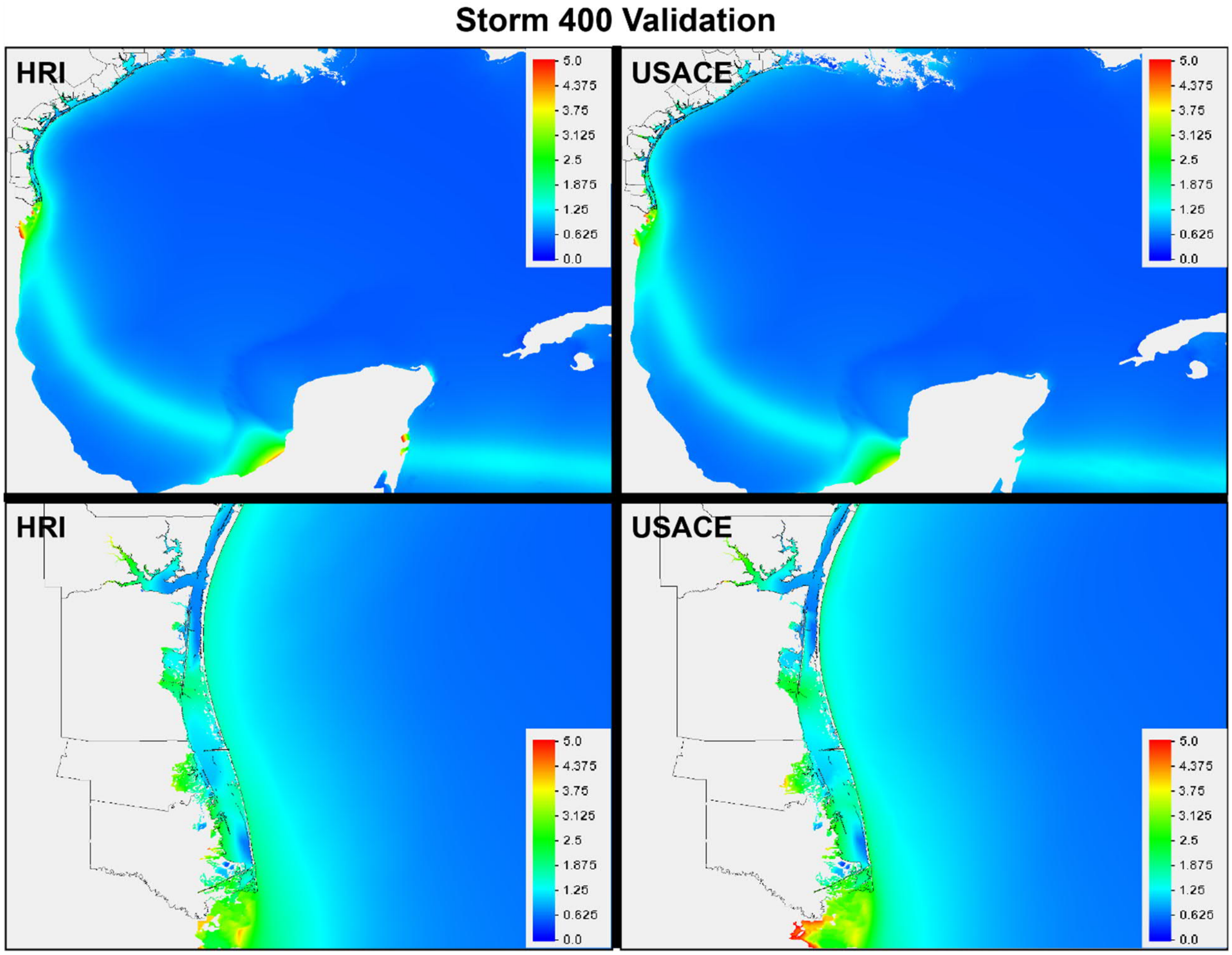


Figure 0-7: Comparison of maximum water surface elevation (MAXELE) output of storm surge modeling due to Storm 400. The maps on the left are MAXELE files with HRI simulated ADCIRC+SWAN run and the maps on the right are MAXELE files with USACE simulated ADCIRC+STWAVE run. The top maps are showing the MAXELE in Gulf of Mexico domain and the maps on bottom are showing the same in Landfall domain.

Storm Surge Depth Timing

Region 1

Storm 466

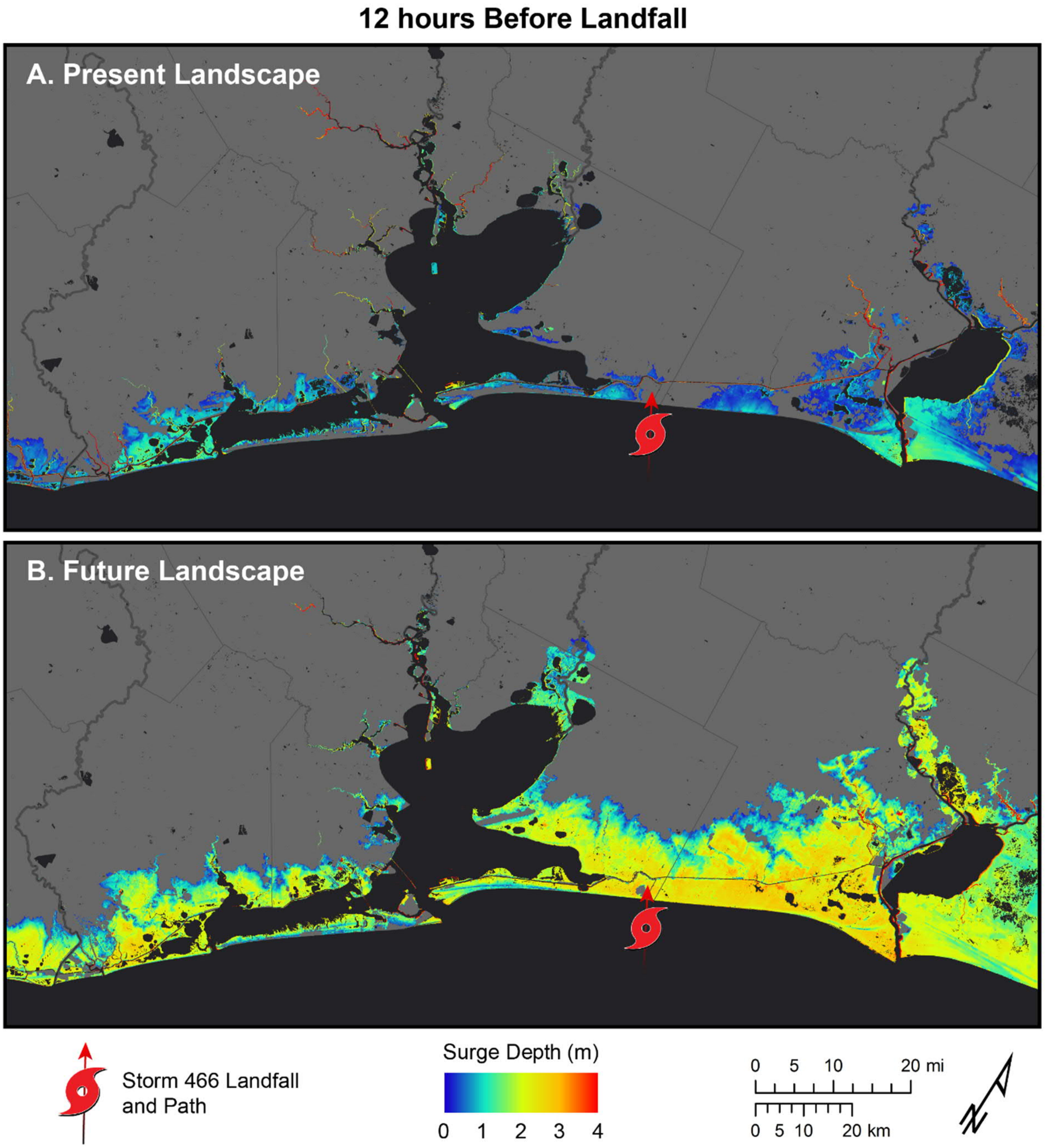


Figure 0-8: Storm surge depth 12 hours before storm 466 made landfall on A) Present landscape and on B) Future landscape.

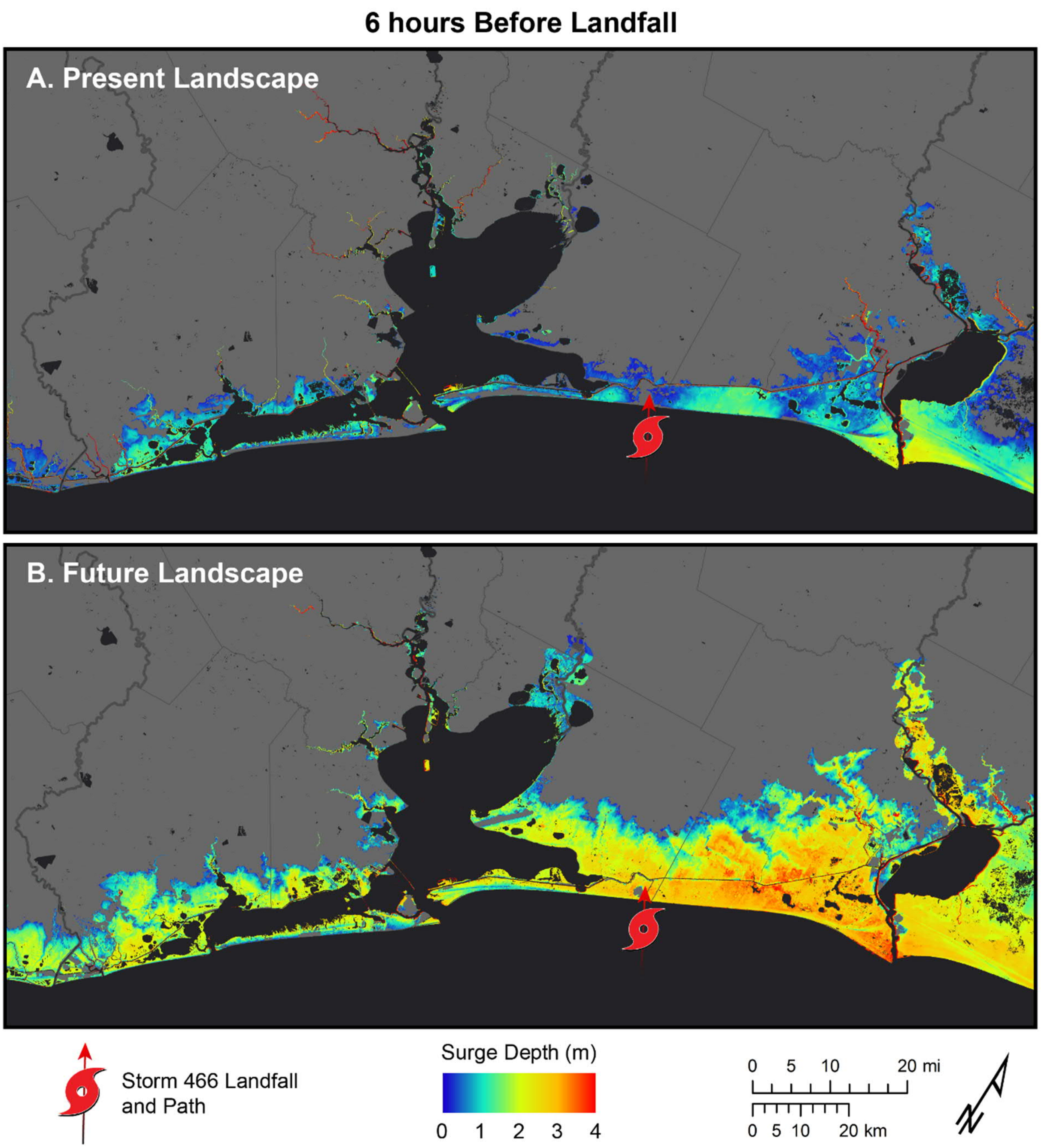


Figure 0-9: Storm surge depth 6 hours before storm 466 made landfall on A) Present landscape and on B) Future landscape.

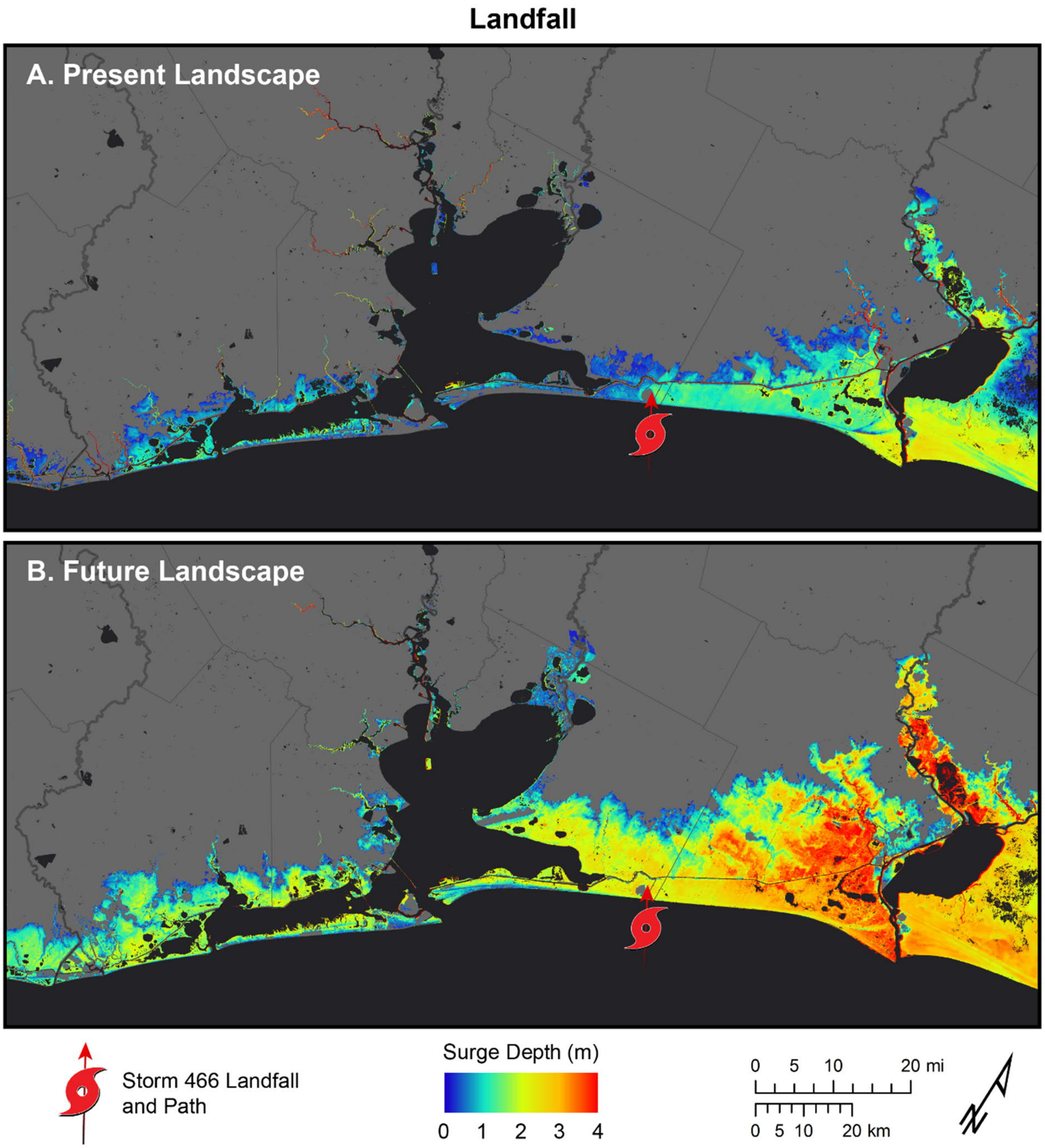


Figure 0-10: Storm surge depth when storm 466 made landfall on A) Present landscape and on B) Future landscape.

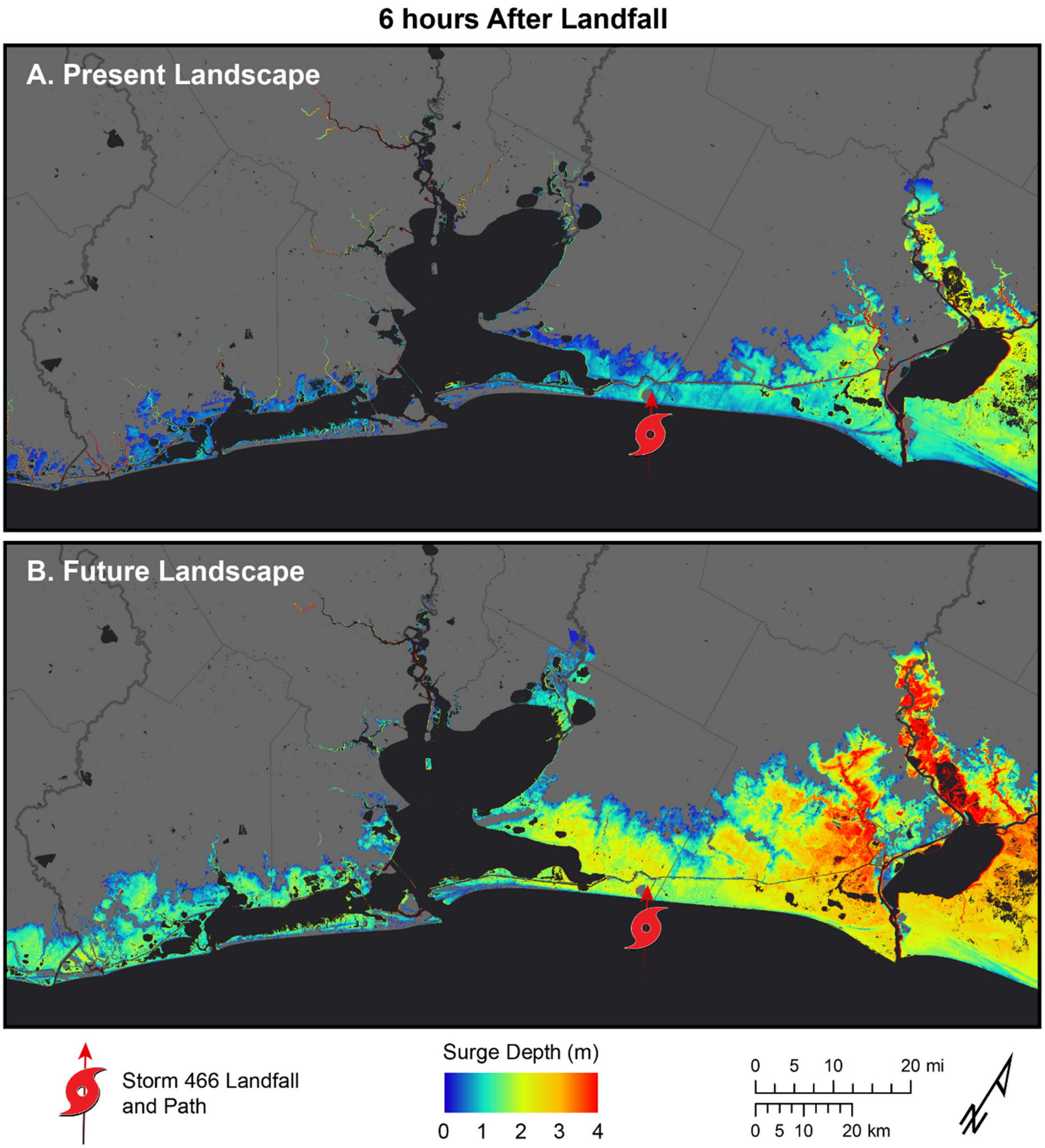


Figure 0-11: Storm surge depth 6 hours after storm 466 made landfall on A) Present landscape and on B) Future landscape.

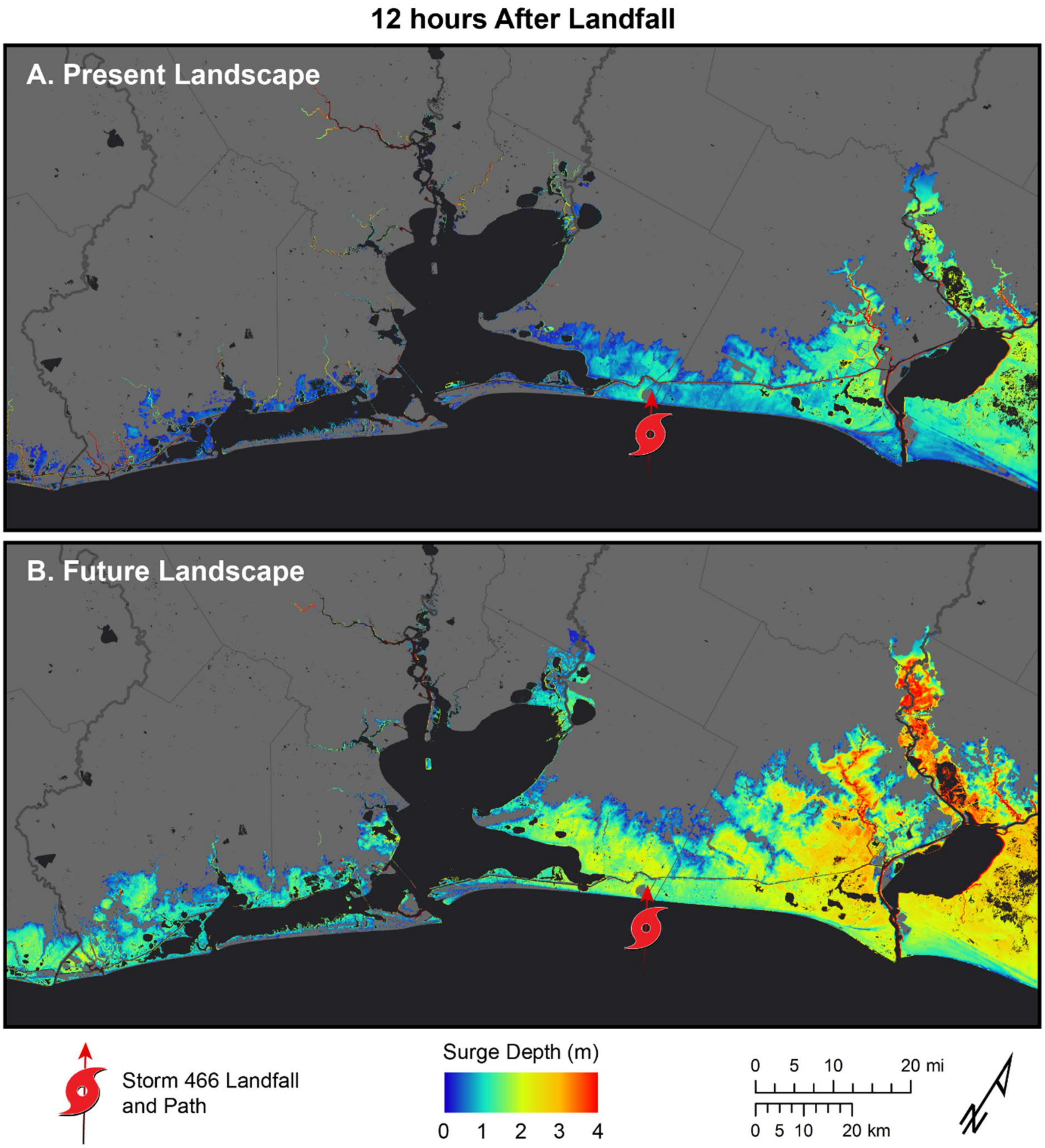


Figure 0-12: Storm surge depth 12 hours after storm 466 made landfall on A) Present landscape and on B) Future landscape.

Storm 154

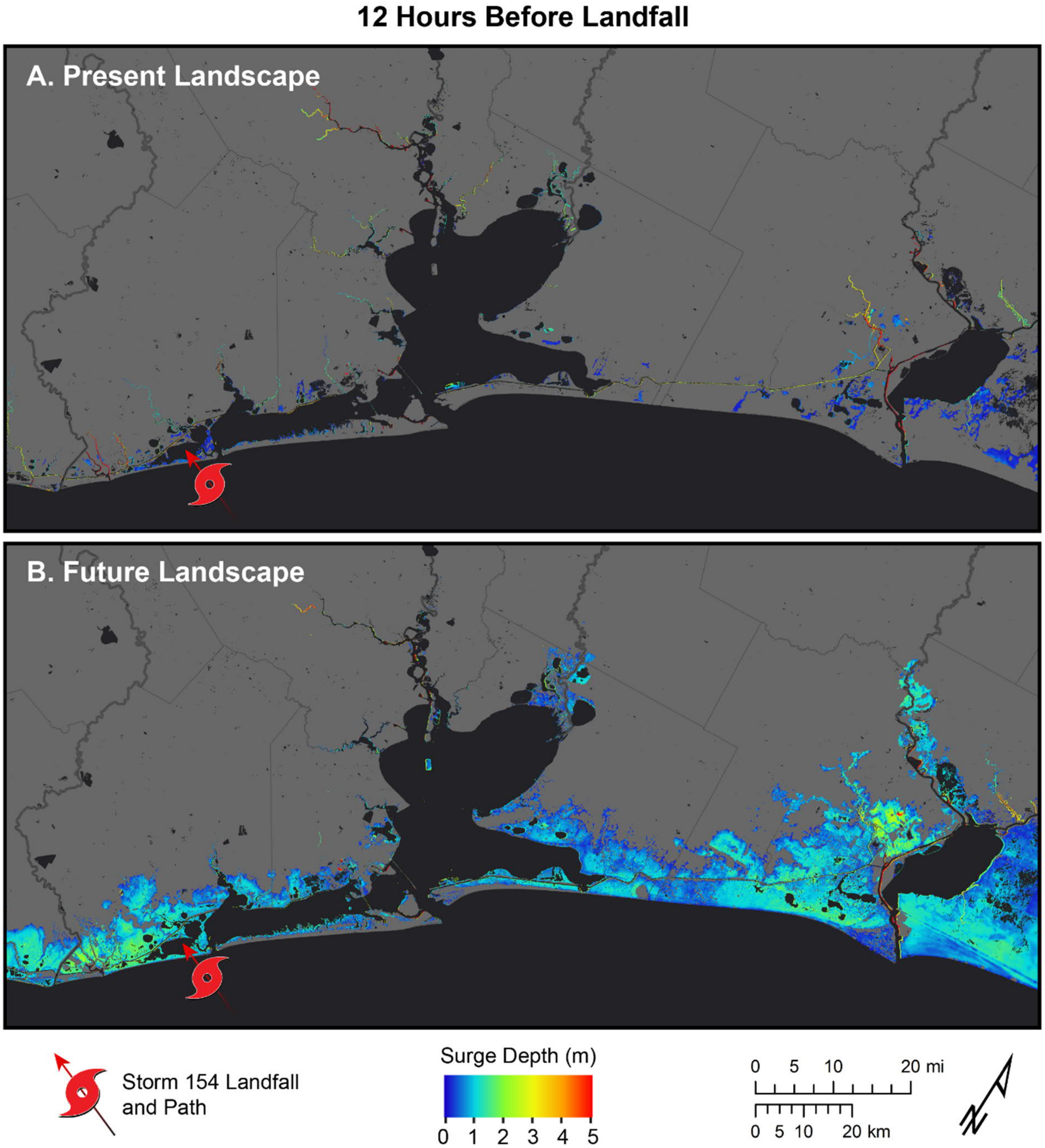


Figure 0-13: Storm surge depth 12 hours before storm 154 made landfall on A) Present landscape and on B) Future landscape.

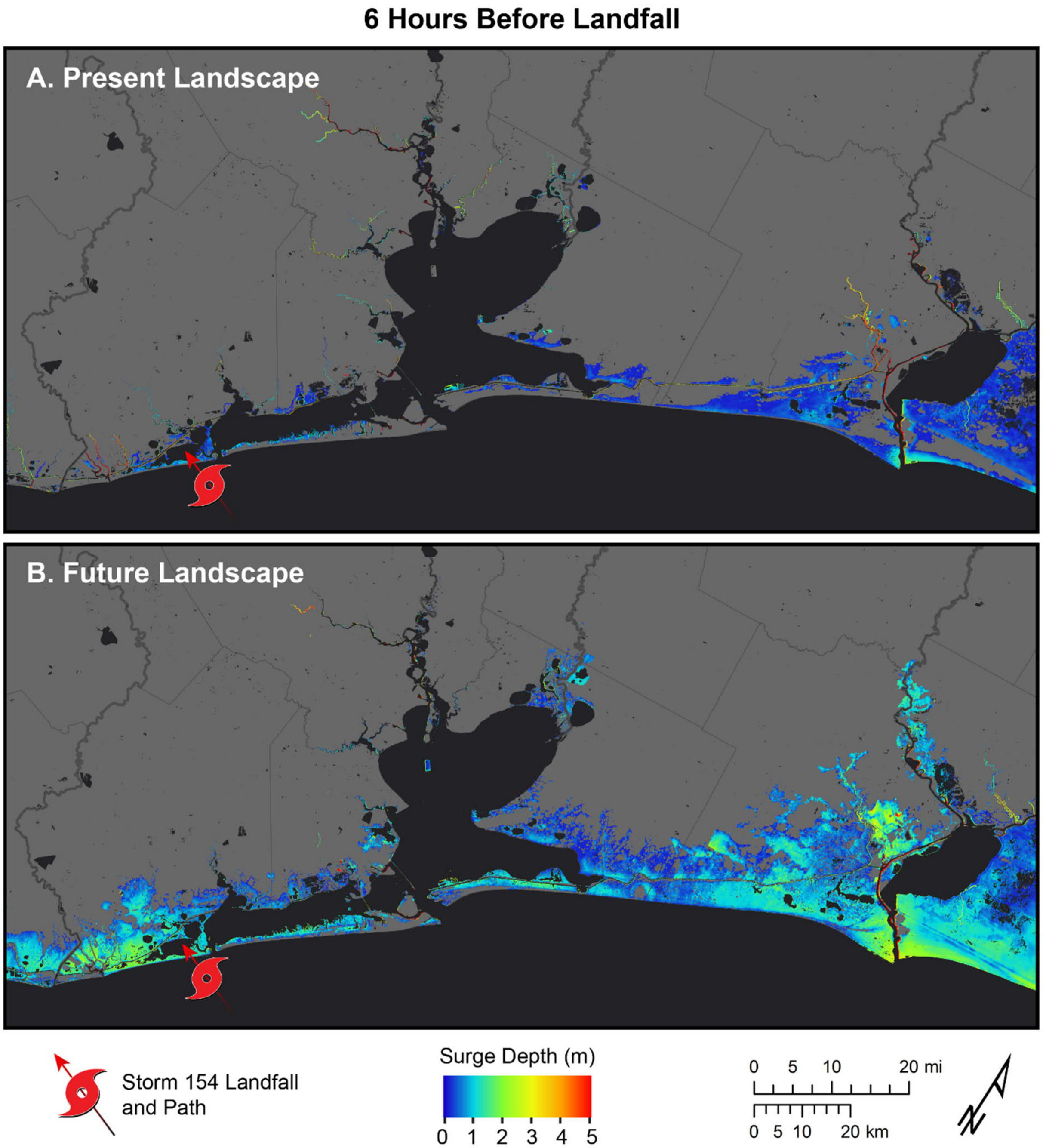


Figure 0-14: Storm surge depth 6 hours before storm 154 made landfall on A) Present landscape and on B) Future landscape.

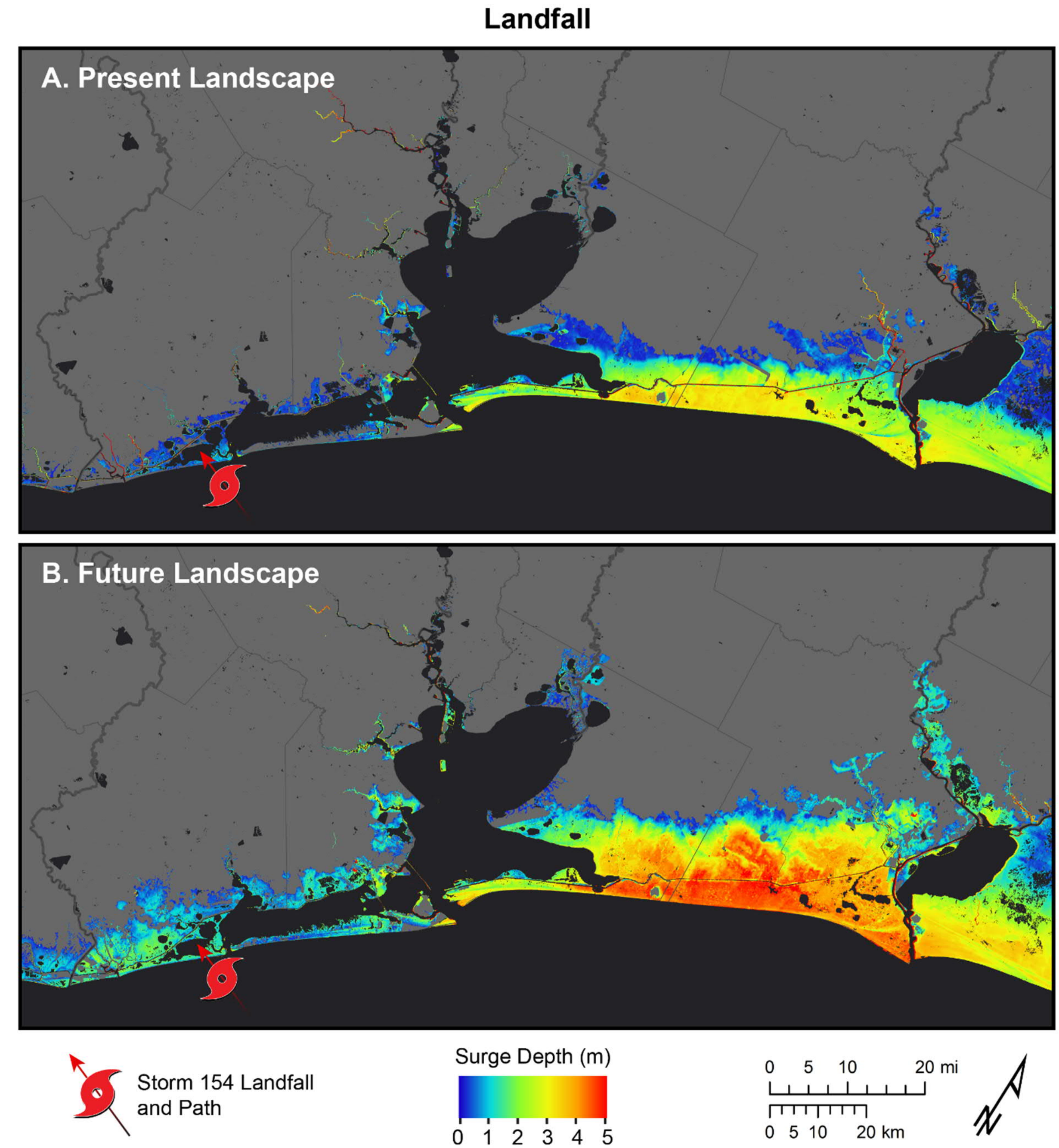


Figure 0-15: Storm surge depth when storm 154 made landfall on A) Present landscape and on B) Future landscape.

6 Hours After Landfall

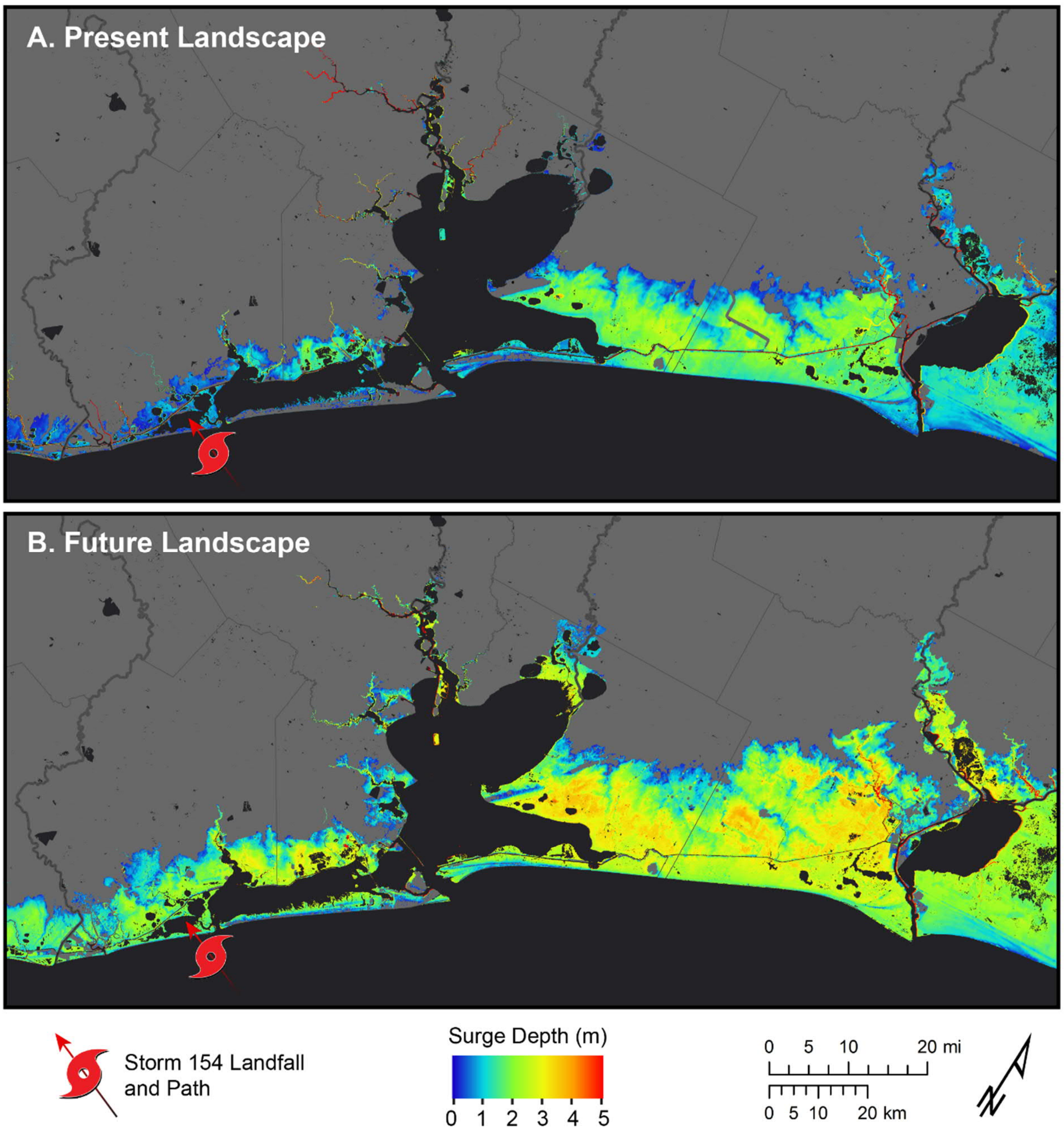


Figure 0-16: Storm surge depth 6 hours after storm 154 made landfall on A) Present landscape and on B) Future landscape.

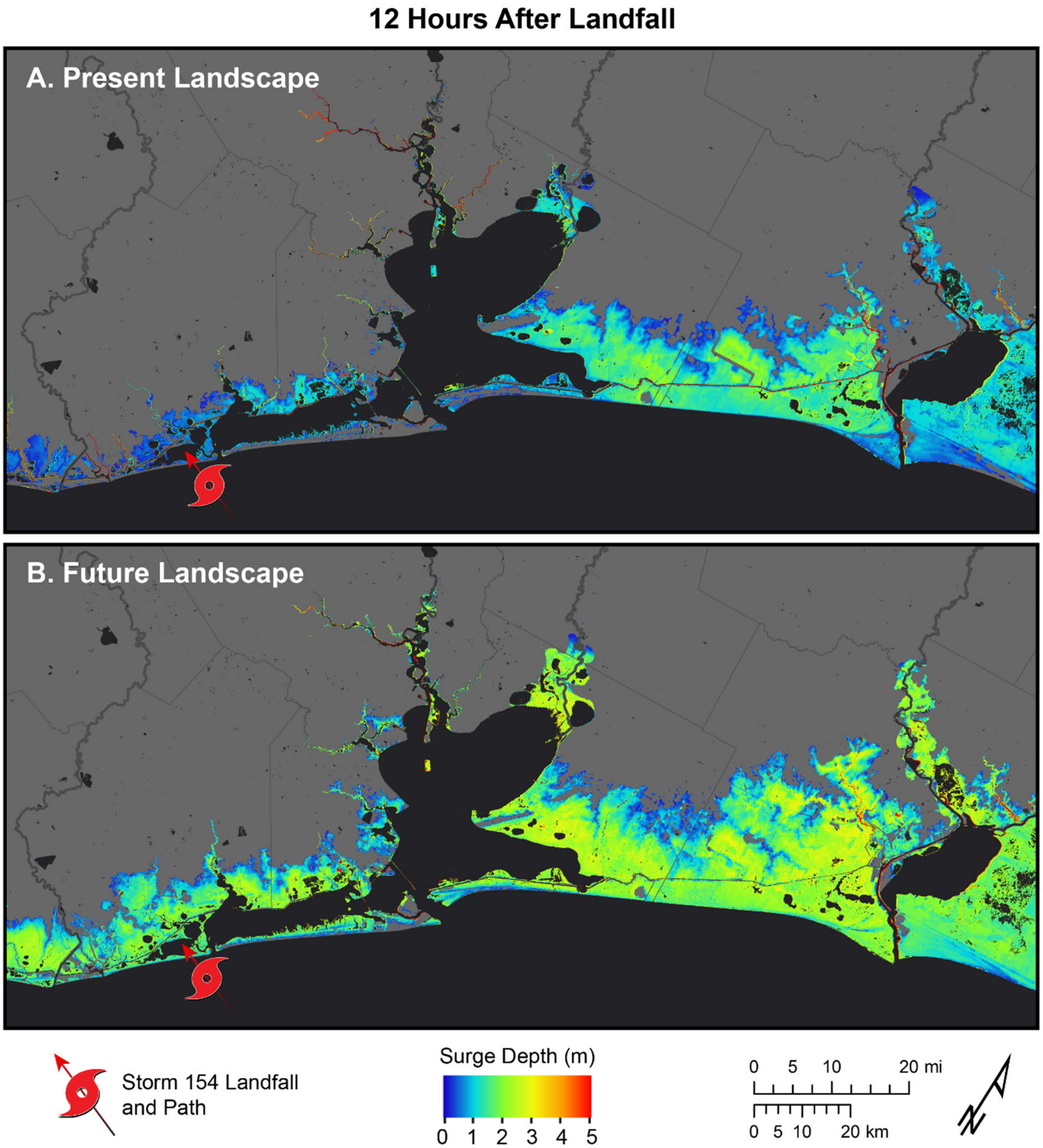


Figure 0-17: Storm surge depth 12 hours after storm 154 made landfall on A) Present landscape and on B) Future landscape.

Region 2

Storm 146

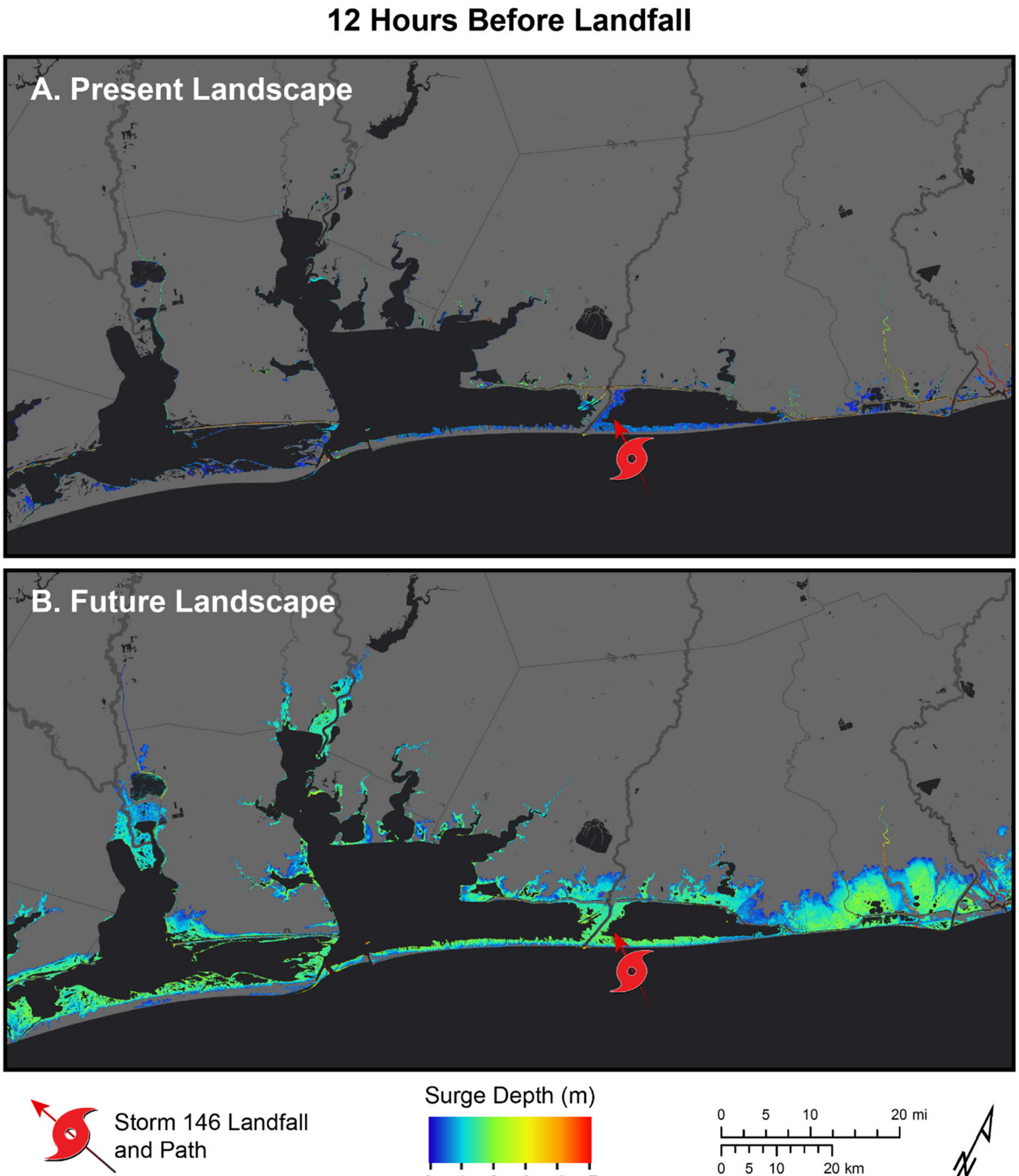


Figure 0-18: Storm surge depth 12 hours before storm 146 made landfall on A) Present landscape and on B) Future landscape.

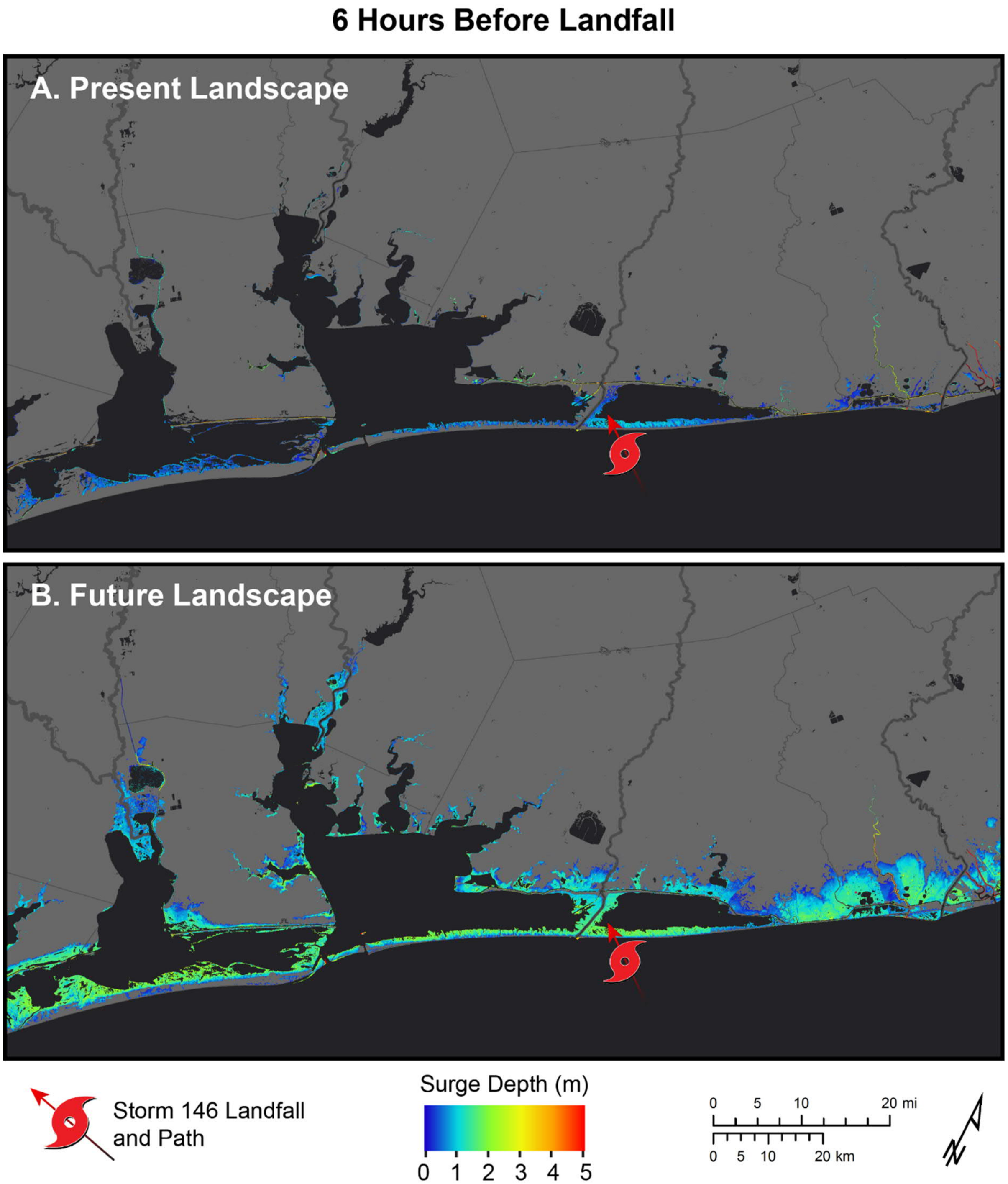


Figure 0-19: Storm surge depth 6 hours before storm 146 made landfall on A) Present landscape and on B) Future landscape.

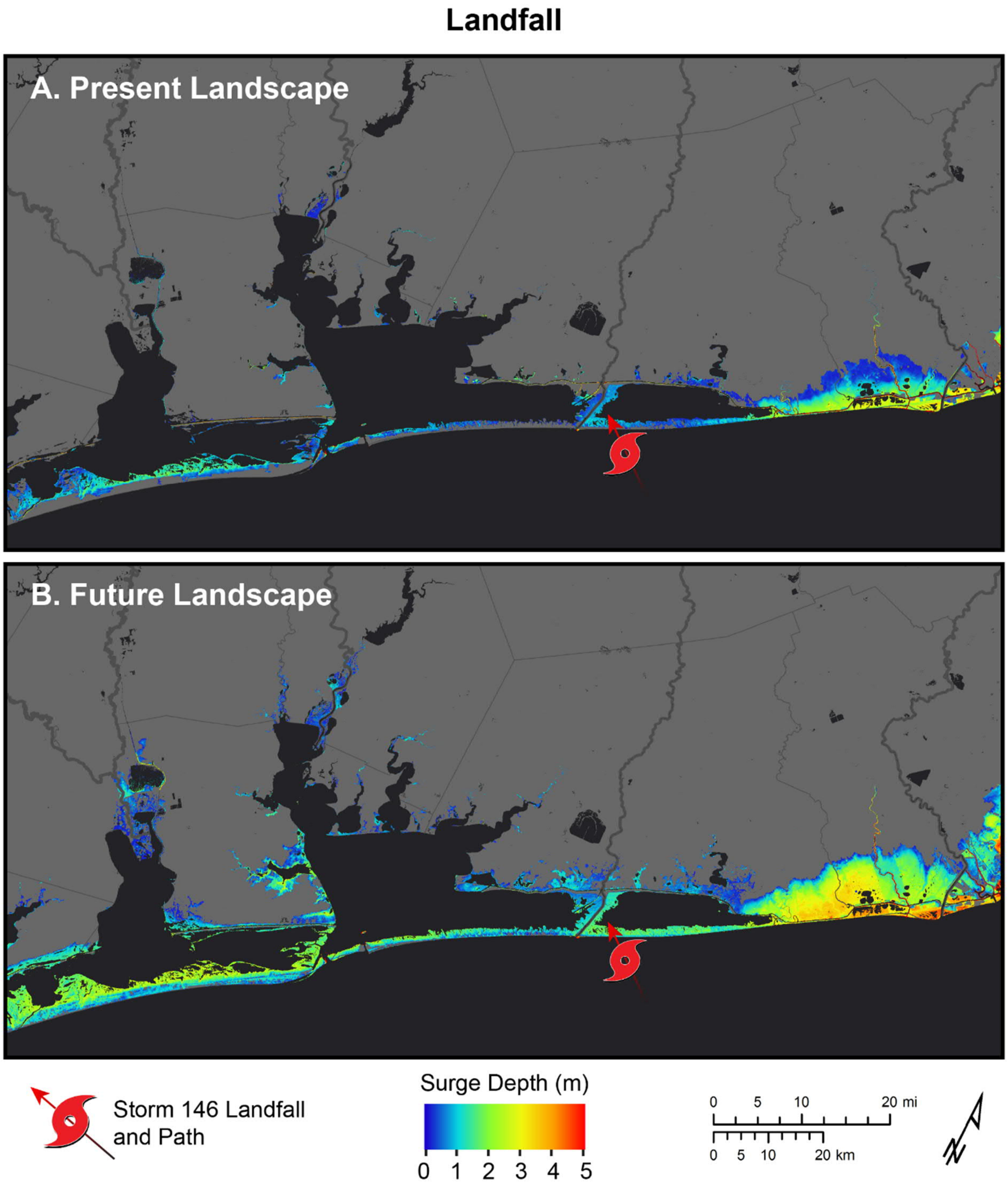


Figure 0-20: Storm surge depth when storm 146 made landfall on A) Present landscape and on B) Future landscape.

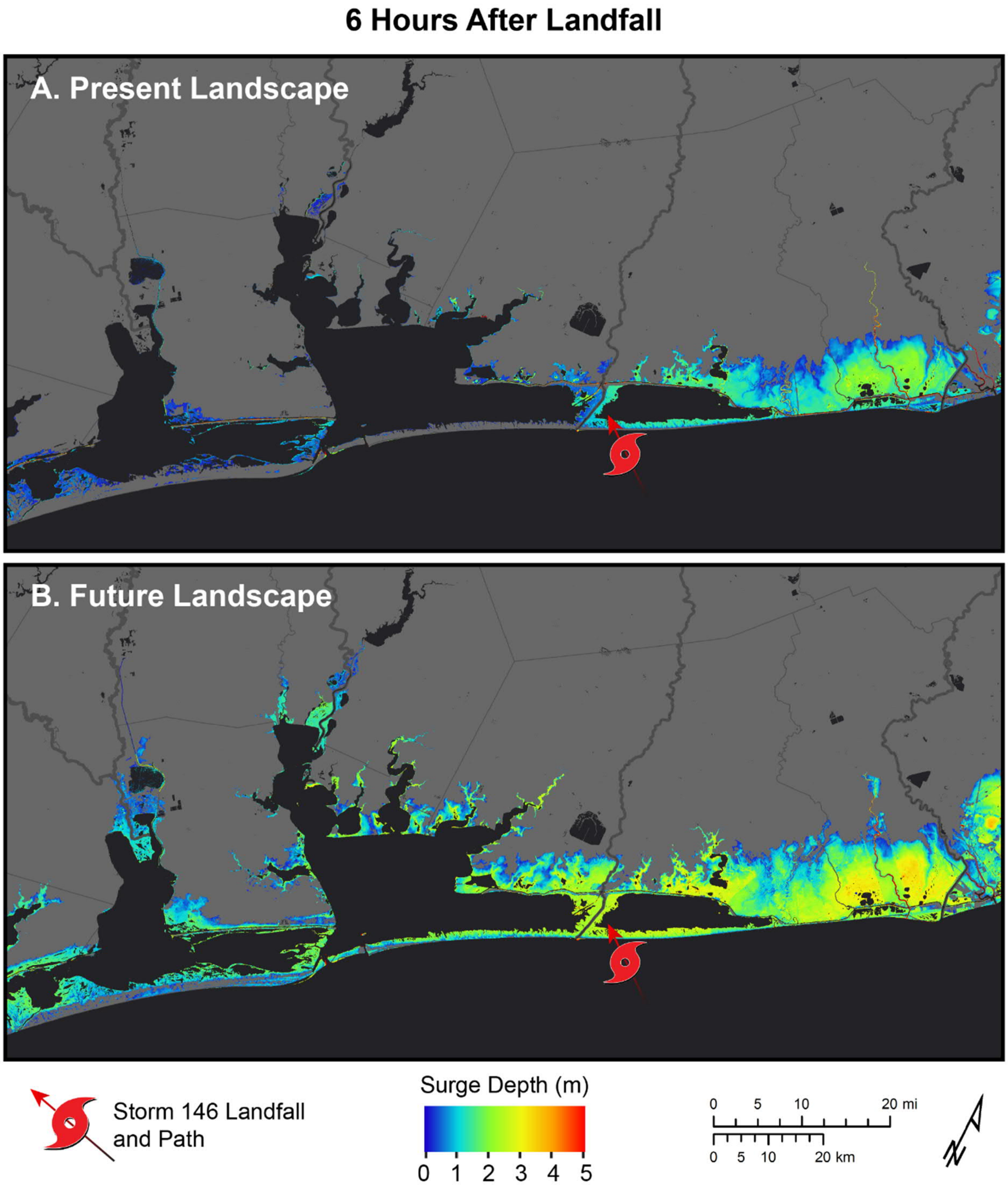


Figure 0-21: Storm surge depth 6 hours after storm 146 made landfall on A) Present landscape and on B) Future landscape.

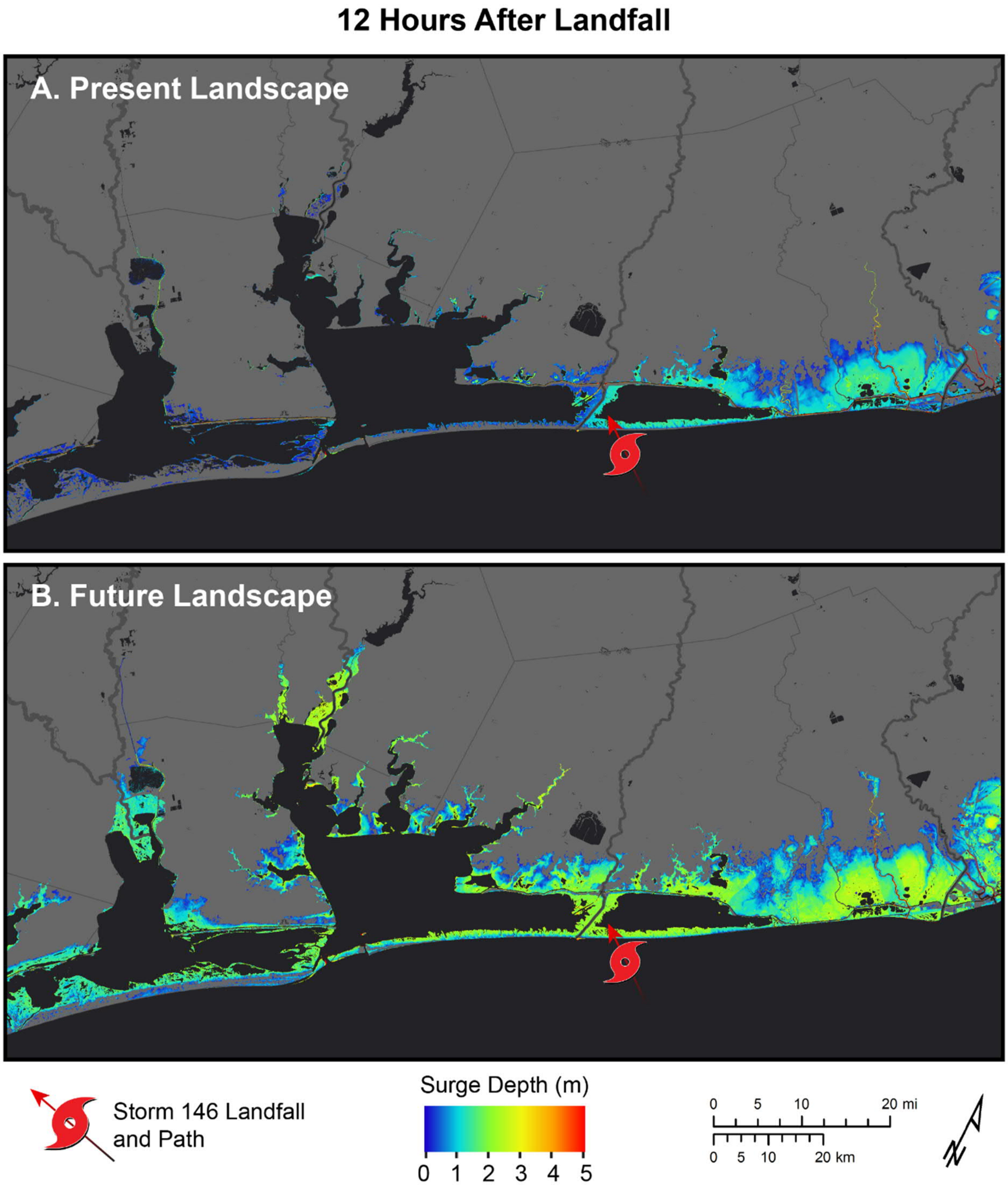


Figure 0-22: Storm surge depth 12 hours after storm 146 made landfall on A) Present landscape and on B) Future landscape.

Storm 240

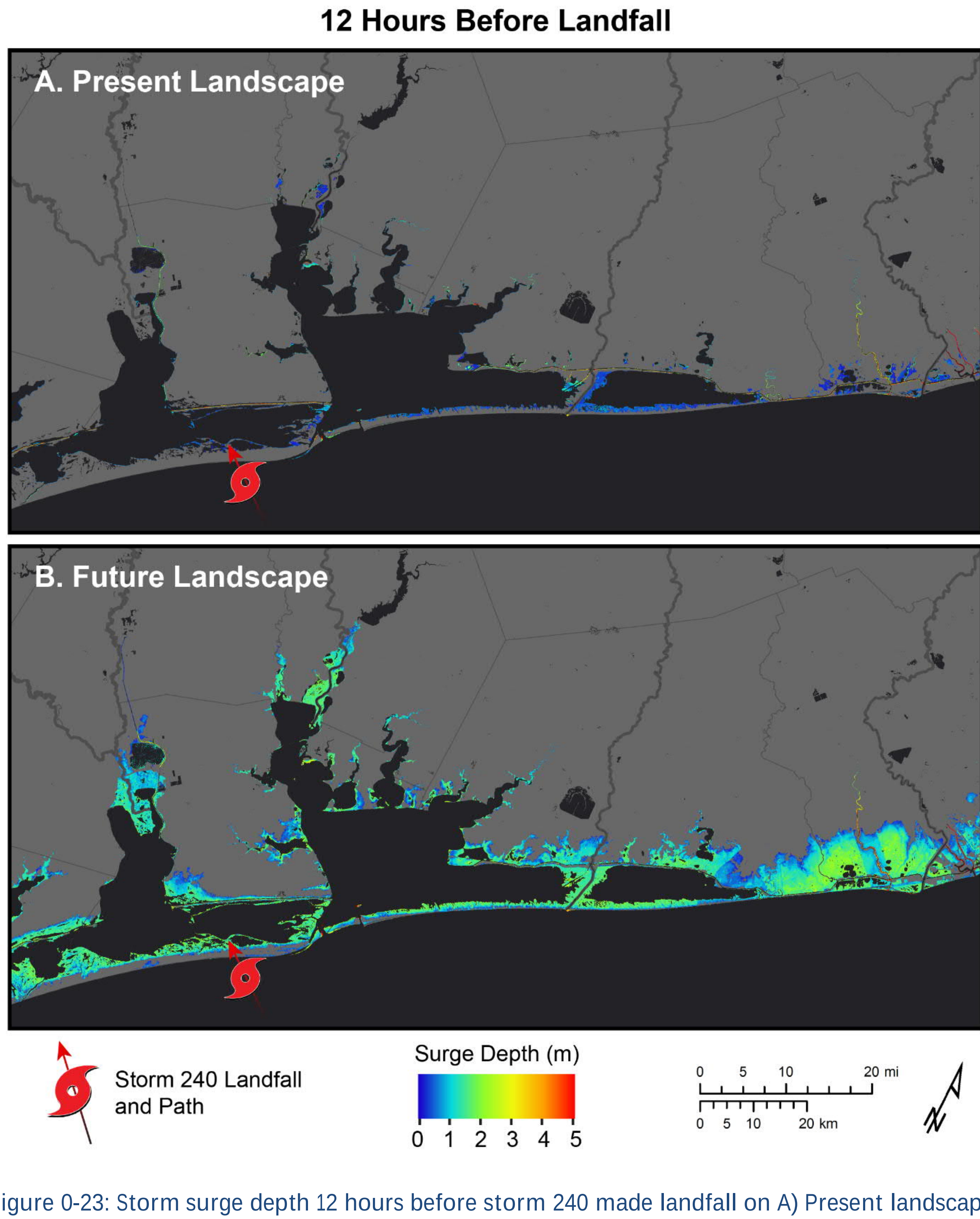


Figure 0-23: Storm surge depth 12 hours before storm 240 made landfall on A) Present landscape and on B) Future landscape.

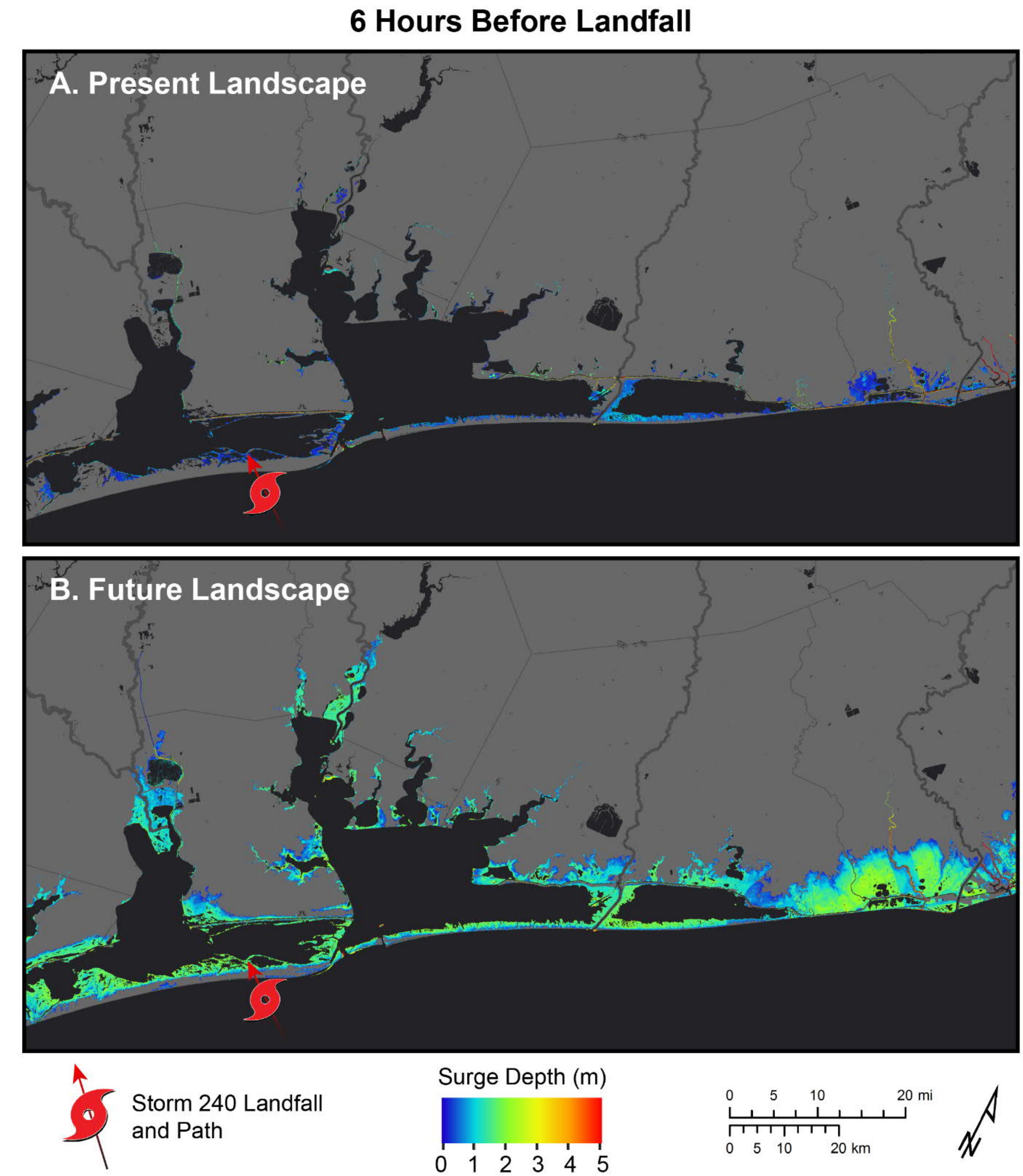


Figure 0-24: Storm surge depth 6 hours before storm 240 made landfall on A) Present landscape and on B) Future landscape.

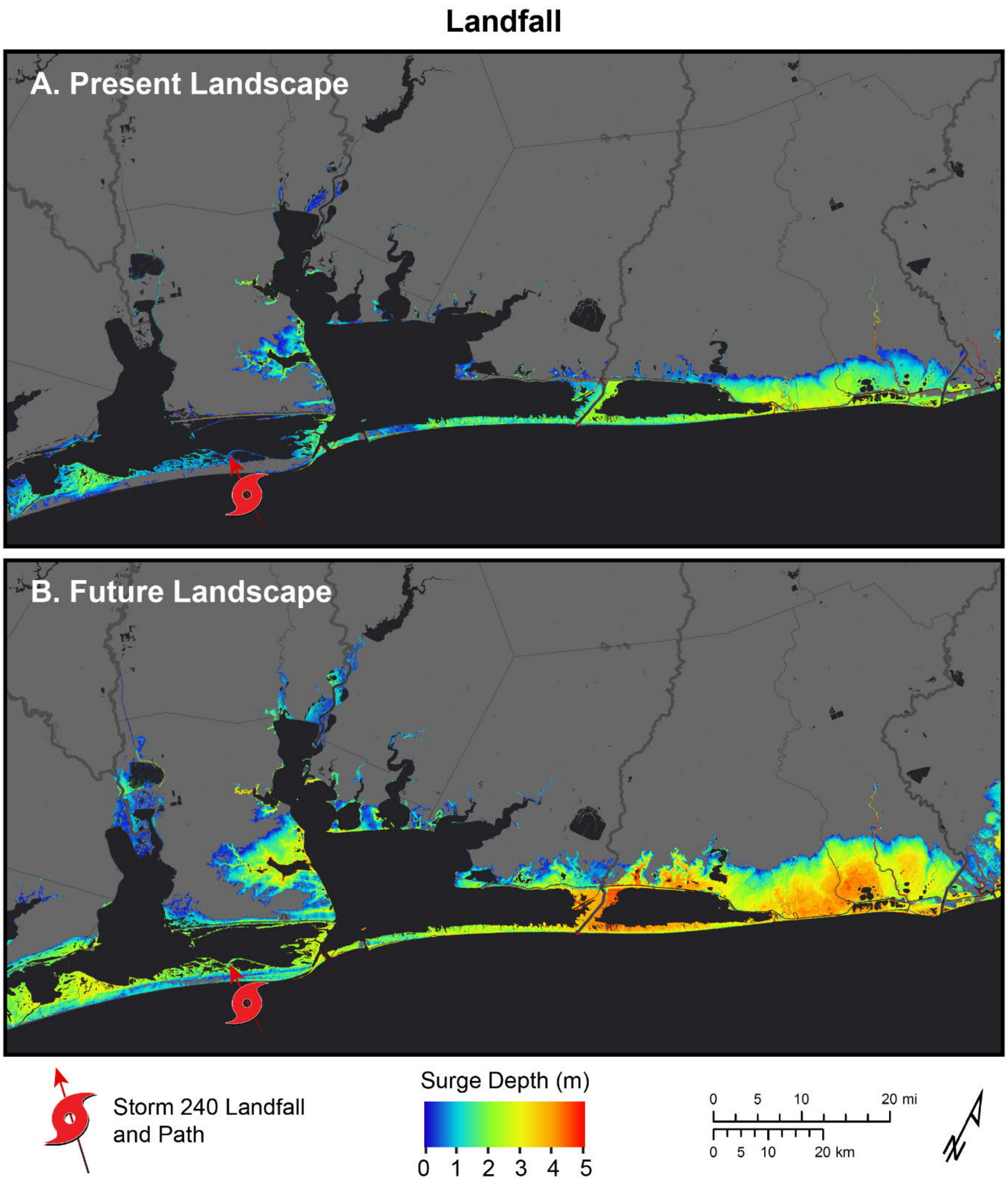


Figure 0-25: Storm surge depth when storm 240 made landfall on A) Present landscape and on B) Future landscape.

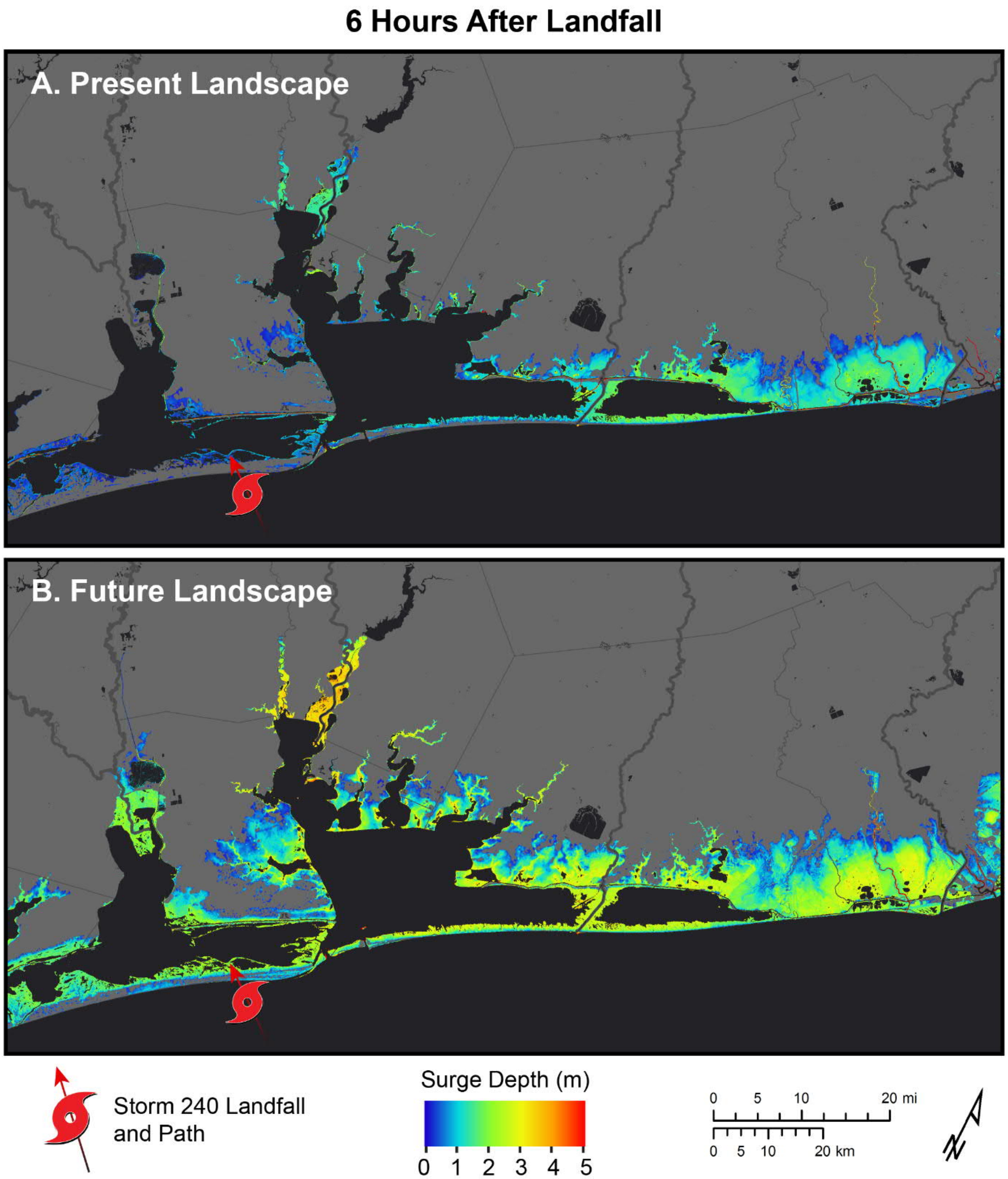


Figure 0-26: Storm surge depth 6 hours after storm 240 made landfall on A) Present landscape and on B) Future landscape.

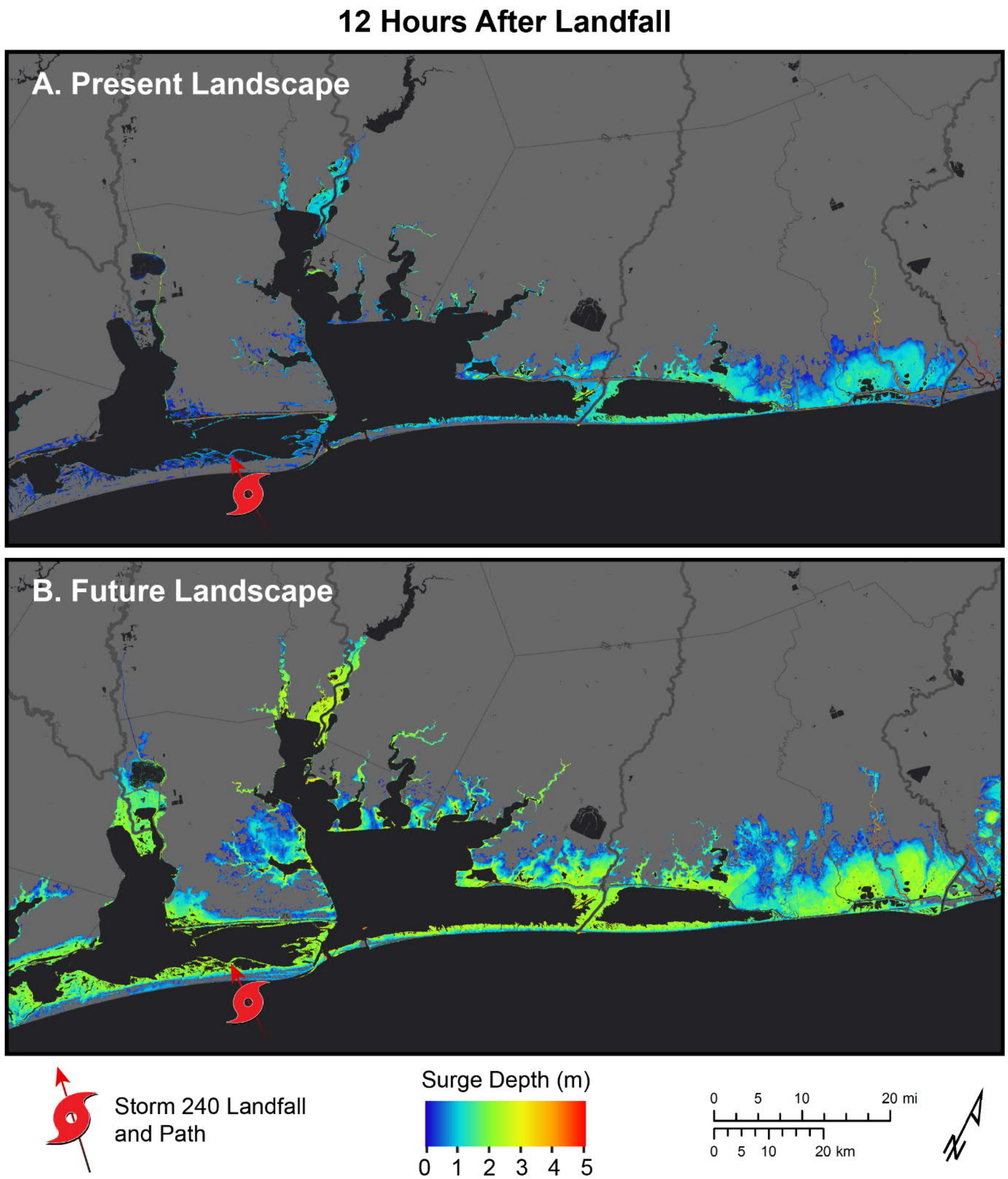


Figure 0-27: Storm surge depth 12 hours after storm 240 made landfall on A) Present landscape and on B) Future landscape.

Region 3

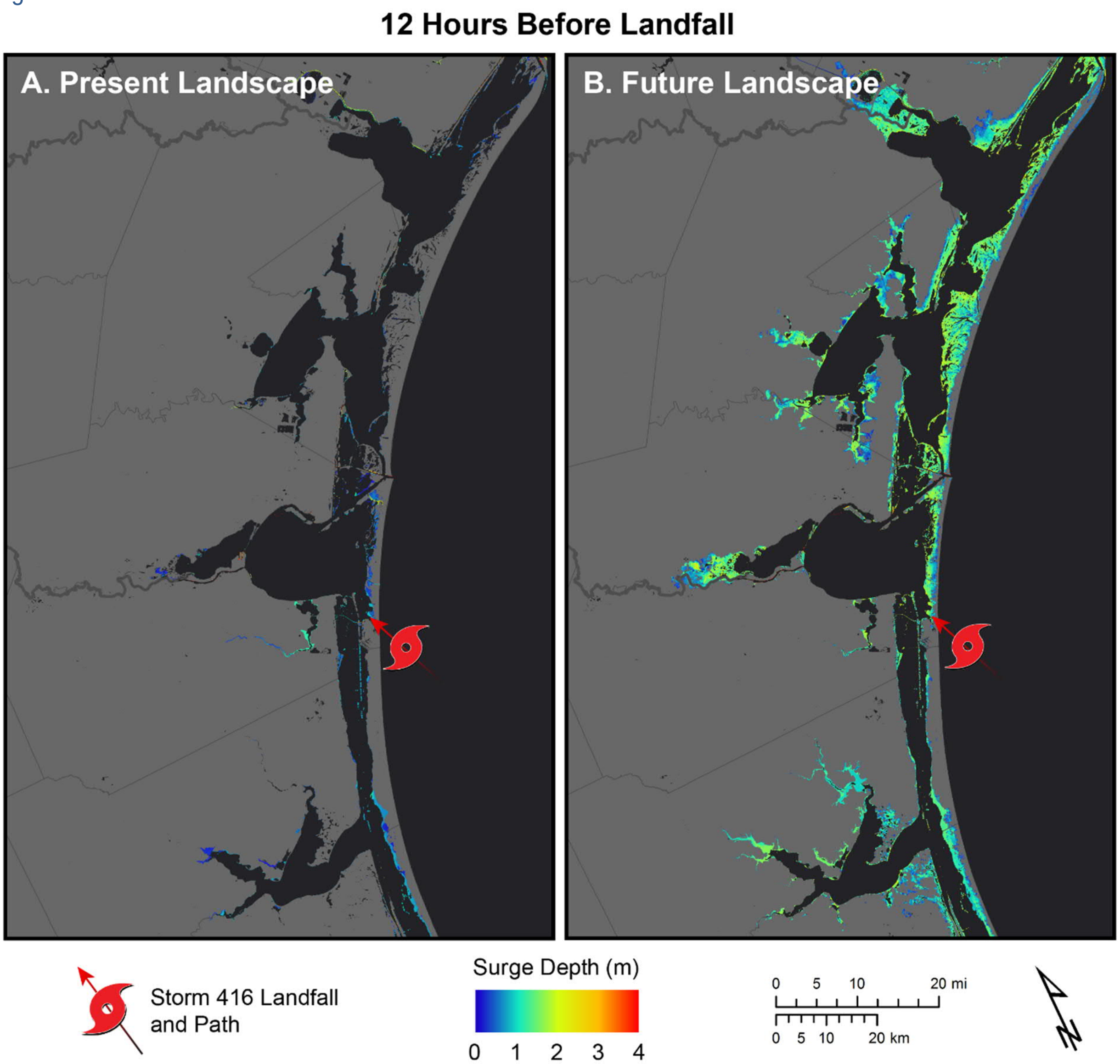


Figure 0-28: Storm surge depth 12 hours before storm 416 made landfall on A) Present landscape and on B) Future landscape.

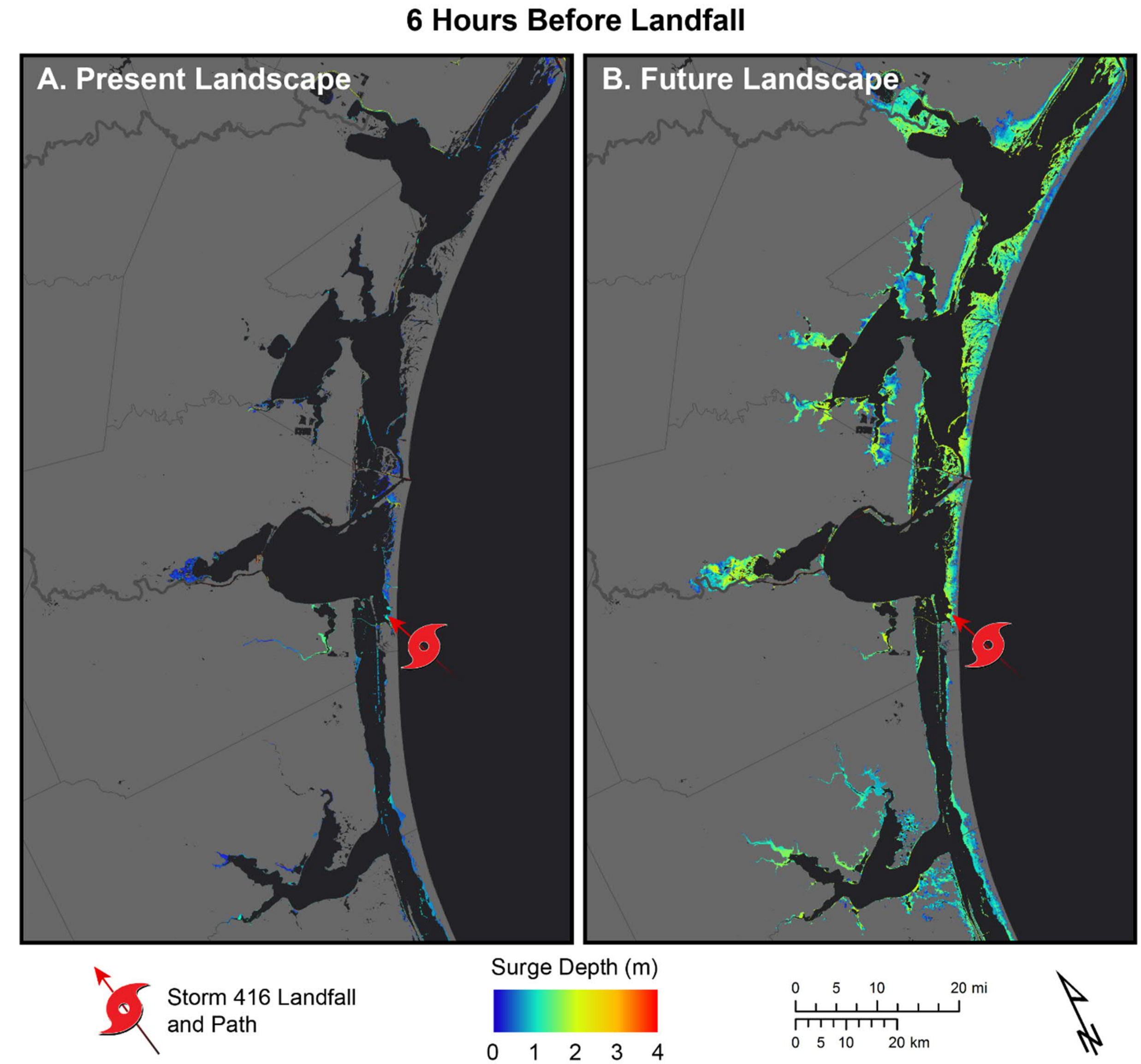


Figure 0-29: Storm surge depth 6 hours before storm 416 made landfall on A) Present landscape and on B) Future landscape.

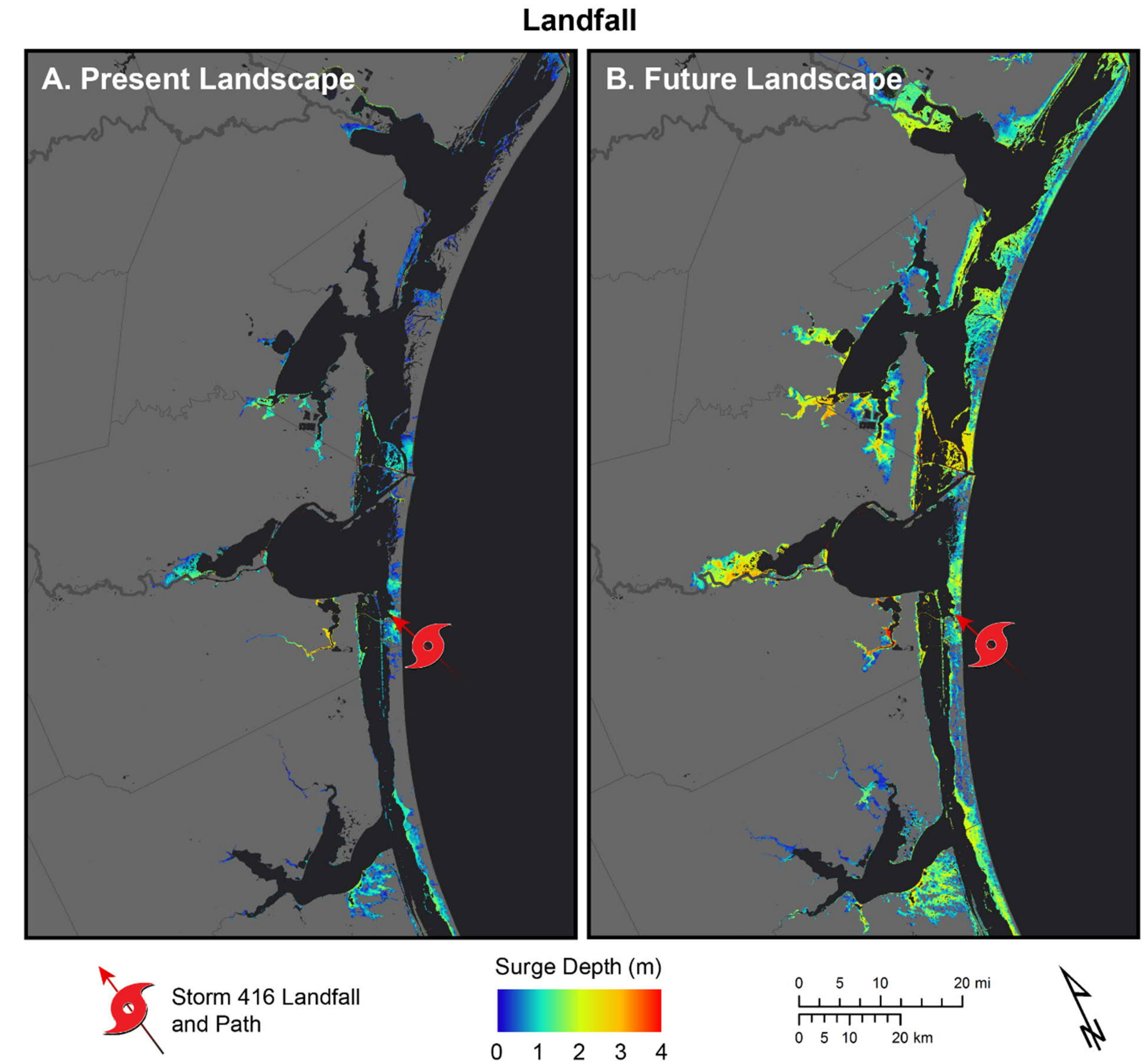


Figure 0-30: Storm surge depth when storm 416 made landfall on A) Present landscape and on B) Future landscape.

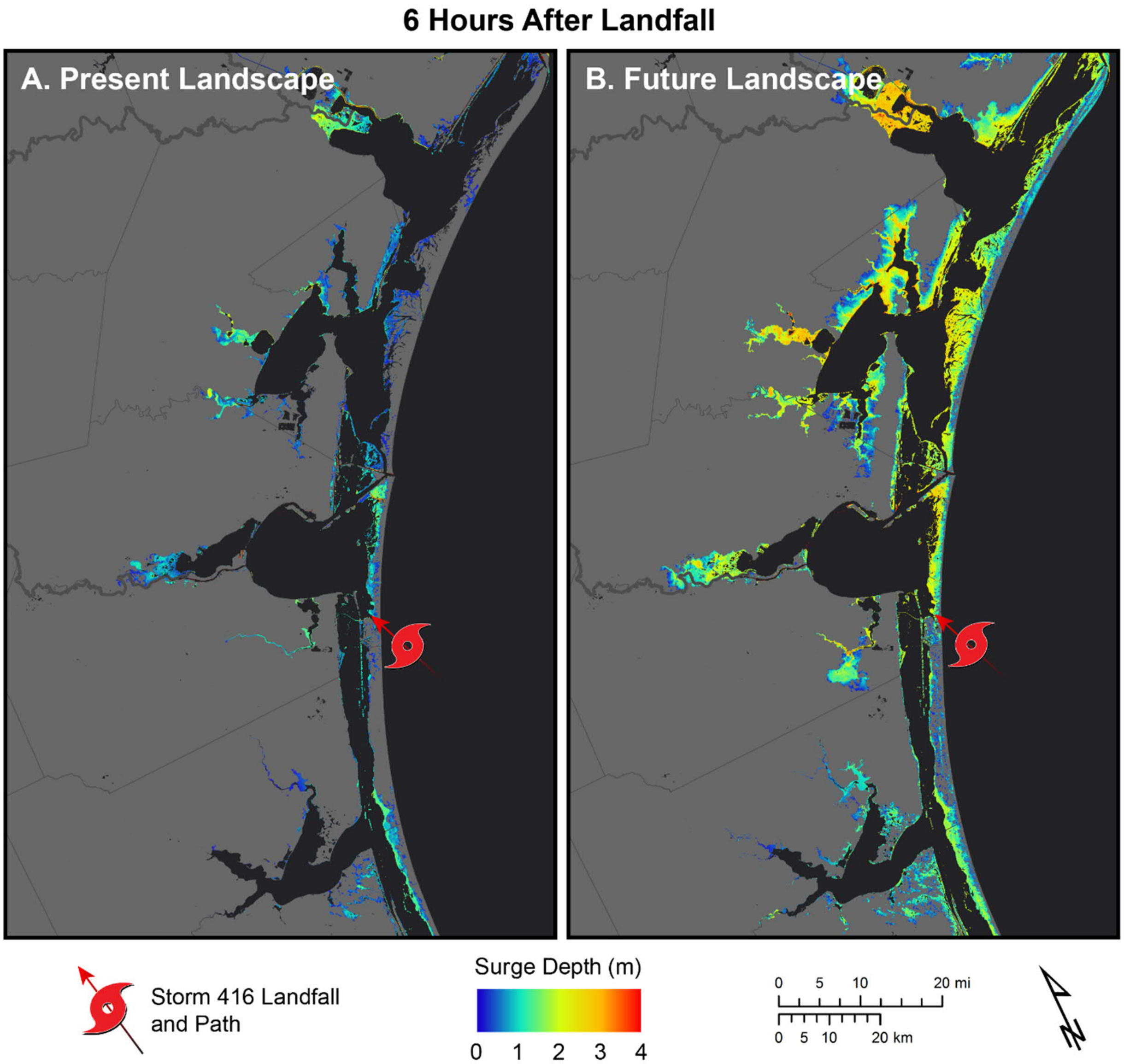


Figure 0-31: Storm surge depth 6 hours after storm 416 made landfall on A) Present landscape and on B) Future landscape.

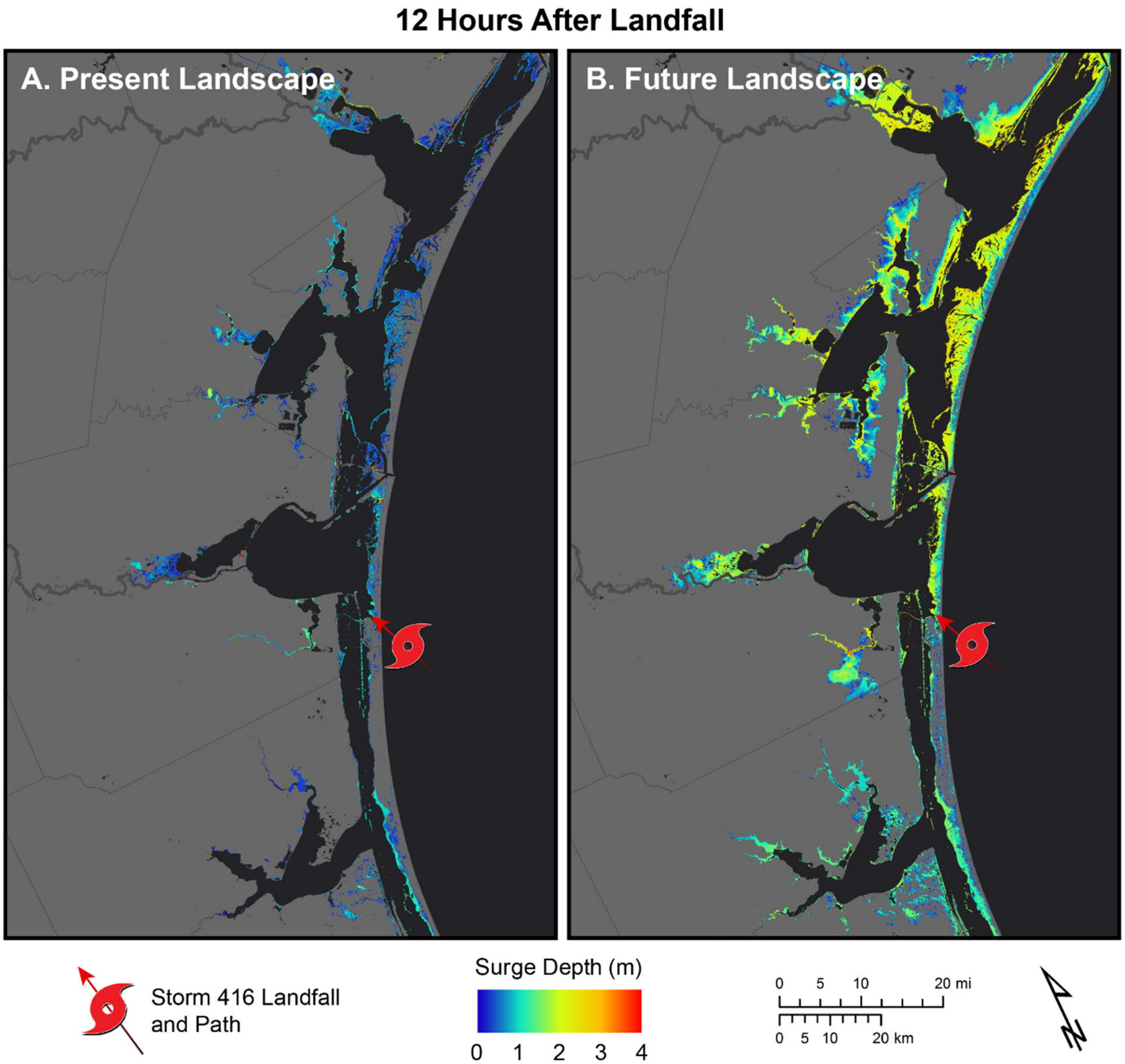


Figure 0-32: Storm surge depth 12 hours after storm 416 made landfall on A) Present landscape and on B) Future landscape.

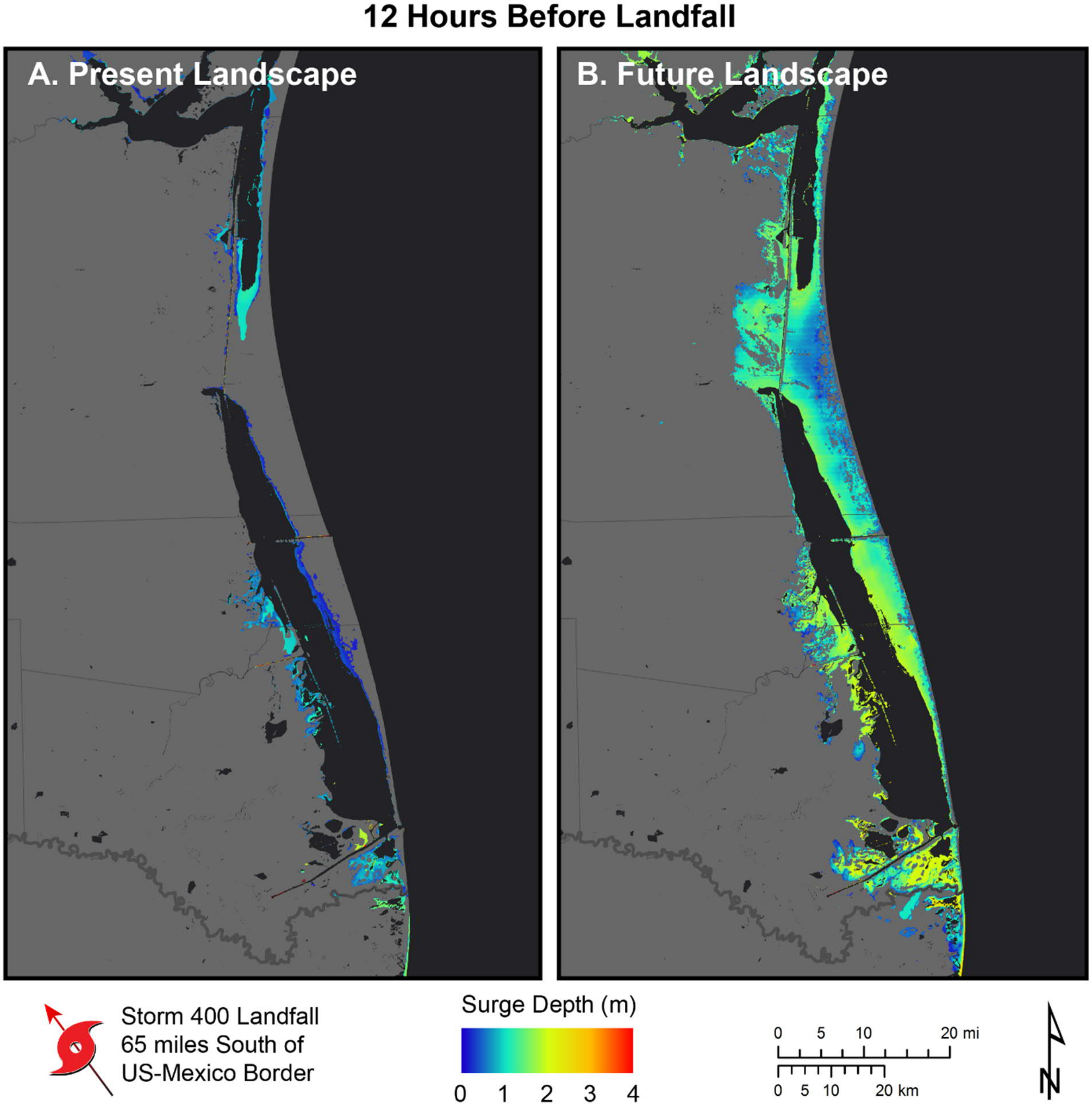


Figure 0-33: Storm surge depth 12 hours before storm 400 made landfall on A) Present landscape and on B) Future landscape.

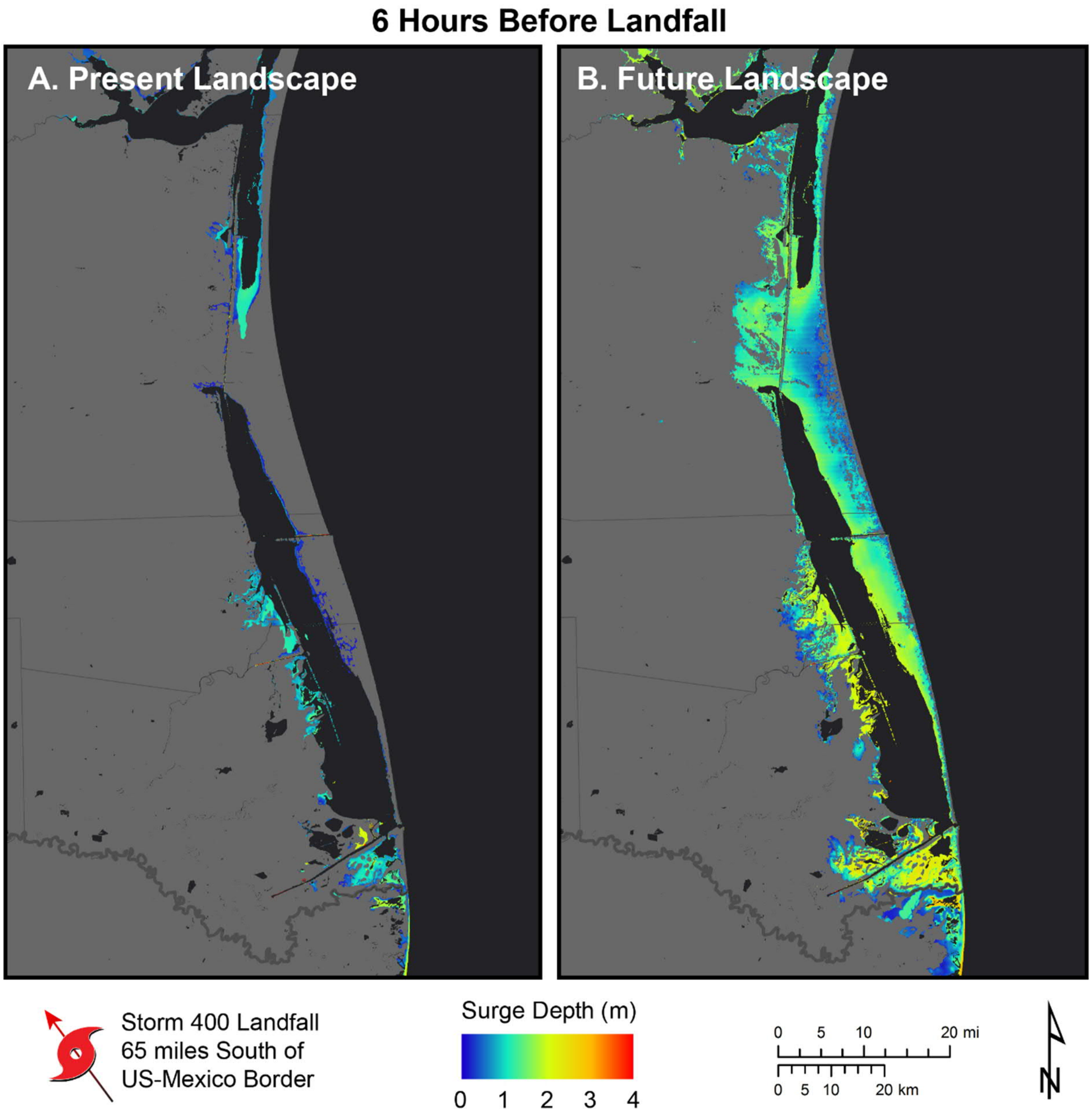


Figure 0-34: Storm surge depth 6 hours before storm 400 made landfall on A) Present landscape and on B) Future landscape.

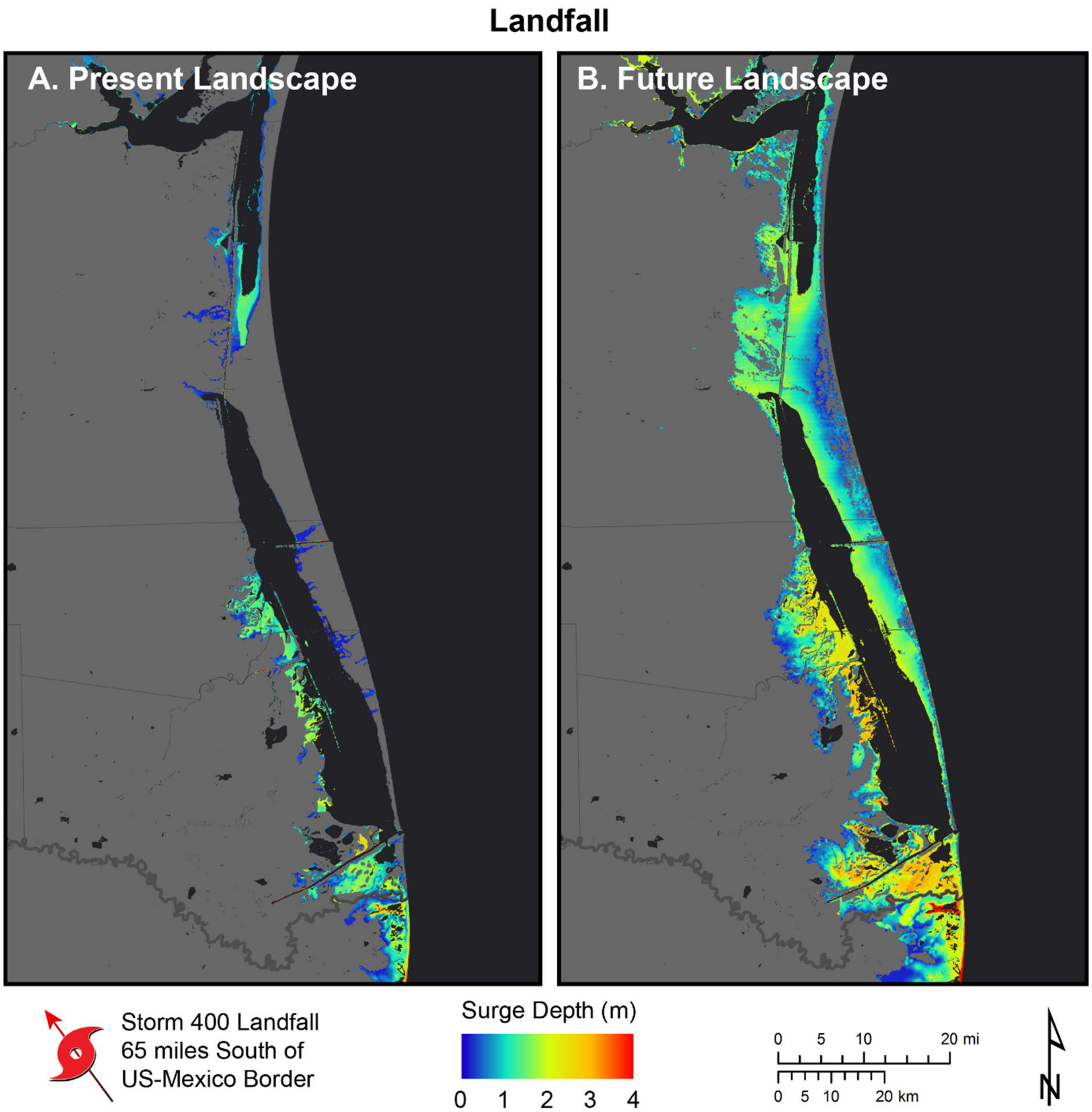


Figure 0-35: Storm surge depth when storm 400 made landfall on A) Present landscape and on B) Future landscape.

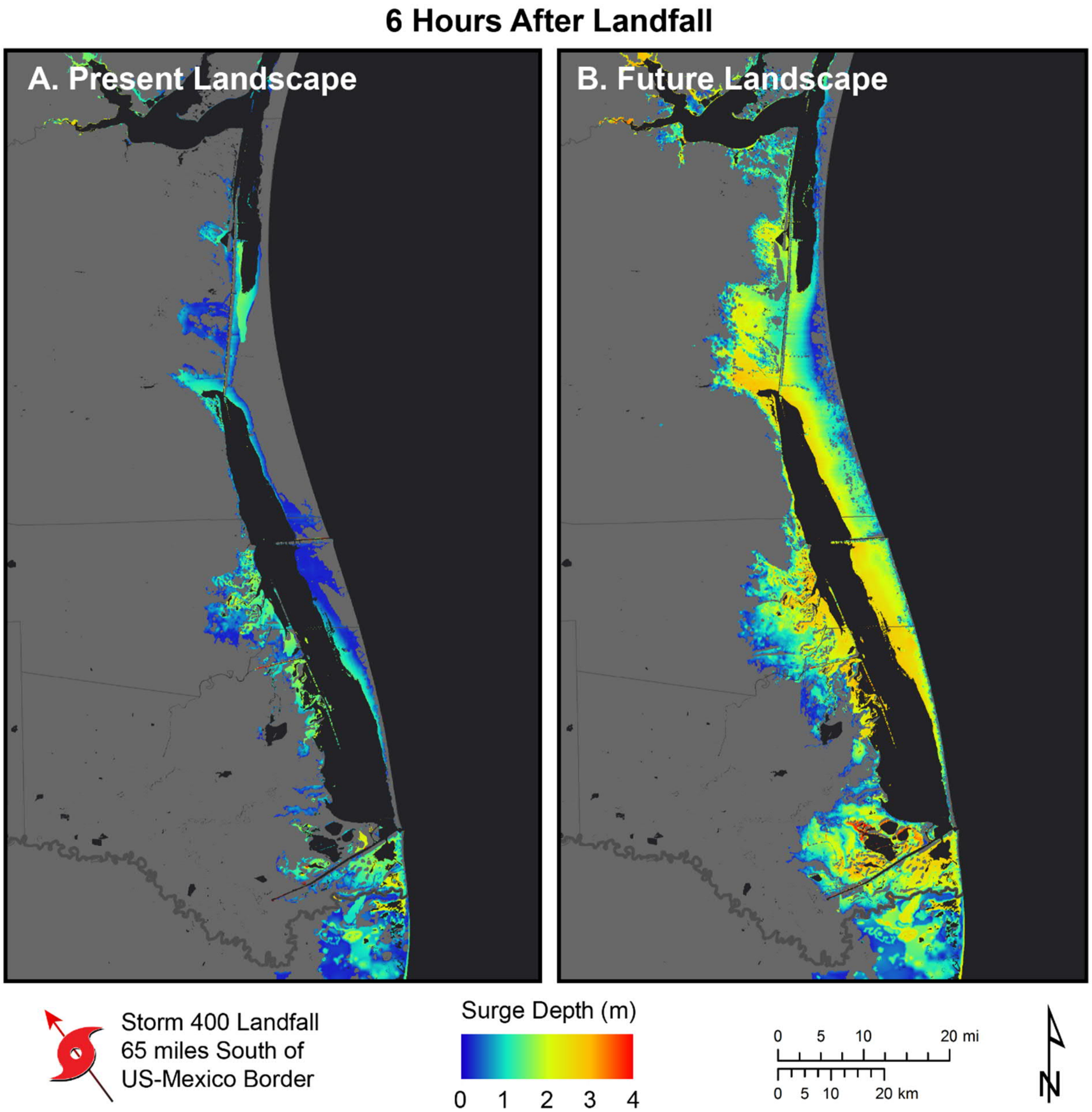


Figure 0-36: Storm surge depth 6 hours after storm 400 made landfall on A) Present landscape and on B) Future landscape.

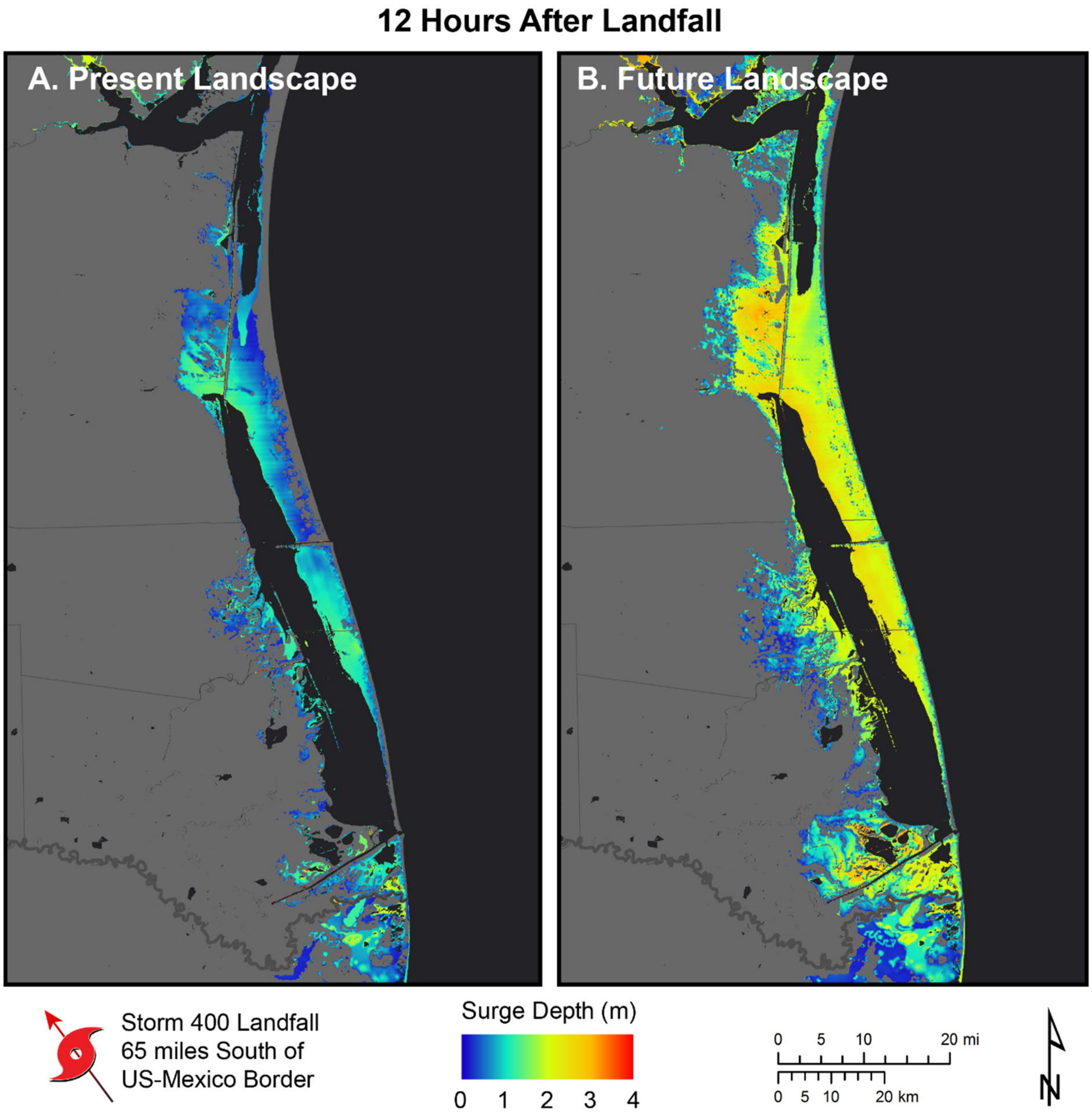


Figure 0-37: Storm surge depth 12 hours after storm 400 made landfall on A) Present landscape and on B) Future landscape.

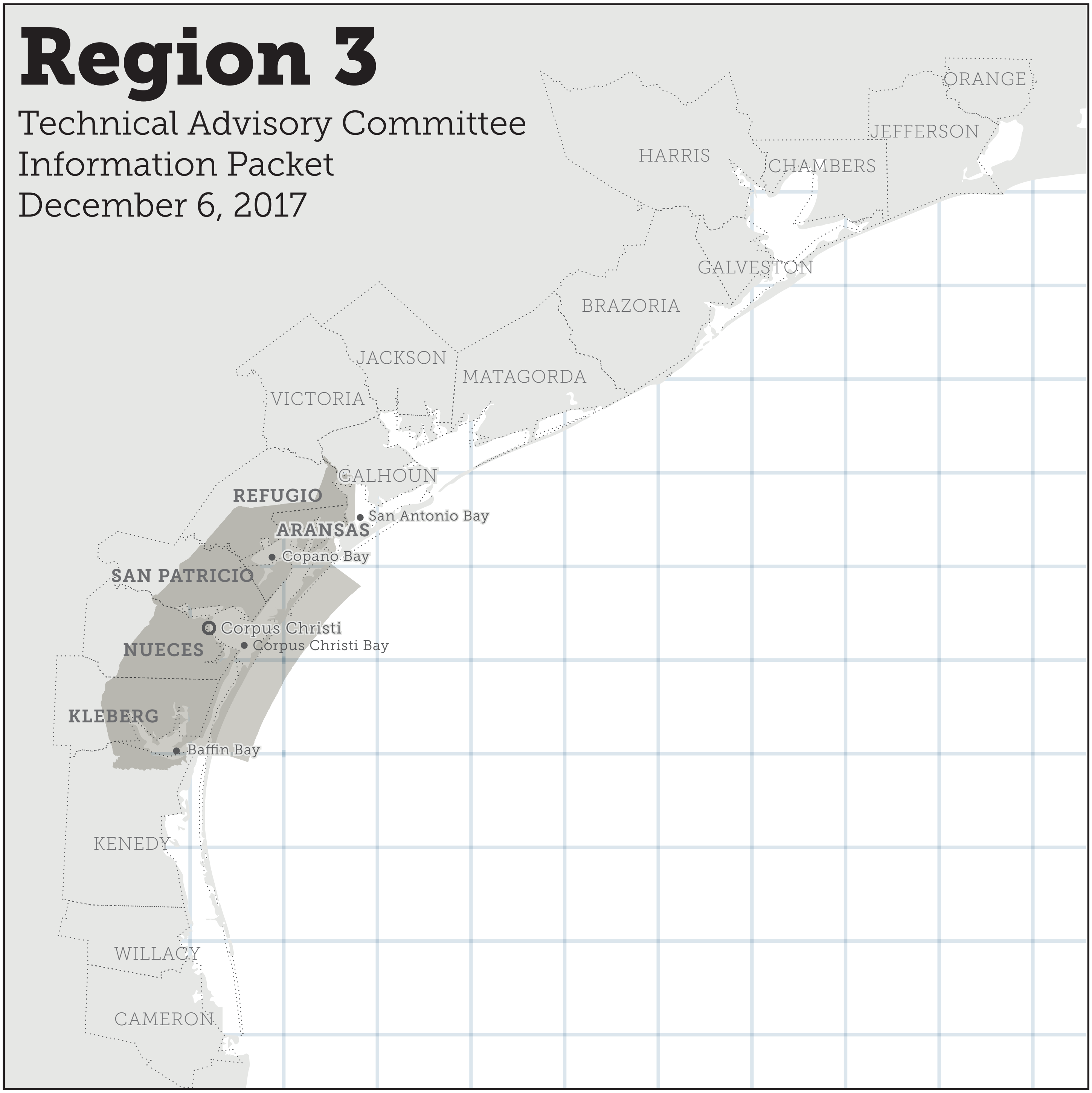
Appendix D. Technical Advisory Committee Meetings

Round 1 TAC Meeting Materials Example

Texas General Land Office

Region 3

Technical Advisory Committee
Information Packet
December 6, 2017



Abbreviations

ADCIRC	Advanced Circulation Model
BUDM	Beneficial Use of Dredged Material
CSRM	Coastal Storm Risk Management
GCCPRD	Gulf Coast Community Protection and Recovery District
GIWW	Texas Gulf Intracoastal Waterway
GLO	Texas General Land Office
HAZUS	Hazards U.S. Software
IOC	Issue of Concern
MEOW	Maximum Envelope of Water
NED	National Elevation Dataset
NFWF	National Fish and Wildlife Foundation
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
RECONS	Regional Economic System Software
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea Level Rise
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
SRTM	Shuttle Radar Topography Mission
TAC	Technical Advisory Committee
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WWTP	Wastewater Treatment Plant

Table of Contents

1. Introduction to the 2019 Texas Coastal Resiliency Master Plan

The Texas General Land Office (GLO) issued the first iteration of the Texas Coastal Resiliency Master Plan (2017 Plan) in March 2017 as the initial step towards achieving a comprehensive plan for the State of Texas. Using the framework from the 2017 Plan as a starting point, the second iteration of the Texas Coastal Resiliency Master Plan (2019 Plan) will continue to build and improve upon the information presented in 2017 to make the GLO better equipped to steward the needs of Texans and their coast. The 2019 Plan will be published and presented to the Texas State Legislature during the 2019 legislative session.

1.1. Key Framework Definitions

The 2017 Plan laid a foundation for the GLO's planning efforts. In the 2017 Plan, several key concepts were defined that will continue to contribute to the framework used in the 2019 Plan.

Actions: One or more proposed projects that work to mitigate a coastal Issue of Concern (IOC) or the IOC's underlying Pressures.

Issues of Concern: Natural and human-induced disturbances which, if left unaddressed, will have or will continue to have adverse impacts on infrastructure, natural resources, economic activities, and the health and safety of Texas residents. The Issues of Concern include: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion, Coastal Flood Damage; Existing and Future Coastal Storm Surge Damage; Gulf Beach Erosion and Dune Degradation; Impact on Coastal Resources; Impact on Water Quality and Quantity; and Abandoned or Derelict Vessels, Structures and Debris.

Planning Area: The planning area of the Texas Coastal Resiliency Master Plan is the Texas Coastal Zone Boundary from the Texas Coastal Management Program, which is the area the GLO is required to regulate through state and federal laws.

Regions: Four regions spanning the Texas coast used to present overall Plan results, beginning with Region 1 on the northeast part of the coast and moving to Region 4 towards the southwest part of the coast.

Resiliency: The ability of a given system (e.g., ecological, socio-economic, infrastructure) to absorb natural and/or anthropogenic disturbances, and retain or quickly return to a previous desired state.

Resiliency Strategy: A method of restoration and protection measures for coastal resiliency. Collectively, the Resiliency Strategies and the proposed projects address the Issues of Concern identified over the course of the planning process.

Study Areas: For the 2017 Plan, IOCs and proposed projects were presented to the TAC using study areas, or groups of coastal subregions within a region. This more-focused view of the coast will be continued as part of the 2019 Plan to better define subregional coastal IOCs and proposed actions.

Subregion: Sub-areas within the four regions, which are defined by watershed boundaries.

Technical Advisory Committee (TAC): A group of statewide and regional coastal decision makers and technical experts working in state and federal agencies, universities, local governments, non-profit organizations, engineering firms, ports, and regional trusts, foundations and partnerships. The TAC meets regularly to provide expert feedback on the GLO's development of the 2017 and 2019 Plans.

Tier 1 Projects: Projects that represent the most resilient and actionable project solutions recommended for the state, as identified in the 2017 Plan.

Study Areas: For the 2017 Plan, IOCs and proposed projects were presented to the TAC using study areas, or groups of coastal subregions. This more-focused view of the coast will be continued as part of the 2019 Plan to better define subregional coastal IOCs and proposed actions.

1.2. Technical Advisory Committee Process

The GLO will continue to meet regularly with the TAC to evaluate current and future coastal Texas needs. For the 2019 Plan, a tentative schedule will be as follows:

TAC Meetings	Tentative Schedule	Tentative Description
Round 1	October-December 2017	To solicit qualitative feedback on integrating new resiliency considerations to the planning process (e.g., transportation infrastructure).
Round 2	February – April 2018	To solicit quantitative feedback on new proposed projects and actions.
Round 3	Fall 2018	To present interim results and request comments.

1.3. Updated Resiliency Strategy Framework

The key framework definitions provided in Section 1.1 are shown graphically in the revised Resiliency Strategy Framework (Figure 1-1). The framework, which was created in an initial version for the 2017 Plan to incorporate the combination of green and gray projects that can address the Issues of Concern in a holistic manner. This undertaking will create a more resilient coast and enhance the existing Texas Coastal Resiliency Master Plan.

Additions to the framework include:

- **Resiliency Strategies** – Revised the Resiliency Strategies to clarify 2017 Plan strategies and to add new strategies related to infrastructure.
- **Actions** – One or more proposed projects that work to mitigate a coastal IOC or the IOC's underlying Pressures.
- **Gap Analysis & Modeling (Future Conditions)** – Evaluating future conditions for the coast will better inform locations of future needs as well as where proposed actions will have the greatest chance of success.
- **TAC Input and Evaluation** – Remains a central part of the planning process; added to the framework to reflect its importance.
- **Monitoring & Adaptive Management** – Incorporating monitoring and adaptive management into the planning process.

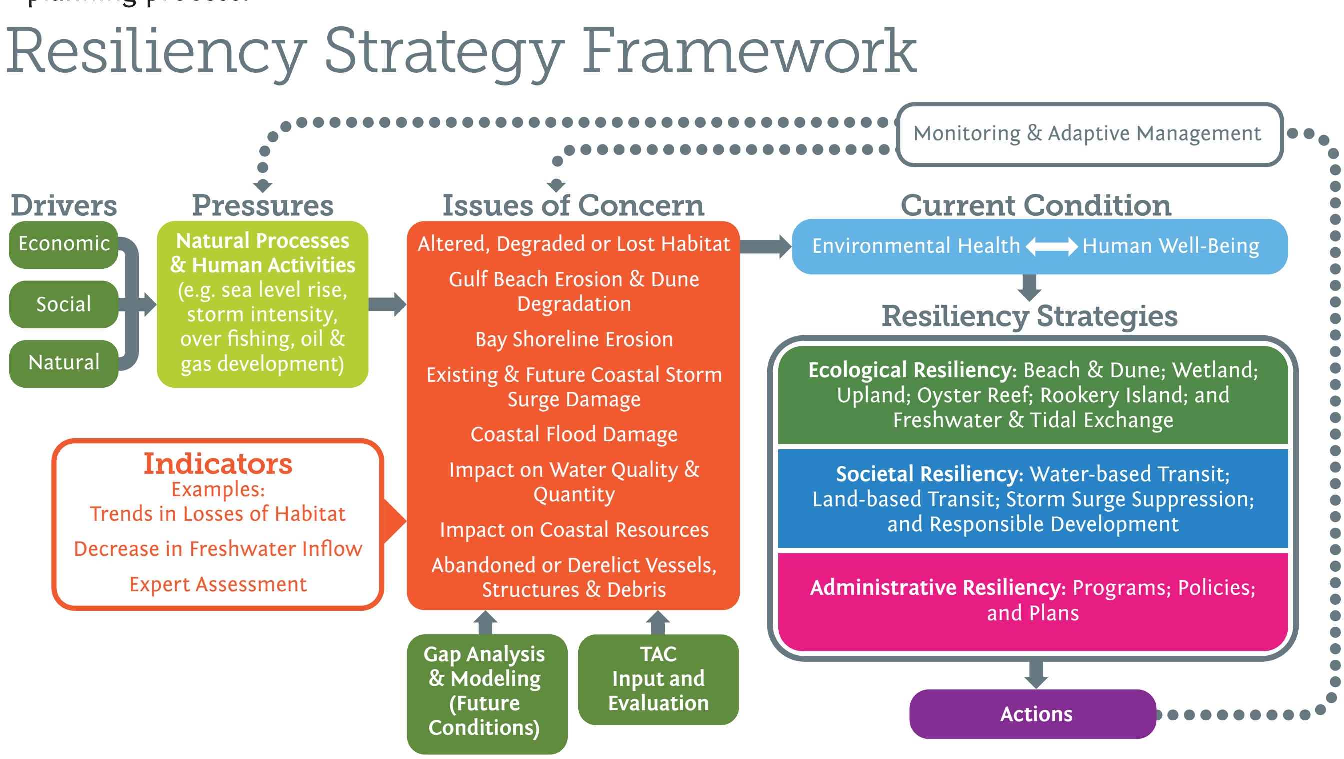


Figure 1-1: *Resiliency Strategy Framework*

1.4. Issues of Concern

The Issues of Concern represent the problems introduced by the dominant Drivers and Pressures facing the Texas coast. Addressing these IOCs is the primary goal when evaluating methods to improve coastal resiliency. Project solutions that can mitigate or eliminate the IOCs in a feasible and cost effective manner are considered the most resilient solutions for the coast. Identifying where specific IOCs exist and the severity to which they impact Texas' environments at the time of this study, provided the basis to analyze projects for inclusion in the 2017 Plan.

Altered, Degraded or Lost Habitat

Healthy bays, wetlands and estuaries provide the critical foundation for sustainable environments and thriving economies. These coastal habitats help maintain wildlife and plant populations, improve water quality, support fishing activities, enhance local tourism and maintain community resilience by reducing the impact of coastal hazards, such as flooding and storm surge. Coastal population growth, development and relative sea level rise adversely impact coastal habitats. This effect will continue unless mitigation projects are implemented.

Gulf Beach Erosion and Dune Degradation

Approximately 65 percent of the Texas Gulf shoreline is considered an eroding area. An eroding area is defined by state regulation as a portion of the shoreline eroding at a rate of greater than 2 feet per year. Natural or restored Gulf beaches and dunes provide recreation areas and habitat for wildlife, including threatened and endangered species, such as sea turtles and piping plovers. Beaches and dunes also serve as a natural first line of defense from storm surge for inland populations and infrastructure by absorbing the impact of high waves and by stopping or delaying intrusion of water inland. Erosion is a threat to public beach use and access, public and private property and infrastructure, fish and wildlife habitat, and public health and safety. The combined effects of erosion are amplified by coastal population growth and increased development.

Bay Shoreline Erosion

Bay shorelines are experiencing many of the same issues as the Gulf-facing shorelines. Bay shore areas function as buffers, protecting upland habitats from erosion and storm damage, and adjacent wetlands and waterways from water quality degradation. The loss of these bay shorelines from coastal development, vessel wakes along the Gulf Intracoastal Waterway, relative sea level rise, and wind and wave erosion contributes to habitat loss, water quality degradation, loss of property and reduced protection from storm surge and other coastal hazards.

Existing and Future Coastal Storm Surge Damage

Maintaining the coast's natural protective features is critical to minimizing the impact of future storms and hurricanes, and their associated human, infrastructure and economic losses. Coastal storms present a major threat to people and property living near the coast, with many long-lasting impacts on community infrastructure, the natural environment and the local, state and national economies. Increased coastal development, erosion, relative sea level rise and wetland loss contribute to increased risk and exposure to coastal storm events.

Coastal Flood Damage

Much of the Texas coastal zone lies in a floodplain susceptible to storm and nuisance flooding that impacts and disrupts coastal communities, damages property and natural environments, and poses risks to human health and safety. The impact of coastal flooding may be exacerbated by increased floodplain development, wetland loss and ongoing processes such as erosion, subsidence and sea level rise. Continued landscape changes increase risk and exposure to hazards, even in areas not previously prone to flooding.

Impact on Water Quality and Quantity

Increased urban development and water use places demands on water resources, and can negatively impact water quality and quantity. Poor water quality leads to habitat and wildlife degradation, health and safety issues, and negative economic impacts on coastal communities, tourism, recreation and fishing. When coupled with the fact that Texas is a drought-prone state, freshwater inflows to Texas' watersheds and bays are threatened. Adequate inflows are essential to support healthy coastal habitats and wildlife, water quality, salinity, recreation, and commercial activities, such as farming and fishing.

Impact on Coastal Resources

The coastal zone of Texas boasts an abundance of resources, including oysters, turtles, birds, fish, crabs and several endangered species that are sensitive to environmental changes. These resources are important to maintain the health of coastal systems, but also for the economy, as they support ecotourism and recreational and commercial fisheries. All of which generate tax revenue for the coastal communities and the state. These resources are impacted by various natural and human disturbances, including population growth, increased resource extraction, habitat loss from development, degraded habitat and water quality from pollution, reduced freshwater inflows, invasive species, disease, storms and salinity changes.

Abandoned or Derelict Vessels, Structures and Debris

Abandoned and derelict vessels, structures and other debris can become hazards to navigation as well as natural resources, and can restrict and alter coastal processes. When left neglected, vessels and structures can sink or move during storms, disperse oil and toxic chemicals, destroy marine and coastal habitats, and affect the health and safety of residents and visitors of the coastal communities.

2. Resiliency Strategies: What's New

The 2017 Plan proposed eight Resiliency Strategies, or methodologies deemed to be most appropriate and effective for counteracting coastal Issues of Concern. Those Resiliency Strategies are enhanced for the 2019 Plan to capture the broader scope and range of projects. The below table illustrates the transition from the 2017 Resiliency Strategies to the 2019 Resiliency Strategies.

	2017 Resiliency Strategy	2019 Resiliency Strategy	Description
Ecological Resiliency	Restoration of Beaches and Dunes	Beach and Dune Enhancement	Renourishment of sediment to beach and dune complexes to address erosion, shoreline loss and limited sediment supply. This includes Gulf-facing and back bay beaches.
Ecological Resiliency	Bay Shoreline Stabilization and Estuarine Wetland Restoration	Wetland Enhancement	Restores, conserves and protects ecologically significant wetlands through shoreline protection, material placement, hydrologic restoration, and other conservation and restoration practices.
Ecological Resiliency	Freshwater Wetlands and Coastal Uplands Conservation	Upland Enhancement	Restores, conserves and protects ecologically significant coastal uplands through land acquisition, hydrologic restoration, and other conservation and restoration practices.
Ecological Resiliency	Delta and Lagoon Restoration	Freshwater Inflow and Tidal Exchange Enhancement	Identification and mitigation of hydrologic and water quality impairments within the major delta, lagoon and bay systems along the coast.
Ecological Resiliency	Oyster Reef Creation and Restoration	Oyster Reef Enhancement	Identification and restoration or re-establishment of productive oyster reefs.
Ecological Resiliency	Rookery Island Creation and Restoration	Rookery Island Enhancement	Provides for the identification and restoration or re-establishment of rookery island nesting habitats to support colonial waterbird populations.
Societal Resiliency	Stabilizing the Texas Gulf Intracoastal Waterway	Water-Based Transit Enhancement	Addresses water-based navigation infrastructure improvement needs along the coast. Identifies new opportunities to support the beneficial use of dredged materials in state-owned waters.
Societal Resiliency	Stabilizing the Texas Gulf Intracoastal Waterway	Land-Based Transit Enhancement	Addresses land-based transit infrastructure improvement needs in and around coastal communities. Identifies opportunities to incorporate future conditions and ecological considerations into final design.
Societal Resiliency	Stabilizing the Texas Gulf Intracoastal Waterway	Storm Surge Suppression	Relays results of federal, state and regional storm surge suppression studies and identifies how other projects in the Plan interact with the proposed protections. Proposes new or follow-on storm surge suppression studies, if needed.
Societal Resiliency	Stabilizing the Texas Gulf Intracoastal Waterway	Responsible Development	Proposes proactive, resilient planning opportunities in coastal communities. Identifies projects to support communities' current needs while considering future conditions.
Administrative Resiliency	Plans, Policies and Programs	Plans	Identifies completed, ongoing or proposed plans that guide the screening, design and/or implementation of proposed coastal resiliency projects.
Administrative Resiliency	Plans, Policies and Programs	Policies	Identifies legislative and/or administrative changes to uphold coastal resiliency principles.
Administrative Resiliency	Plans, Policies and Programs	Programs	Identifies GLO-administrated or supported programs related to coastal management.

3. Coastal Infrastructure

The 2017 Plan identified coastal projects that address many of the major concerns along the Texas coast with respect to ecological resiliency. The 2019 Plan will expand upon this work by including projects to help improve the resiliency of Texas's coastal infrastructure.

The project sources that will be used to identify proposed coastal infrastructure projects for the 2019 Plan include Tier 1 projects, continued TAC input and new project sources, as shown in Table 3-1. Proposed projects may also include ones already existing in the 2017 Plan database that were not previously evaluated or need to be re-evaluated based on the new planning approach. To initially identify communities' coastal infrastructure needs, the GLO referenced the Texas Coastal Infrastructure Study, a state-led planning process that worked with communities throughout coastal Texas to compile a list of community infrastructure needs in 2015-2016.

Table 3-1 describes the typical projects that will be considered during the 2019 planning process. In most cases, capital improvement projects, such as neighborhood street reconstruction or maintenance facility renovations, will not be considered unless they can be shown to directly relate to the Plan's strategies and goals.

Table 3-1: Coastal Infrastructure Project Identification

Water-Based Transit Enhancement	• Port of Houston Authority and U.S. Army Corps of Engineers (USACE) Houston Ship Channel Mega Study • Calhoun Port Authority and USACE Matagorda Ship Channel Improvement Project • Cataloging local, state and federally maintained channels is ongoing	• Opportunities for Beneficial Use of Dredged Material • State and locally maintained navigation channels, such as the Texas Gulf Intracoastal Waterway (GIWW)
Land-Based Transit Enhancement	• Texas Department of Transportation (TxDOT) Project Lists • GLO Texas Coastal Infrastructure Study	• Major Evacuation Routes • Coastal Highway Elevation • Coastal Highway Repairs • Causeways
Storm Surge Suppression	• USACE Sabine-to-Galveston Study (Orange, Port Arthur, Freeport systems) • USACE Coastal Texas Study (the Tentatively Selected Plan will be available in early 2018 and will propose improvements for the Houston-Galveston, Matagorda, and South Padre Island systems) • Gulf Coast Community Protection and Recovery District (GCCPRD) Storm Surge Suppression Study	• Results of ongoing federal, state, and regional studies for large-scale coastal storm risk management systems • Local levees and storm surge suppression systems may be considered
Responsible Development	• Erosion Response Plans	• Large-Scale (Regional) Drainage Projects or Studies • Utility Planning • Critical Facility Planning • Setbacks

3.1. Multiple Lines of Defense

In addition to compiling new "traditional" infrastructure projects from the sources mentioned, the GLO intends to work with planners, engineers and local sponsors to determine how ecologically resilient coastal infrastructure projects can be implemented. These projects would combine the best engineering technology with appropriate ecological improvement methods to enhance the longevity of projects. Part of this process is expanding the mindset of coastal infrastructure to include an all-encompassing vision that includes "gray" and "green" projects working together in complementary fashion under the current multiple lines of defense concept. This concept provides the linkage between Texas's barrier islands, bays, ecological systems and community infrastructure, as it iterates that all elements work together to mitigate risk. Historically, these elements have all been thought of individually, but as part of the 2019 Plan, the goal is to shift the formerly independent thought process and to begin implementing holistic solutions.

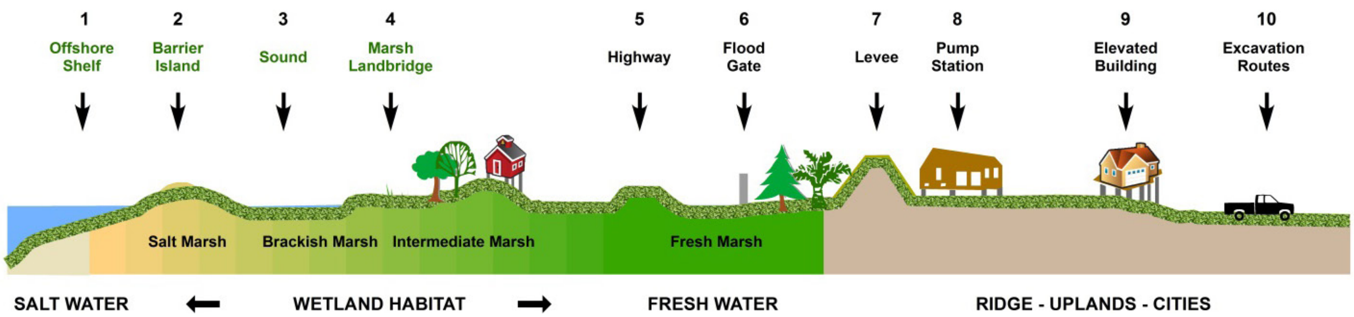


Figure 3-1: *Multiple Lines of Defense*

The 2017 hurricane season has reminded us that the Texas coastal zone is extremely vulnerable to storm surge, strong winds and inland flooding. While the more recent tropical storms show that overall, tropical storms are intensifying, Texas has long been under siege from hurricanes. The destruction wrought by these hurricanes can be mitigated with a multiple lines of defense approach. Figure 3-2 shows the hurricane tracks and landfalls impacting Texas prior to 2017.

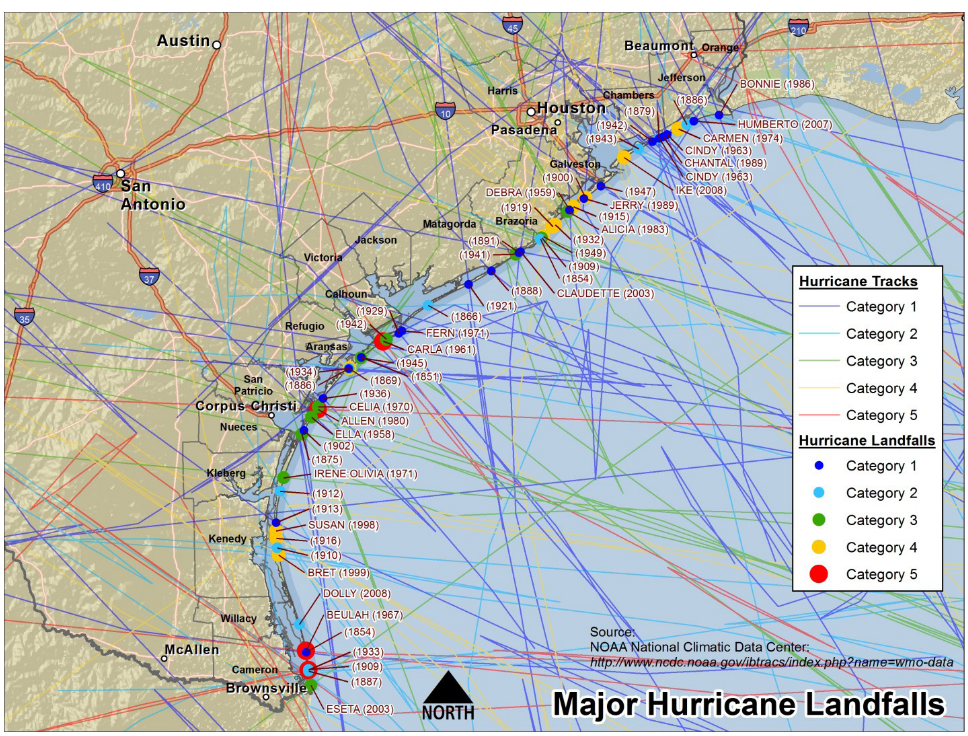


Figure 3-2: *Hurricane Landfalls Pre-2017.*

Examples of the importance of multiple lines of defense, such as beach and dune systems, along with responsible development (green and gray) are readily apparent when comparing and contrasting the areas that experienced landfall during the last two hurricanes along the Texas coast – Hurricane Ike (2008) and Hurricane Harvey (2017). It should be noted that the two storms had many differing variables, including their size, energy, wind speed and storm surge. Therefore, this discussion should be considered solely conceptual and not a direct quantified comparison.

Hurricane Ike made landfall along Bolivar Peninsula, a populated and developed stretch of shoreline lacking a robust beach and dune system. Without a strong multiple lines of defense system, the homes and businesses on the peninsula were exposed to the direct force of the Gulf and destroyed by wind and storm surge. The catastrophic overwash of Bolivar Peninsula allowed surge and wave action to propagate into the bays. This inflicted flooding and damage to the inland communities. As a result, inland communities also suffered due to the lack of a resilient beach and dune system. In addition, many areas lacked the natural wetland complexes that also would have reduced the wave energy. Because of the ecological shortcomings, the community infrastructure suffered with the destruction of homes and buildings, inundation of the water supply and treatment facilities, and crippling of critical transportation networks.

Gilchrist, Texas after Hurricane Ike in 2008.[1]

[1]Pool photo by Smiley N. Pool, via Getty Images. Obtained from: NY Times Sunday Review. Oct 7, 2016. "When the Next Hurricane Hits Texas." Available at: https://www.nytimes.com/2016/10/09/opinion/sunday/when-the-hurricane-hits-texas.html (accessed Oct 3, 2017)

Blowout on San Jose Barrier Island.[2]

Hurricane Harvey inflicted massive damages to a majority of the Texas coast with winds, tornadoes and historic rainfall. Until more robust modeling can be completed, it is difficult to estimate the storm surge level at San Jose Barrier Island, because there are no measurement devices in the immediate Gulf vicinity. But, because the eye of Hurricane Harvey made landfall at San Jose Barrier Island and not over a major port or city, Texas was fortunate to not also have the same devastation from storm surge damage seen during Hurricane Ike. Instead, the San Jose Barrier Island, an undeveloped area that has a strong beach, dune and wetland system, absorbed the initial impact of the hurricane and offered some storm surge protection. Acting as a first line of defense, the barrier island did, however, sustain major damages to its beach and dune system, including large blowouts and areas of overwash. To continue to take the brunt of tropical storms and hurricanes, this barrier island will need to be repaired and restored.

The San Jose Barrier Island represents the benefits of the concepts of responsible development, including conservation of Gulf-facing lands. While Port Aransas, Rockport, Aransas Pass and surrounding communities were devastated by Hurricane Harvey, this was primarily the result of wind damage, which is not mitigated through elements of coastal resiliency, outside of responsible development.

[2]Texas Civil Air Patrol MOVES Oblique Photography. "Photo Name: S0907A0479A_0076. Date/Time: 2017-09-07 15:19:10." Available at: http://magic.csr.utexas.edu/public/views/ (accessed Sept 20, 2017)

3.2. Green Infrastructure Concepts

Due to the impacts of Superstorm Sandy, the Northeastern portion of the United States is undergoing extensive efforts to incorporate long-term community resiliency into designs of traditional “gray” infrastructure, like coastal highways and drainage systems, particularly in highly urbanized areas. The conceptual projects that resulted from their research provide examples of how to best combine “green” and “gray” infrastructure that improve both ecological and community-based resiliency along the coast. Using the efforts from the Northeastern U.S. as an example, Texans have an opportunity to leverage the work that has been done to develop methodologies specific to the Gulf Coast. The following pages provide examples of future concepts that integrate a multiple lines of defense approach to coastal resiliency, and can be reimagined and adopted for the Texas coast.

Similar to how nourished beaches and dunes, and wetlands and prairies protect adjacent coastal neighborhoods, drainage systems within a city can take advantage of the local landscape and site characteristics to also provide protection. While many systems in a city can be overwhelmed by the volume of water, as we all observed during Hurricane Harvey, newer developments constructed at higher elevations are better able to avoid storm surge damage and inland flooding. A city can have multiple initiatives to incorporate green infrastructure such as bioswales, wetland creation, and permeable paving to reduce overall runoff attributed to stormwater. Combining these types of green infrastructure improvements along with elevating of critical facilities and roadways is essential to the development of societal and ecological resiliency in coastal communities.

Conceptual Green Infrastructure Enhancement Opportunities

- Living Shorelines
- Permeable Materials and Paving
- Retaining and Restoring Areas of Open Space
- Bioswales and Vegetated Shelfs
- Flood Resilient Parks and Recreational Spaces
- Wetland Creation

A rain garden funded by the Texas Coastal Management Program at the Environmental Institute of Houston at the University of Houston-Clear Lake.

Figure 3-3: *Improvements to Civic Amenity Property*[3]

[3]State of New Jersey Department of Environmental Protection (NJDEP). January 31, 2017. "Rebuild by Design Meadowlands: Citizen Advisory Group (CAG) Meeting #7, Stormwater Drainage Improvements" Bureau of Flood Resilience. Available at: http://www.nj.gov/dep/floodresilience/docs/rbdm-cag-20170131-pres.pdf (accessed Sept 20, 2017)

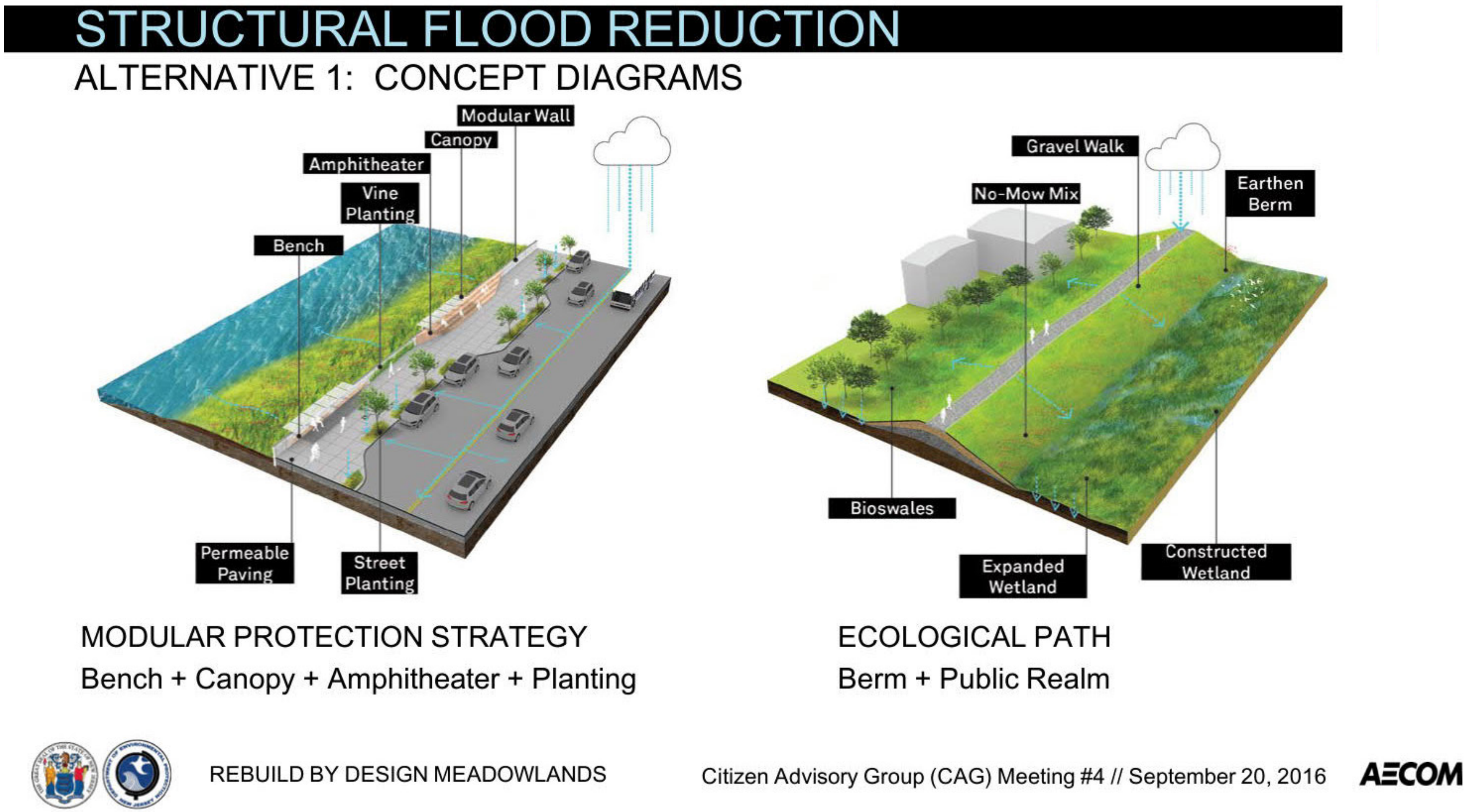


Figure 3-4: *Structural Flood Reduction Concept Diagrams – Modular Protection Strategy and Ecological Path*[4]

[4] *State of New Jersey Department of Environmental Protection (NJDEP). September 20, 2016. "Rebuild by Design Meadowlands: Citizen Advisory Group (CAG) Meeting #4, Concept Component Development" Bureau of Flood Resilience. Available at: http://www.nj.gov/dep/floodresilience/docs/rbdm-20160920-cag-pres.pdf (accessed Sept 20, 2017)*

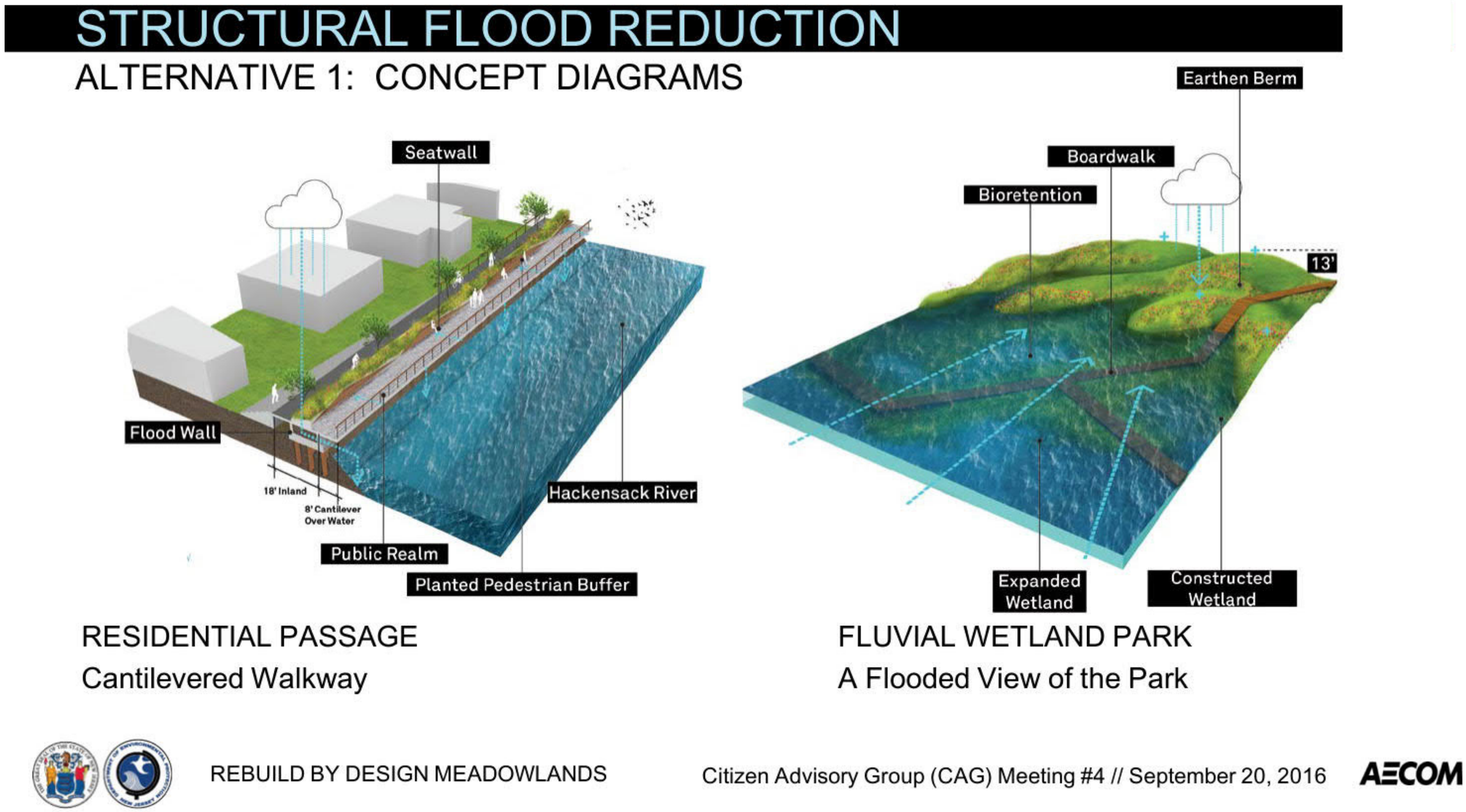


Figure 3-5: *Structural Flood Reduction Concept Diagrams - Residential Passage and Fluvial Wetland Park* [5]

[5]State of New Jersey Department of Environmental Protection (NJDEP). September 20, 2016. "Rebuild by Design Meadowlands: Citizen Advisory Group (CAG) Meeting #4, Concept Component Development" Bureau of Flood Resilience. Available at: http://www.nj.gov/dep/floodresilience/docs/rbdm-20160920-cag-pres.pdf (accessed Sept 20, 2017)

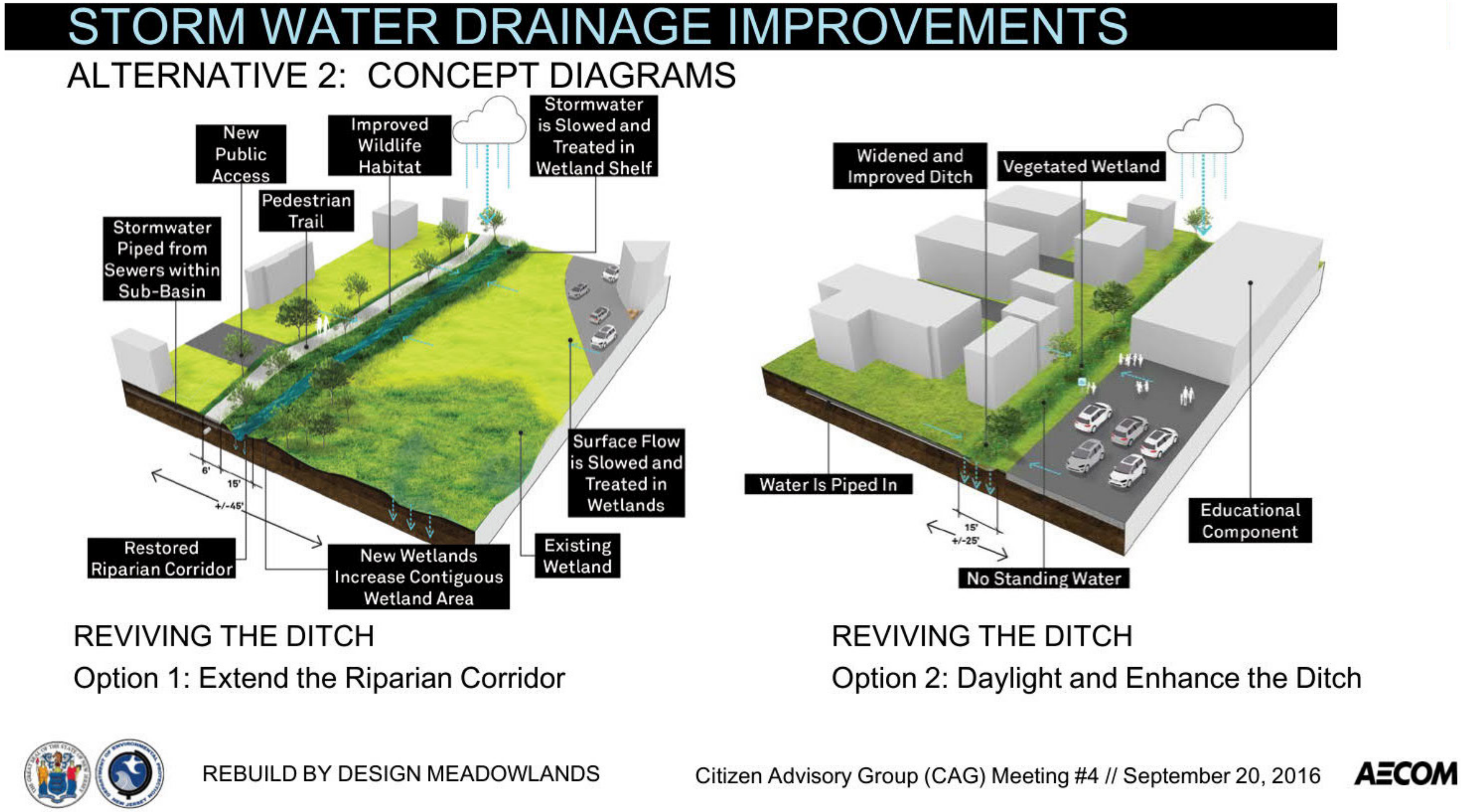


Figure 3-6: *Storm Water Drainage Improvement Concepts*[6]

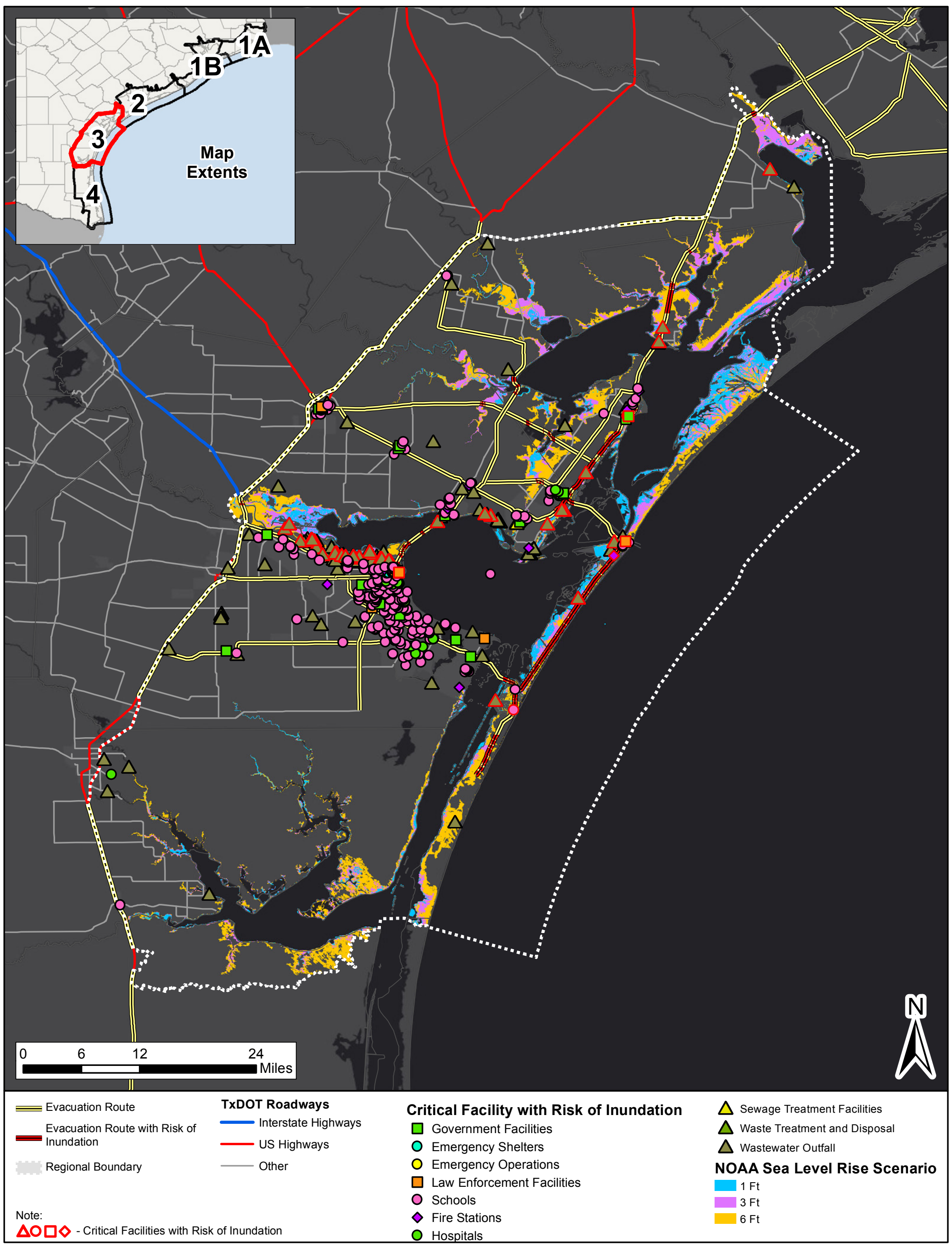
[6]*State of New Jersey Department of Environmental Protection (NJDEP). September 20, 2016. "Rebuild by Design Meadowlands: Citizen Advisory Group (CAG) Meeting #4, Concept Component Development" Bureau of Flood Resilience. Available at: http://www.nj.gov/dep/floodresilience/docs/rbdm-20160920-cag-pres.pdf (accessed Sept 20, 2017)*

3.3. Region 3 Coastal Infrastructure Vulnerabilities

Sea Level Rise

Low elevations along the coastline and rising sea levels place the region's coastal infrastructure at risk. Roadways may become inundated and impassable during high water events, while critical facilities such as schools, fire stations and hospitals are at risk of water damage. Expectations for increasing rates of relative sea level rise caused by regional land subsidence and global sea level rise may continue to increase the number of facilities noted as being at risk. The infrastructure that are at risk now or will become at risk in the future may require structural solutions to mitigate these risks, such as elevating the facilities, and incorporating green solutions when applicable.

The sea level rise inundation scenarios shown were developed by the National Oceanic and Atmospheric Administration (NOAA) and represent sea level rise inundation above mean higher high water.



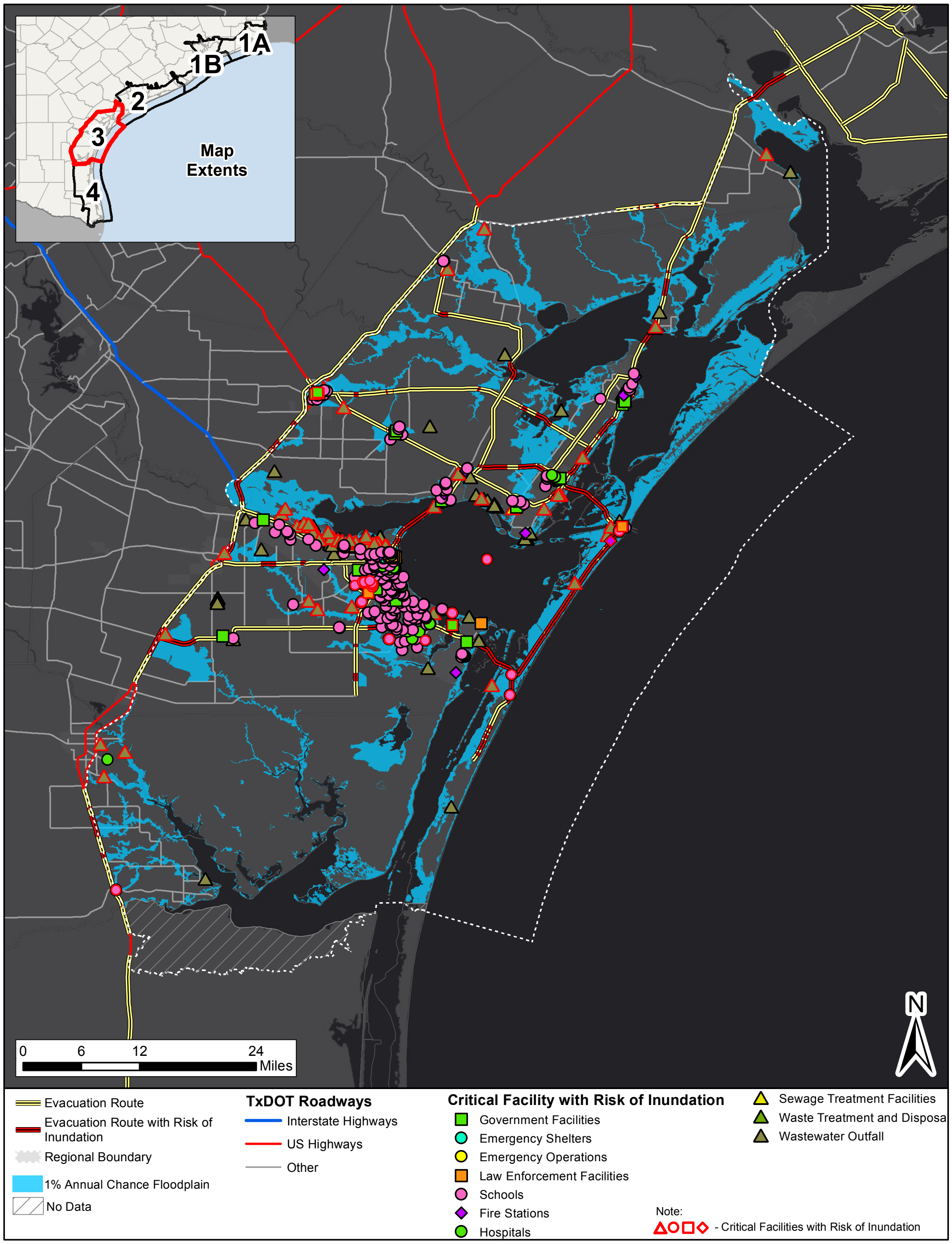
Critical Facilities at Risk of Inundation

- **7** Government Facilities
- **2** Law Enforcement Facilities
- **2** Schools
- **2** Fire Stations
- **40** Wastewater Outfalls
- **40.1** Miles of Evacuation Routes

Coastal Flood Hazard

Current floodplain maps indicate the coastal and inland areas at risk of flooding due to storm surge and rainfall events.

The flood inundation extents shown on the maps provided are the 1 percent annual chance flood hazard areas developed by the Federal Emergency Management Agency for the Flood Insurance Rate Maps (FIRMs) in Aransas County (data effective as of 2016), Kenedy County (no data), Kleberg County (data effective as of 2014), Nueces County (data preliminary as of 2015), Refugio County (data effective as of 2014), and San Patricio County (data effective as of 2016).



Critical Facilities at Risk of Inundation

- **6** Government Facilities
- **2** Law Enforcement Facilities
- **25** Schools
- **2** Fire Stations
- **1** Sewage Treatment Facility
- **64** Wastewater Outfalls
- **95.1** Miles of Evacuation Routes

4. Application of the Framework

The 2017 Plan lays the framework for the major Issues of Concern facing the Texas coast and proposes a set of Resiliency Strategies to mitigate coastal vulnerabilities that are applicable across the Texas Gulf Coast. Within that larger framework, each community along the Texas coast has an individual history and a unique environment that partly explains how the IOCs are experienced by that area of the coast. As such, each community should approach resiliency planning with their specific Pressures, IOCs and recommended Resiliency Strategies in mind.

To facilitate this understanding, the 2019 Plan will present a cohesive account of coastal Pressures by study areas that outline how IOCs would best be addressed by local stakeholders. The study areas used in the planning process will describe how individual projects can be constructed in logical order and how these projects would then function together to create the most effective defense against IOCs.

The 2019 Plan will include specific Actions/Projects to harness the idea of multiple projects operating together to mitigate targeted coastal Pressures and associated Issues of Concern. Each regional study area will be described with a planning diagram to explain how Pressures, Issues of Concern, Resiliency Strategies and Actions/Projects relate to that area.

4.1. How Actions/Projects Are Identified

Tier 1 Projects are the recommended projects from the 2017 Plan that the state and/or local entities can seek to implement in order to begin working towards coastal resiliency. To improve future planning by building upon these initial efforts, the actions proposed in the 2019 Plan will identify which projects work together to address a specific IOC. Actions will also recognize areas with needs identified that lack applicable projects, with the intent of rectifying these project gaps going forward. The proposed actions will be based on TAC feedback, and ongoing modeling and gap analysis results.

Projects that are identified in the Study Areas presented in this workbook include:

- Tier 1 Projects
- Revised Tier 2 Projects[7]
- New Traditional Infrastructure or Ecosystem Restoration Projects[7]
- New Coastal Storm Risk Management Projects (pending completed studies)

> Actions - One or more proposed projects that work to mitigate coastal Issues of Concern or the IOC's underlying Pressures.

The TAC will assess whether the listed actions are appropriate for the region. In addition, the TAC will identify additional opportunities for Actions and projects in each study area.

[7]*The 2017 Plan stated that some projects would be re-evaluated for the 2019 Plan based on changing project conditions and an expanded approach to include infrastructure within the coastal community resilience purview. For this reason, some projects that were previously included as a Tier 2 or Tier 3 project may be re-evaluated for the 2019 Plan. Similar to the 2017 planning process, the TAC will be given the opportunity to evaluate specific projects during future meetings.*

4.2. Enhancements of Actions/Projects

The following approaches can be used to improve the execution of projects and Actions, and will be recommended as Enhancements when possible:

- **Regional Sediment Management** – Is a sediment source identified for large scale or recurring needs?
- **Beneficial Use of Dredged Material (BUDM)** – Is the Action/Project a candidate to provide BUDM to a nearby location?
- **Adaptive Management*** – Is the Action/Project a candidate for post-project monitoring and feedback to improve long term success?
- **Green Infrastructure*** – Can the Action/Project combine nature-based components with traditional infrastructure concepts?

**New to 2019 planning process.*

4.3. The Big Picture: How Other Agencies' and Entities' Work Ties In to the Plan

The 2019 Plan will present a big picture look at coastal resiliency by cataloging and showing ongoing actions from other agencies, and also public and private enterprises. At this point in the 2019 Plan development, the GLO will show currently funded projects in each study area from the following project sources for the purposes of documenting how these funded projects could fit in with the 2019 proposed actions and projects:

- National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund
- Natural Resource Damage Assessment (NRDA)
- Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act

4.4. Gap Analysis

After the completion of the 2017 Plan, a Gap Analysis was conducted to identify potential gaps in the coastal resiliency planning effort in addressing past and future coastal hazards. To accomplish this analysis, two Drivers of coastal change were assessed: 1) Past and future land-cover change due to sea level rise and coastal erosion; and 2) Storm surge inundation vulnerability both at present water levels and with 1 meter of sea level rise.

To address an area's susceptibility to land loss, historic and modeled future land-cover datasets were analyzed to identify areas of potential vulnerability. "Land loss" here is defined as land that was originally wetland or dry land that converted to open water. The 1956 National Wetlands Inventory (NWI) was compared to the 1999 NWI output to quantify historic land lost. To identify areas vulnerable to future sea level rise, Sea Level Affecting Marshes Model (SLAMM) output from the year 2100 was compared to 2001 inputs (inputs and outputs generated by the Gulf Coast Prairie Land Conservation Cooperative). The potential amount of land inundated by storm surge was determined using NOAA's output of Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model for a category 2 hurricane.

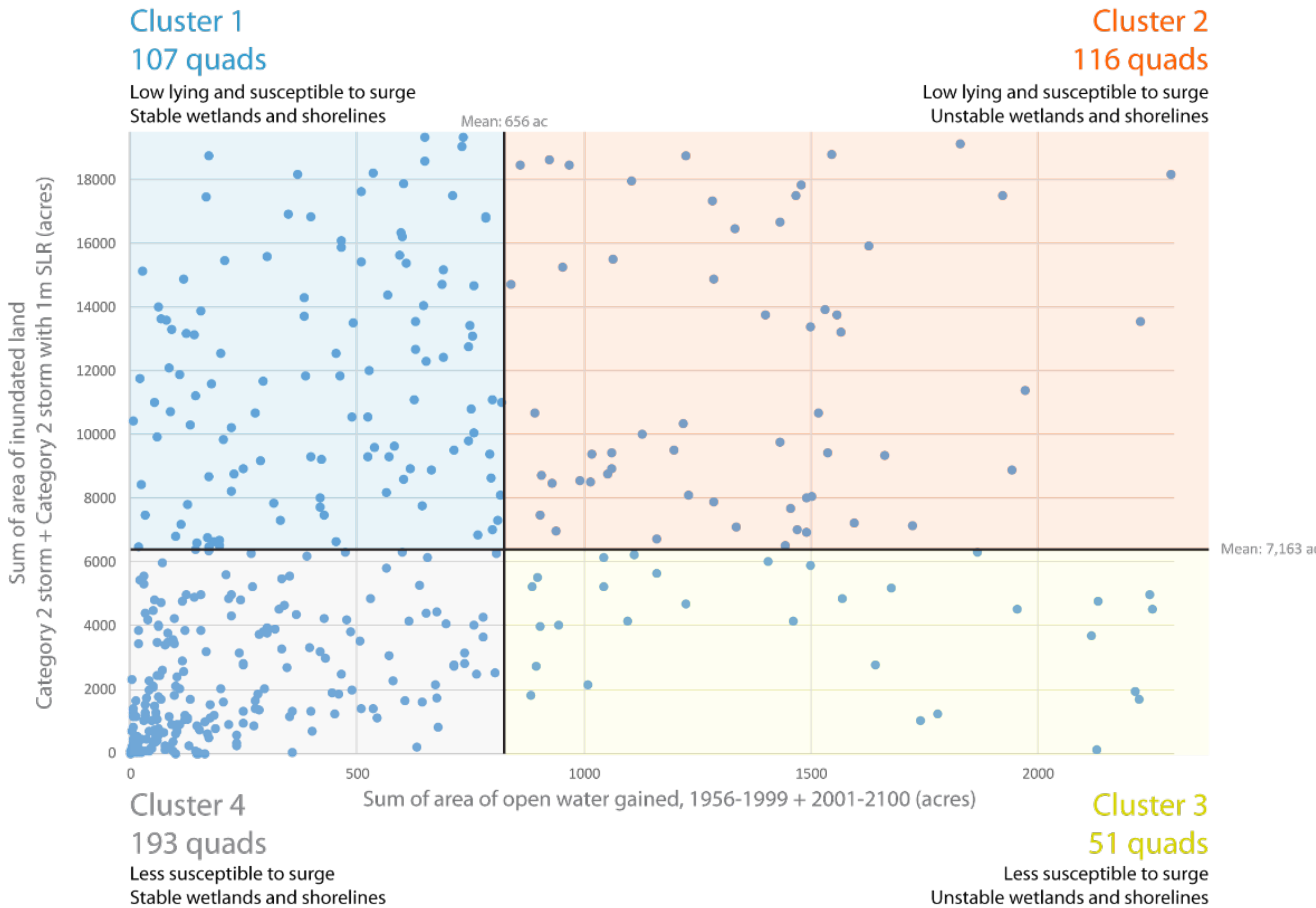


Figure 4-1: *Relative Vulnerability of Quarter Quads to Storm Surge and Land Loss*

The areas of land analyzed correspond to U.S. Geological Survey (USGS) 3.75-minute quarter quadrangle (quarter quad) maps. The quarter quads were ranked in classes from one to four to show their relative vulnerability to storm surge and land loss. If a quarter quad's area of inundated land is above the mean for all quads (mean = 7,163 acres), but the amount of land lost to open water falls below the mean for all quads (mean = 656 acres), it was classified in Cluster 1 ("above average susceptibility to surge, less to land loss"), meaning that area is low-lying and susceptible to storm surge but that the wetlands and shoreline are stable. If both acreages are above the mean, it is classified in Cluster 2 ("above average susceptibility to surge and land loss"), meaning that the area is vulnerable to storm surge and the wetlands and shorelines there are unstable. If the quad is less susceptible to surge but has unstable wetlands and shorelines, it is in Cluster 3 ("above average susceptibility to land loss, less to surge"). Lastly, if the quad is both less vulnerable to surge and has stable wetlands and shorelines, it is in Cluster 4 ("below average susceptibility to surge and land loss"). The results of the cluster analysis are shown in Figure 4-1 and spatially in Figure 4-2. The results are shown by study area in Section 5.

Gap Analysis Results for the Four Coastal Regions

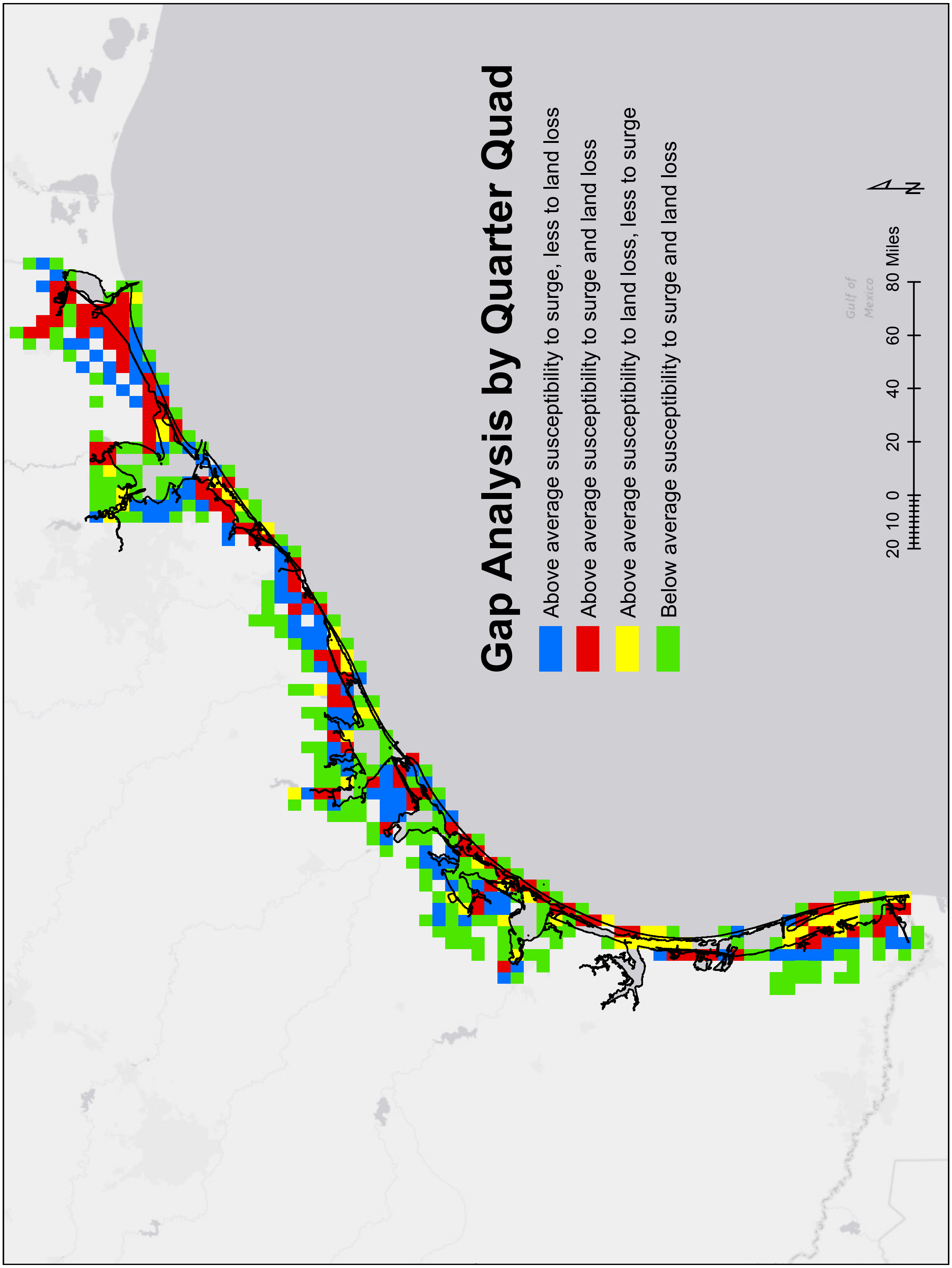


Figure 4-2: *Relative Vulnerability of Quarter Quads to Storm Surge and Land Loss to Open Water by Region*

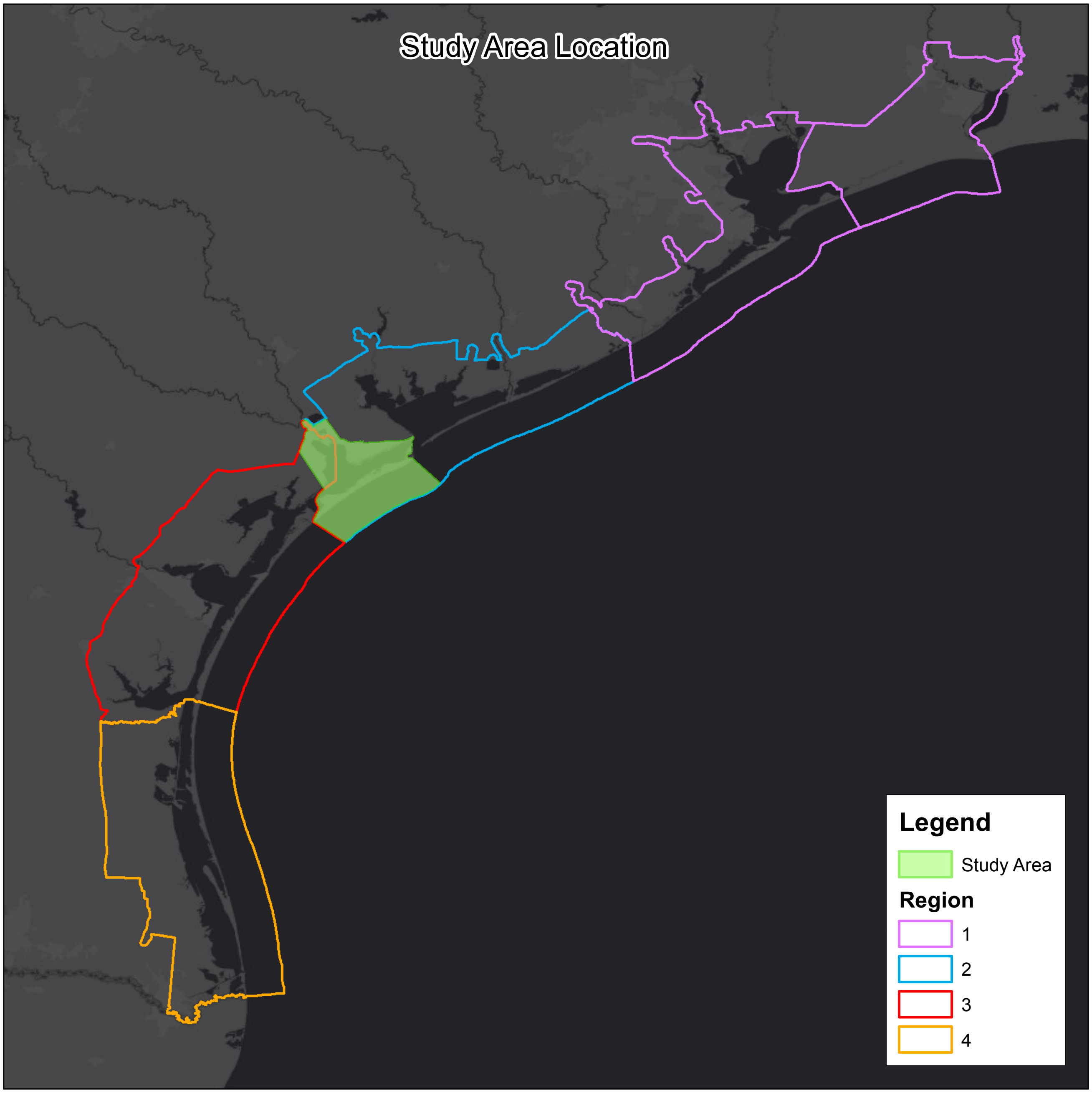
The data used to generate the areas of potential vulnerability are shown in Table 4-1.

Table 4-1: Gap Analysis Component and Source Data

Areas of Analysis	United States Geological Survey (USGS) 3.75-min quarter quad maps	Acreage of past and future change in open water was summed per USGS quarter quad to represent total change in open water. Acreage of inundated land was calculated per USGS quarter quad for both category 2 and category 2 plus 1-meter of SLR storm scenarios.
Past and Future Change in Open Water (Wetland Loss)	Historical National Wetlands Inventory (NWI)	Open water features from historic NWI for years 1956 and 1999 were extracted for SLAMM classes 15 through 19. Area (in acres) of open water features in both time periods was calculated per USGS quarter quad and the difference in area was used to represent past change in open water.
	Sea Level Affecting Marshes Model (SLAMM)	Version 6.5, scenario years 2001 and 2100, 1-meter of sea level rise (SLR). Classes 15 through 19 represent open water. Area (in acres) of open water features in both time periods was calculated per USGS quarter quad and the difference in area was used to represent future change in open water.
Storm Surge Inundation	Sea, Lake, and Overland Surges from Hurricanes (SLOSH)	Category 2 storm inundation layers were produced from SLOSH water surface elevation output generated by NOAA's National Hurricane Center for four basins: Galveston Bay, Matagorda Bay, Corpus Christi Bay, and the lower Laguna Madre for Category 2 and Category 2 plus 1-meter of SLR. The Maximum of the Maximum Envelopes of Water (MOMs) were used to provide a snapshot of the worst case high water scenario.
	National Elevation Dataset (NED)	The land elevation was subtracted from the maximum water surface to determine areas that would be inundated from a worst case scenario Category 2 storm surge in each basin at a 1 arc-second resolution.
	Shuttle Radar Topography Mission (SRTM)	A land-water delineation layer was developed using the Shuttle Radar Topography Mission (SRTM) elevation dataset to classify results as either open water or inundation.

4.5. Modeling (Future Conditions)

In addition to the gap analysis process described above, the 2019 Plan will begin to use and incorporate new modeling data (e.g., SLAMM, ADCIRC, HAZUS, RECONS) and modeling results from other applicable studies related to coastal planning (e.g., USACE Coastal Texas Study) to better inform decision making. The primary intent of the new modeling will be to target viable locations that ensure longevity of future projects with respect to relative sea level rise and to determine how ecological projects respond to storm surge impacts. This will be accomplished by modeling and comparing future conditions along the Texas coast with and without the proposed projects within the Plan.


Study Area Location
Legend
Study Area
Region
1
2
3
4

5. Region 3 Study Areas

5.1. San Antonio Bay

San Antonio Bay Vulnerabilities & Opportunities

1. The San Antonio Bay bird rookery islands have significantly declined due to erosion. This has led to a decline in many species of birds, such as herons, egrets, black skimmers and brown pelicans. In general, these islands should be restored and protected to benefit the area's overall ecological resiliency. Audubon Texas published a study in fall 2016 that can help inform prioritization of projects. Opportunities may exist for the beneficial use of dredged materials to restore these islands.

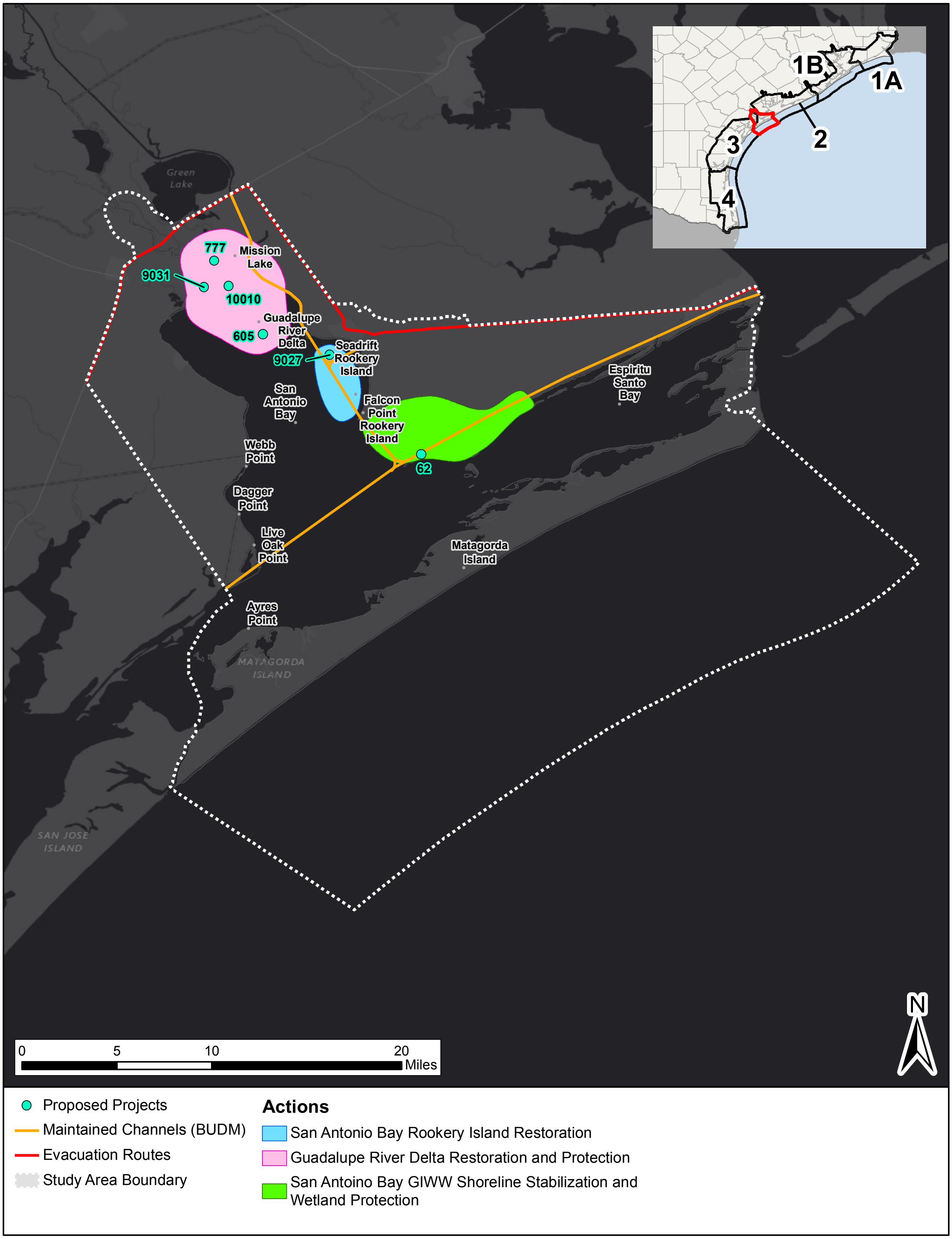
2. Also contributing to the degradation of habitats in San Antonio Bay is the inadequate quantities of freshwater inflows, which is increasing the salinity in the bay. A pressing concern for San Antonio Bay is the Guadalupe River Delta. The majority of the Guadalupe River flows are being diverted through Traylor Cut into Mission Lake, as opposed to flowing to the river delta. Restoring the nutrient transport in this delta, potentially by returning the hydrology at Traylor Cut to its historical flow route and conditions, is expected to improve the habitat in this area, as well. It is critical to understand these changing dynamics and to adapt to these future conditions. This requires adaptive management of the delta and bays.

3. Sea level rise and the proximity of the GIWW are expected to significantly impact the wetlands in Espiritu Santo Bay in the future. Living shorelines in this area should be designed with future conditions in mind. This presents an opportunity for a program including monitoring and adaptive management to prevent continued degradation in the future. Additional opportunities include coordination with local entities to beneficially use dredged materials.

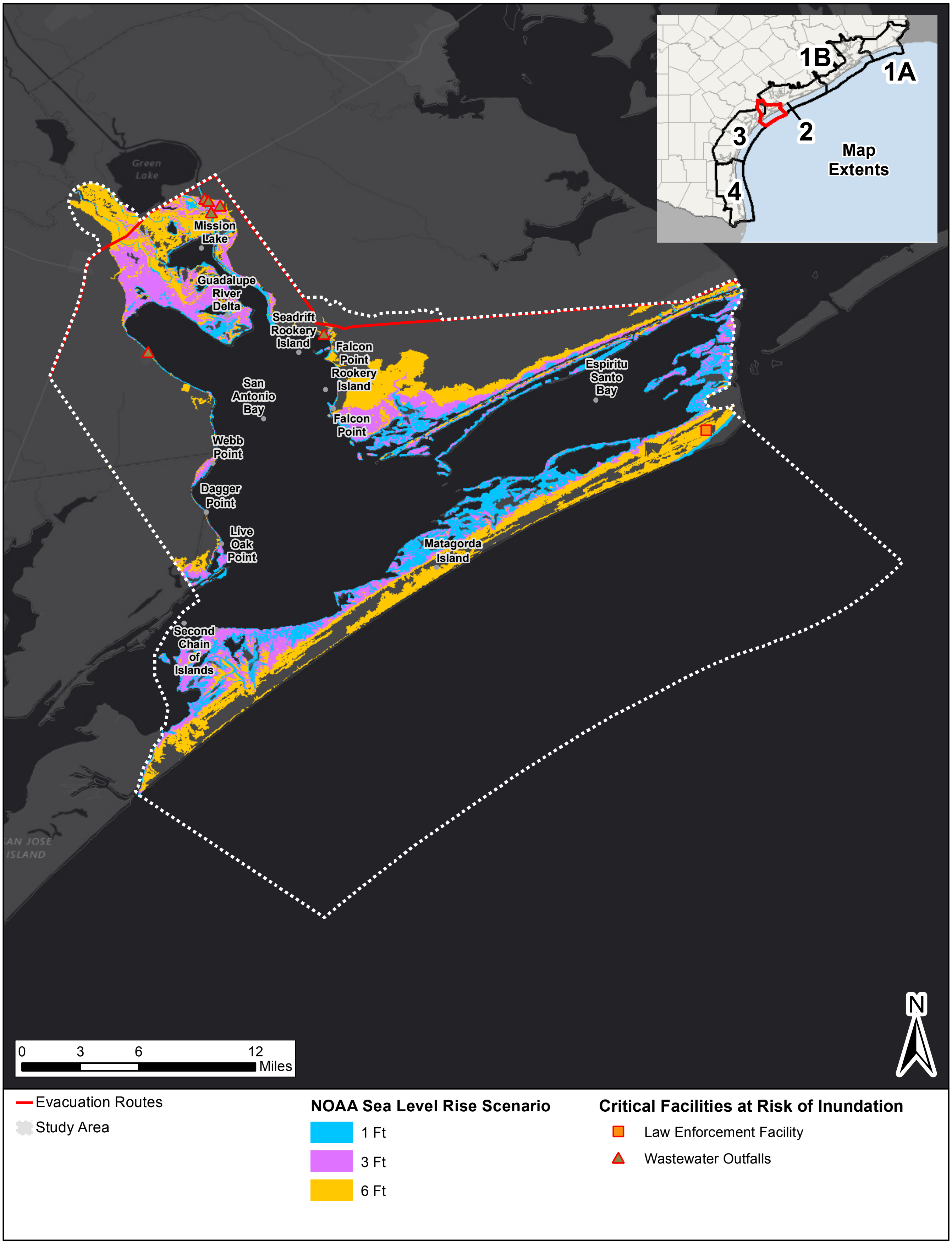
San Antonio Bay Proposed Actions and Projects

Actions	ID	Projects	Status and Funding Notes
San Antonio Bay Rookery Island Restoration	9027	San Antonio Bay Rookery Island Restoration	Audubon Texas published a study in Fall 2016 that can help inform prioritization of projects.
Guadalupe River Delta Restoration and Protection	605	Guadalupe River Delta Estuary Restoration	
	777	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	Identify targeted acquisitions.
	10010	San Antonio Bay Hydrologic Restoration Monitoring and Adaptive Management	
	9031	Traylor Cut Channel Restoration and Reroute	
San Antonio Bay GIWW Shoreline Stabilization and Wetland Protection	62	Welder Flats Wildlife Management Area Living Shoreline	

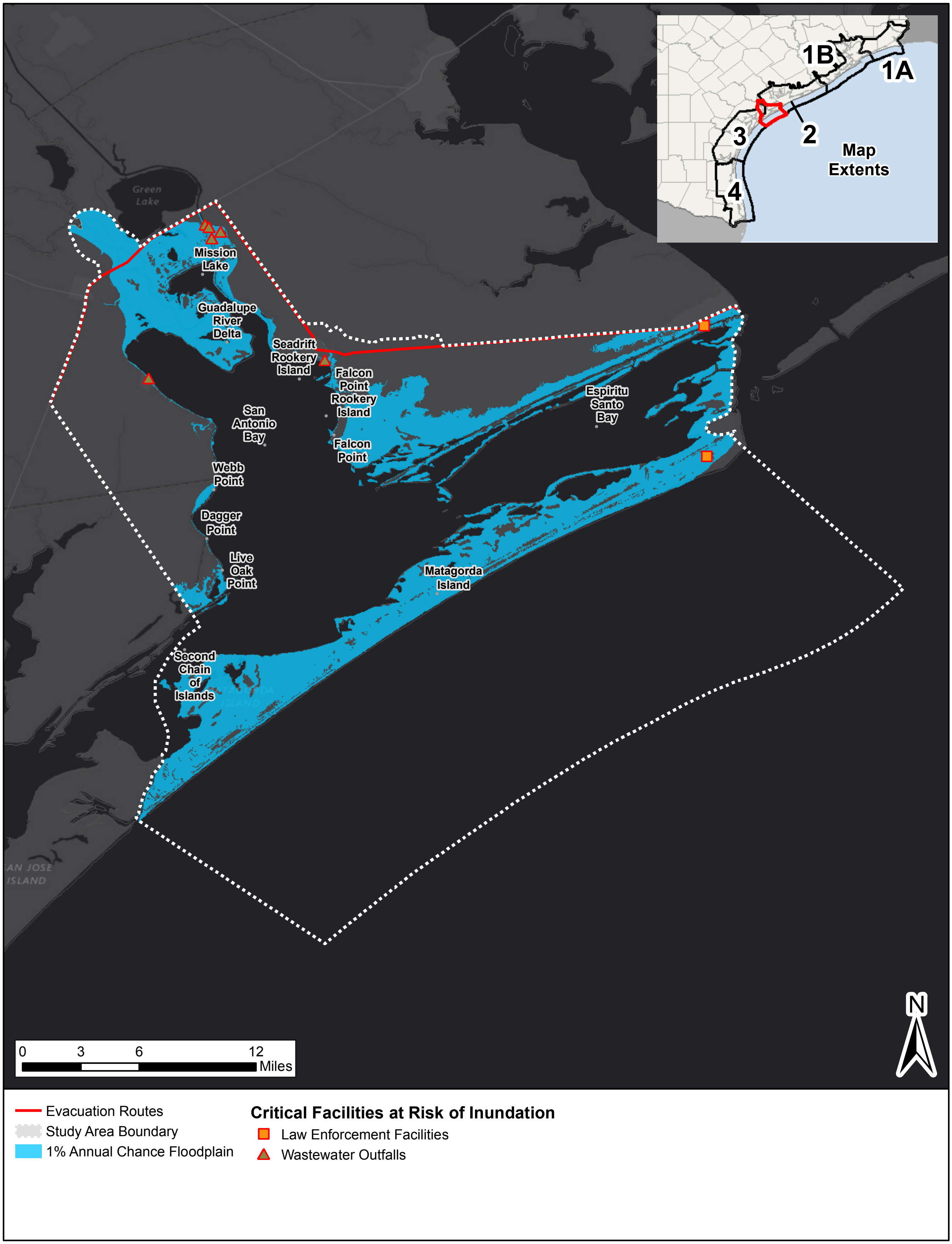
San Antonio Bay Proposed Actions and Projects



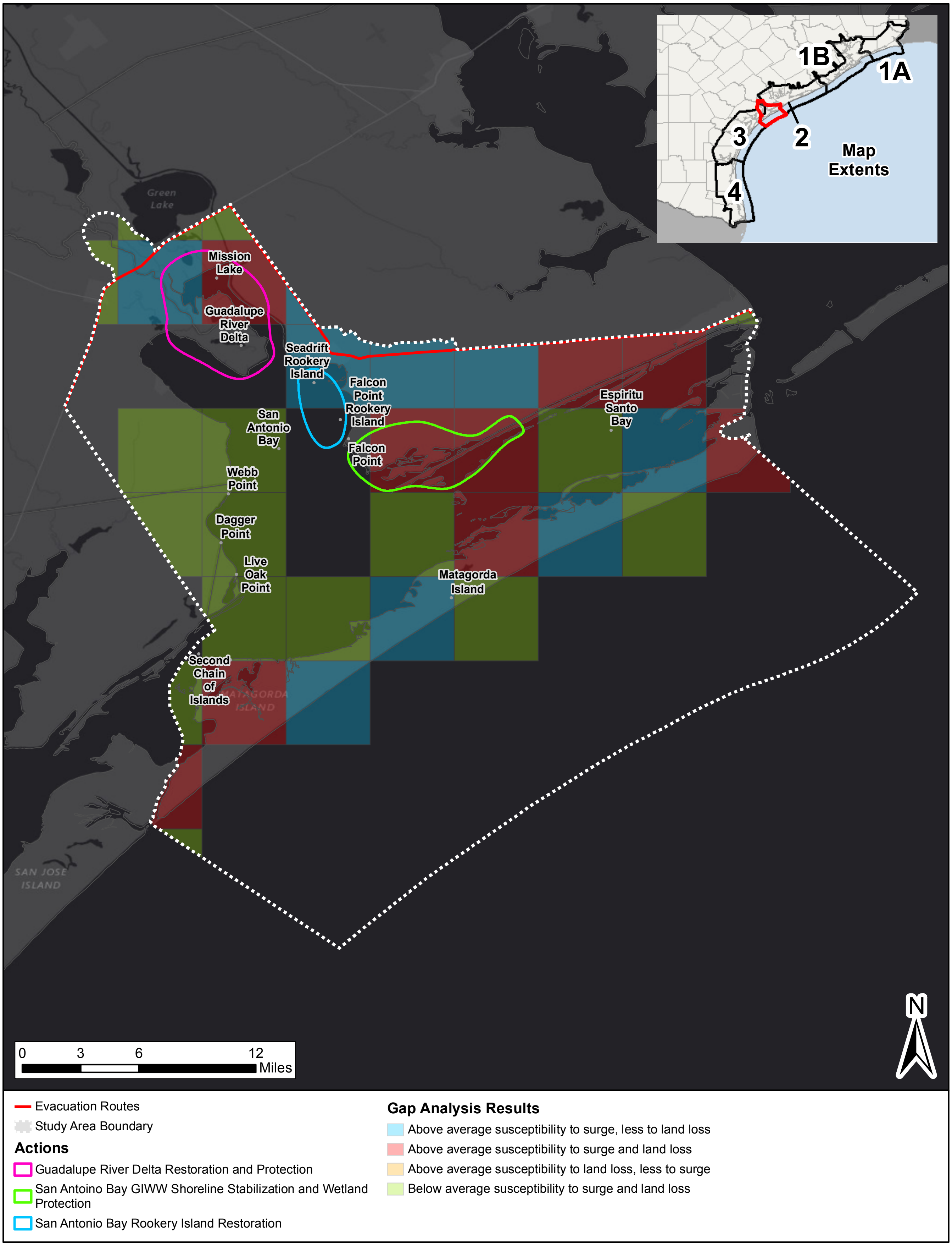
San Antonio Bay Vulnerabilities



San Antonio Bay 1% Annual Chance Floodplain



San Antonio Bay Gap Analysis Results and Actions



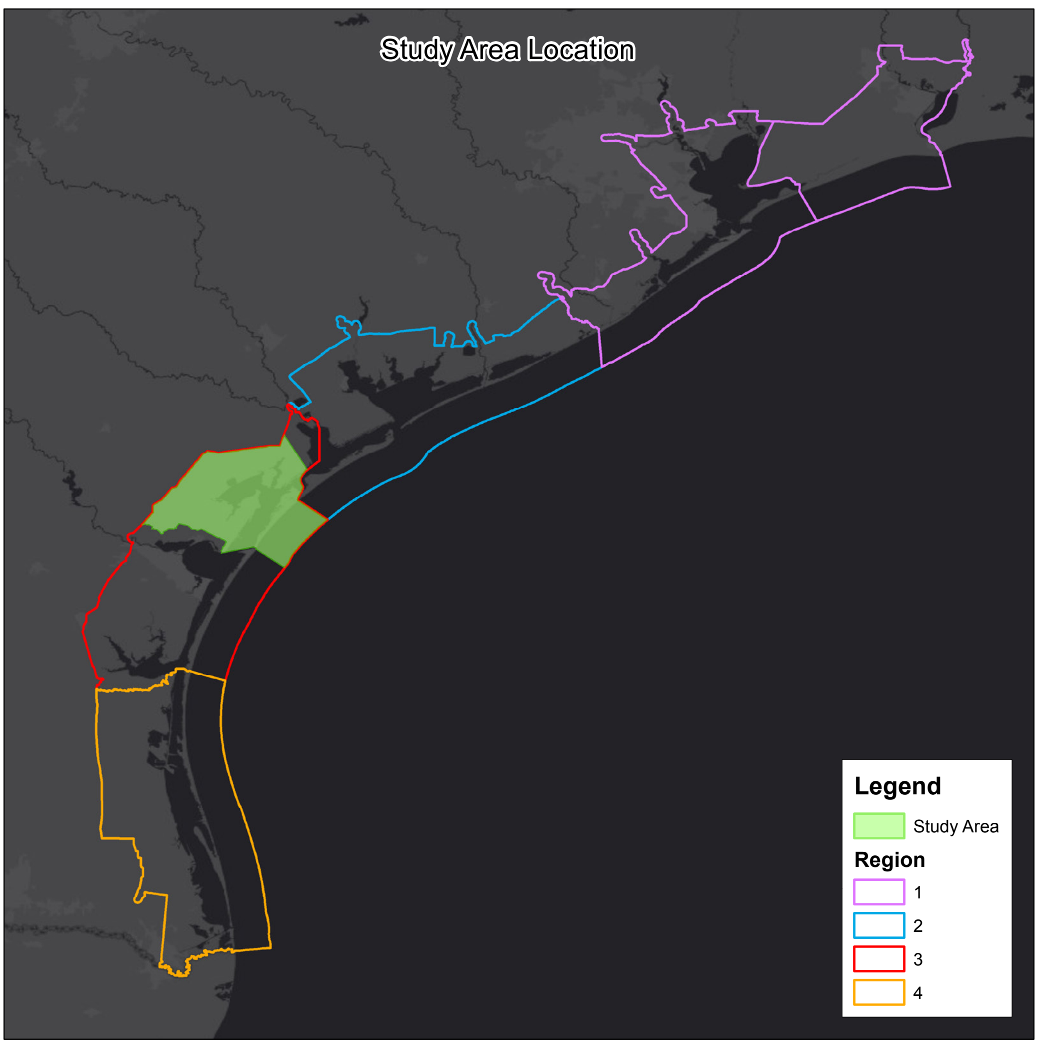
5.2. Aransas Bay and Copano Bay

Aransas Bay and Copano Bay Vulnerabilities & Opportunities

1. While large-scale restoration projects are vital to ensure the long-term resiliency of the Texas coast, smaller focused projects must also continue to address key areas and critical habitat. Aransas Bay and Copano Bay suffer from areas of accelerated shoreline erosion and coastal habitat loss that can be addressed through varying techniques of living shorelines and land conservation. Working with the natural systems to stabilize and adapt to future conditions will be critical to allow for our coastal ecology to exist alongside future development in the region.

2. The rookery islands in Aransas Bay are vital environmental habitats to support migratory bird populations along the Texas coastline. These habitats face vulnerabilities both in the present and the future, including erosion (both natural and anthropogenic) and relative sea level rise. Opportunities exist to beneficially use dredged materials to restore these islands.

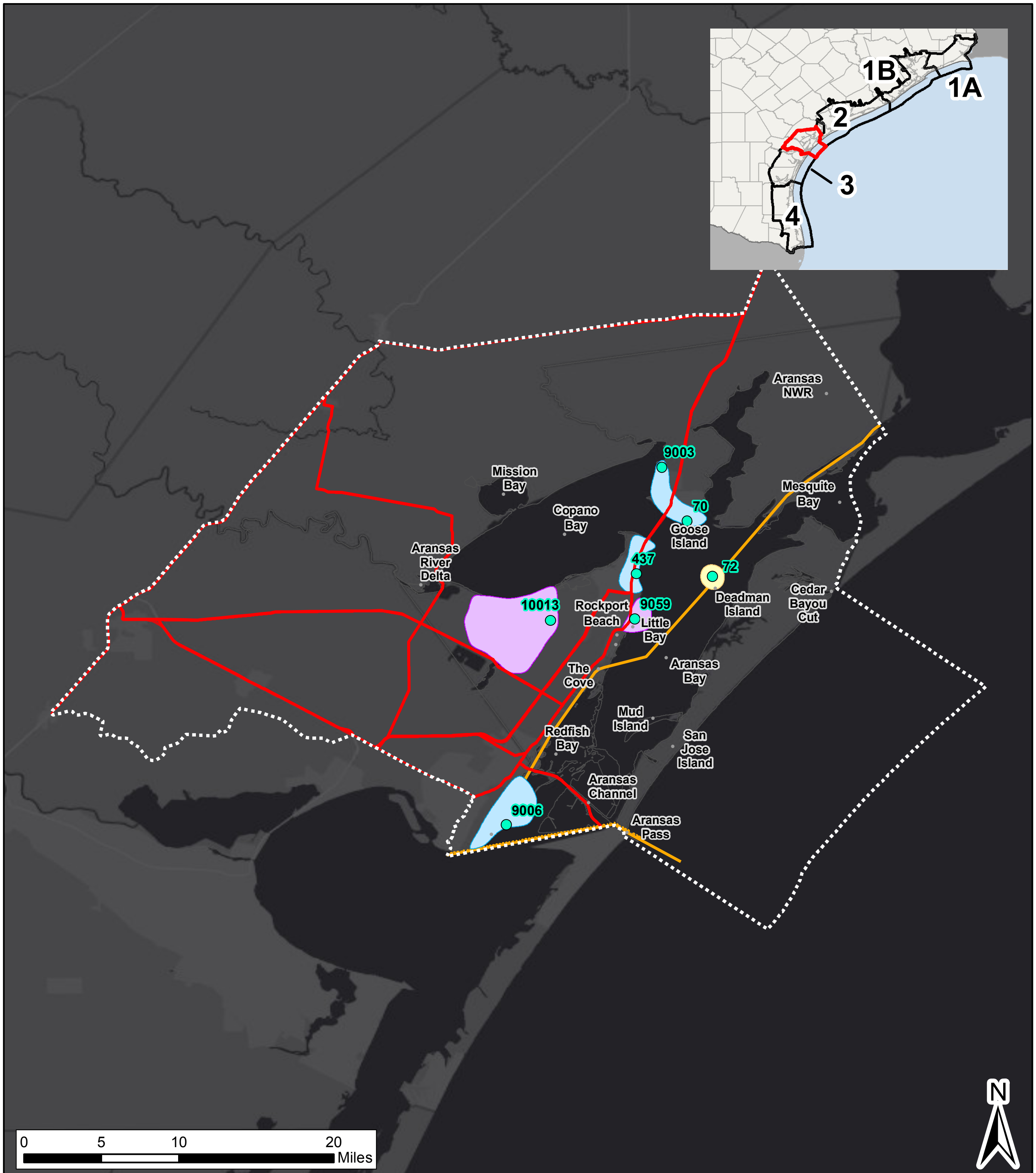
3. The study area is vulnerable to flood damage, and in particular, damage caused by back-bay flooding during storm events. Improving and enhancing wetlands in Copano Bay and Port Bay will help reduce risk of flood events during storms by building buffer areas to detain water. Responsible development practices for the communities can greatly reduce future risk. Opportunities exist for incremental improvements in the short term with an understanding of the ultimate goals, allowing a series of projects to work together to reduce this risk progressively.



Aransas Bay and Copano Bay Proposed Actions and Projects

Resiliency Category	ID	Projects	Status and Funding Notes
Aransas Bay and Copano Bay Living Shorelines and Wetland Protection	70	Goose Island State Park Habitat Restoration and Protection	Permitted.
	437	Fulton Beach Road Protection	Permitted.
	9006	Dagger Island Shoreline Protection	$3.82 million awarded by NFWF in November 2016.
	9003	Shell Point Ranch Wetlands Protection	
Aransas Bay Rookery Island Restoration	72	Long Reef Shoreline Stabilization and Habitat Protection	Audubon Texas published a study in Fall 2016 that can help inform prioritization of projects.
Responsible Development in Aransas and Vicinity	9059	Little Bay Restoration Initiative	
	10013	Mitigate Bay Side Flooding from Port Bay and Copano Bay Using Wetland Restoration or Other Solutions	

Aransas Bay and Copano Bay Proposed Actions and Projects

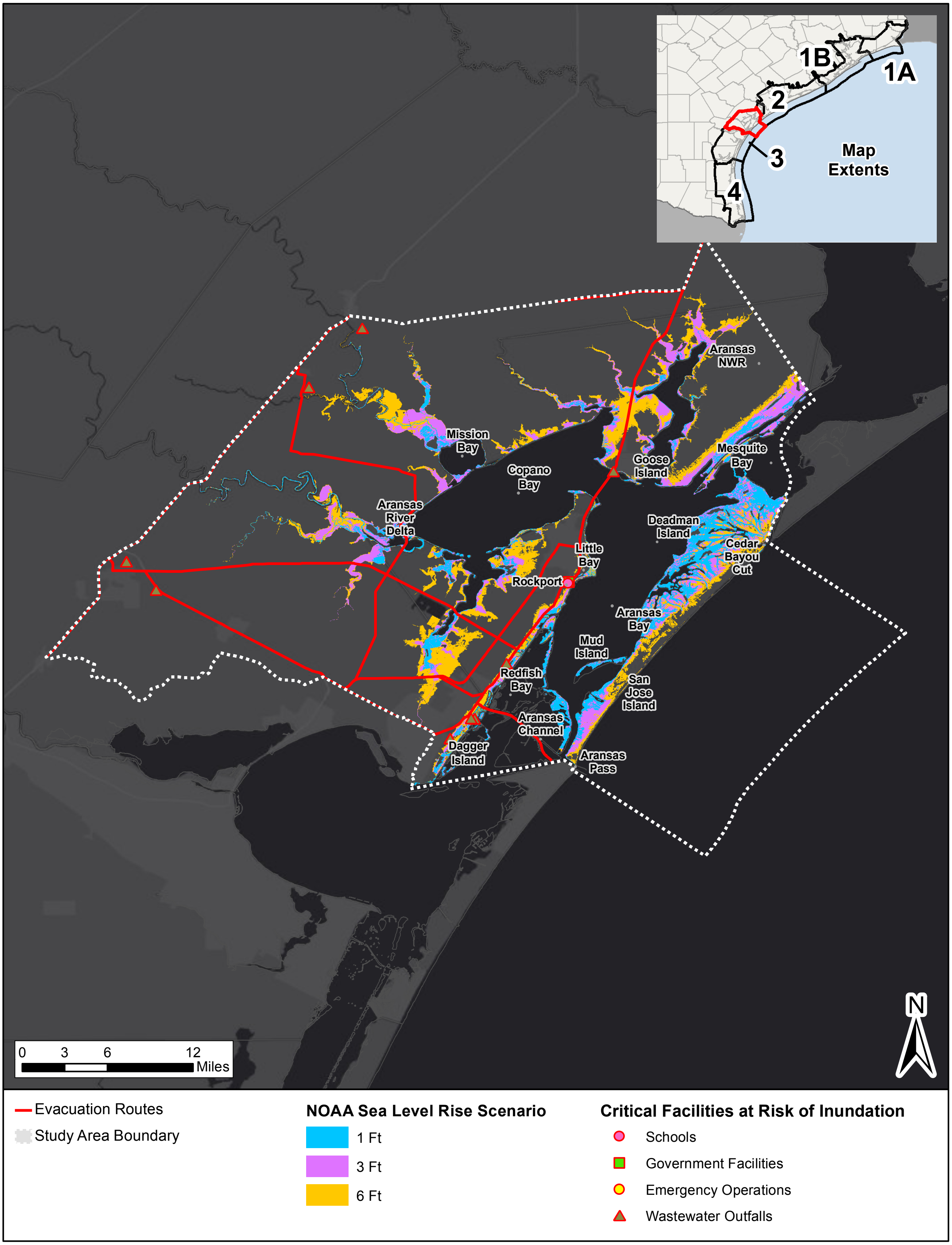


- Proposed Projects
- Maintained Channels (BUDM)
- Evacuation Routes
- Study Area Boundary

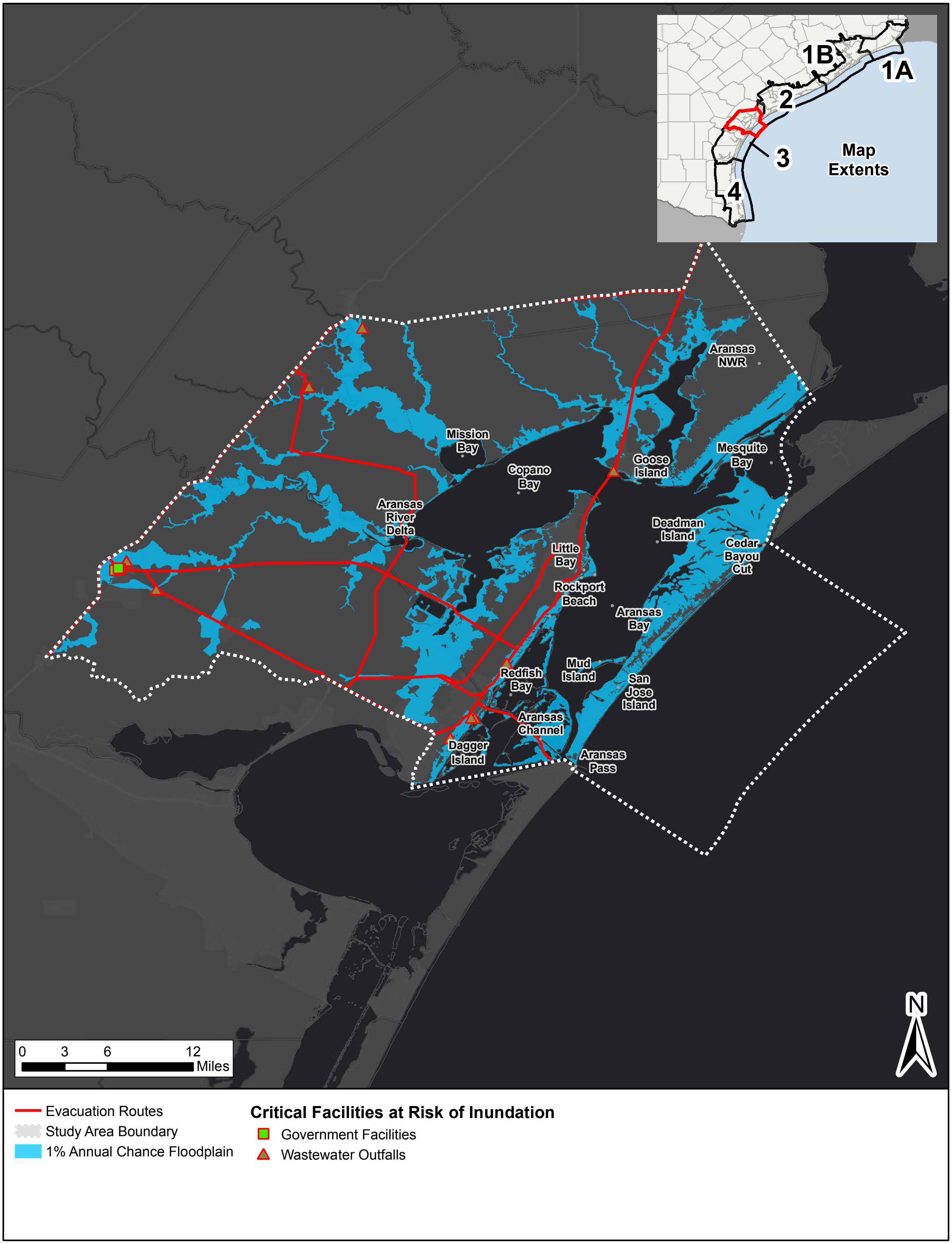
Actions

- Aransas Bay and Copano Bay Living Shorelines and Wetland Protection
- Aransas Bay Rookery Island Restoration
- Responsible Development in Aransas and Vicinity

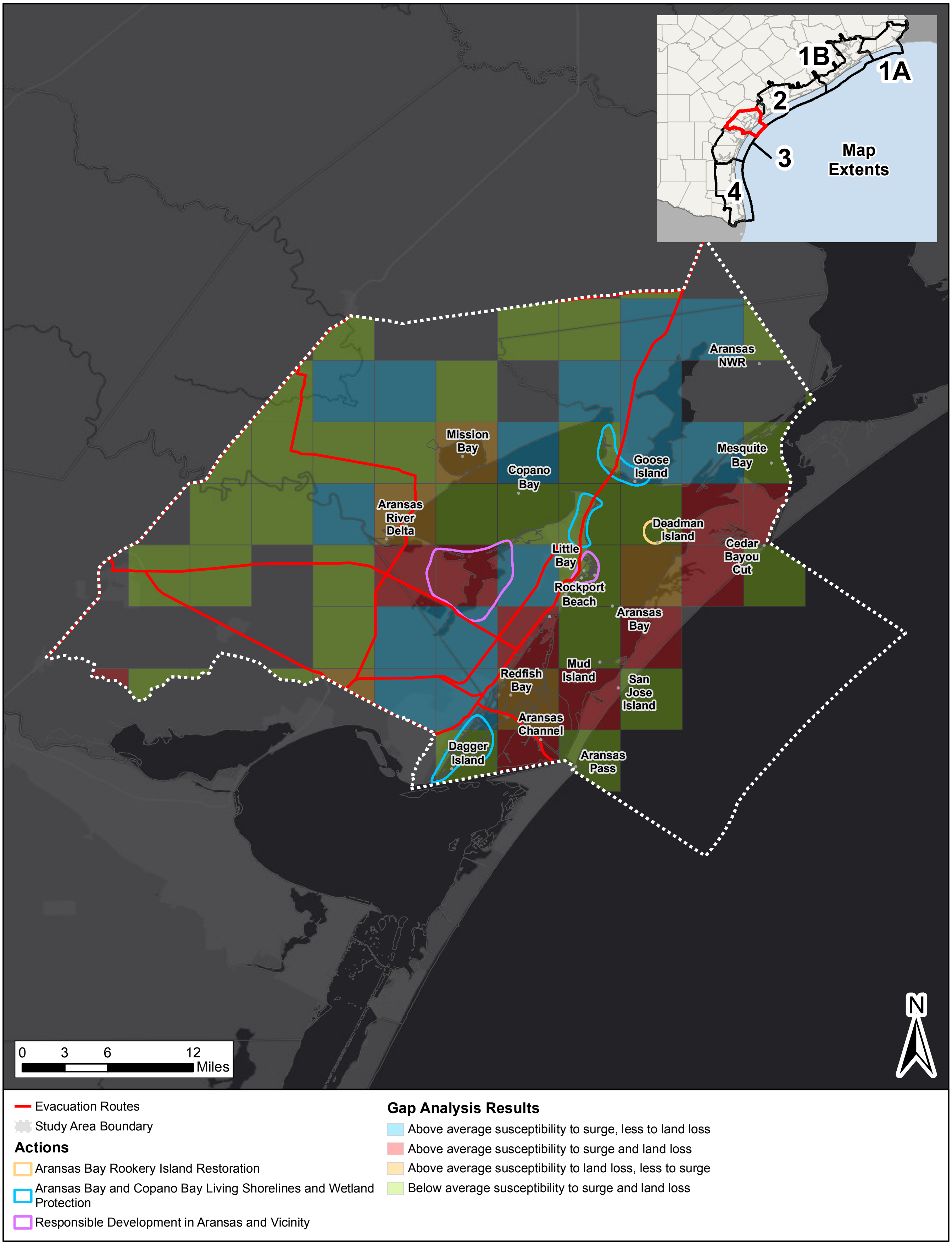
Aransas Bay and Copano Bay Vulnerabilities



Aransas Bay and Copano Bay 1% Annual Chance Floodplain



Aransas Bay and Copano Bay Gap Analysis Results and Actions



5.3. Corpus Christi Bay

Corpus Christi Bay Vulnerabilities & Opportunities

1. Freshwater inflows are vital to the bay network and are under stress due to higher variability of flows because of increasing human demand and volatility in weather patterns. Additionally, relative sea level rise threatens to drown the delta system of the Nueces River, particularly if future development limits room for habitat migration and prevents sediment movement to the delta. It is critical to understand these changing dynamics and future conditions, which requires adaptive management of the delta and bays. Tracking of the delta's health and oyster reefs in the bays are key indicators to freshwater inflow, water quality and relative sea level rise. Monitoring of these indicators allows for mitigating projects to be implemented as dictated by the conditions in a timely and proactive manner, increasing restoration efficiency and limiting future damages.

2. While large-scale restoration projects are vital to ensure the long-term resiliency of the Texas coast, smaller focused projects must also continue to address key areas and critical habitat. Corpus Christi Bay and Nueces Bay suffer from areas of accelerated shoreline erosion and coastal habitat loss that can be addressed through varying techniques of living shorelines. Working with the natural systems to stabilize and adapt to future conditions will be critical to allow for our coastal ecology to exist alongside developments in the region.

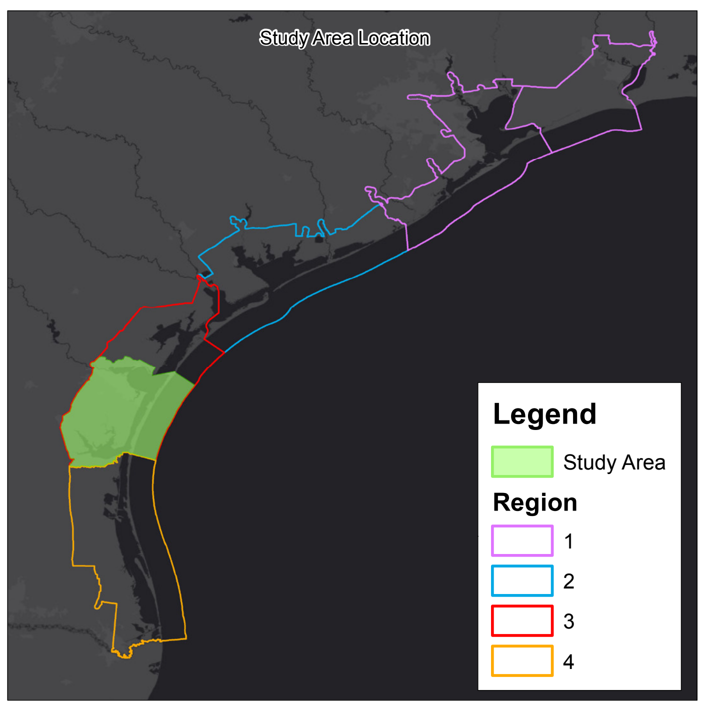
3. The Port of Corpus Christi recently elected to provide $32.2 million in advance funding to pay for beginning work on the Corpus Christi Ship Channel improvements. This project has the potential to result not only in changes with the use of the ship channel and development surrounding the ship channel, but also in Corpus Christi Bay itself. The expansion of the channel has the potential to serve as a significant sediment source for surrounding areas and projects that need clays, silts or sands for construction. This will provide opportunities for beneficial use of dredged materials in quantities not typically available from maintenance dredging alone.

4. Mustang Island serves as the first line of defense for Corpus Christi Bay against storm surge from tropical storms and hurricanes. Opportunities exist to conserve additional land on the island to preclude future development, and mitigate storm surge damages to the region in the long-term. The wetlands on the bay side of Mustang Island, which serve important purposes for fish and wildlife resiliency in the bay, are experiencing degradation and should be restored to allow future adaptation and response to sea level rise.

5. There are proposed improvements for the hurricane flood protection system in Corpus Christi, related to improving and certifying the city levees. This is an important step for protecting the residents of the city and commercial developments now and in the future.

6. The area has seen substantial population growth and anticipates that to continue, particularly with the expansion of the ship channel, creating the vulnerability of adding public areas susceptible to storm damage, flooding and erosion. Responsible development practices for the communities can greatly reduce this added future risk. Presently, roadway improvements can be made to improve evacuation and drainage in the event of hurricanes and other storms. Improvements are needed for industrial infrastructure that has the potential to directly impact drinking water quality and endanger public health.

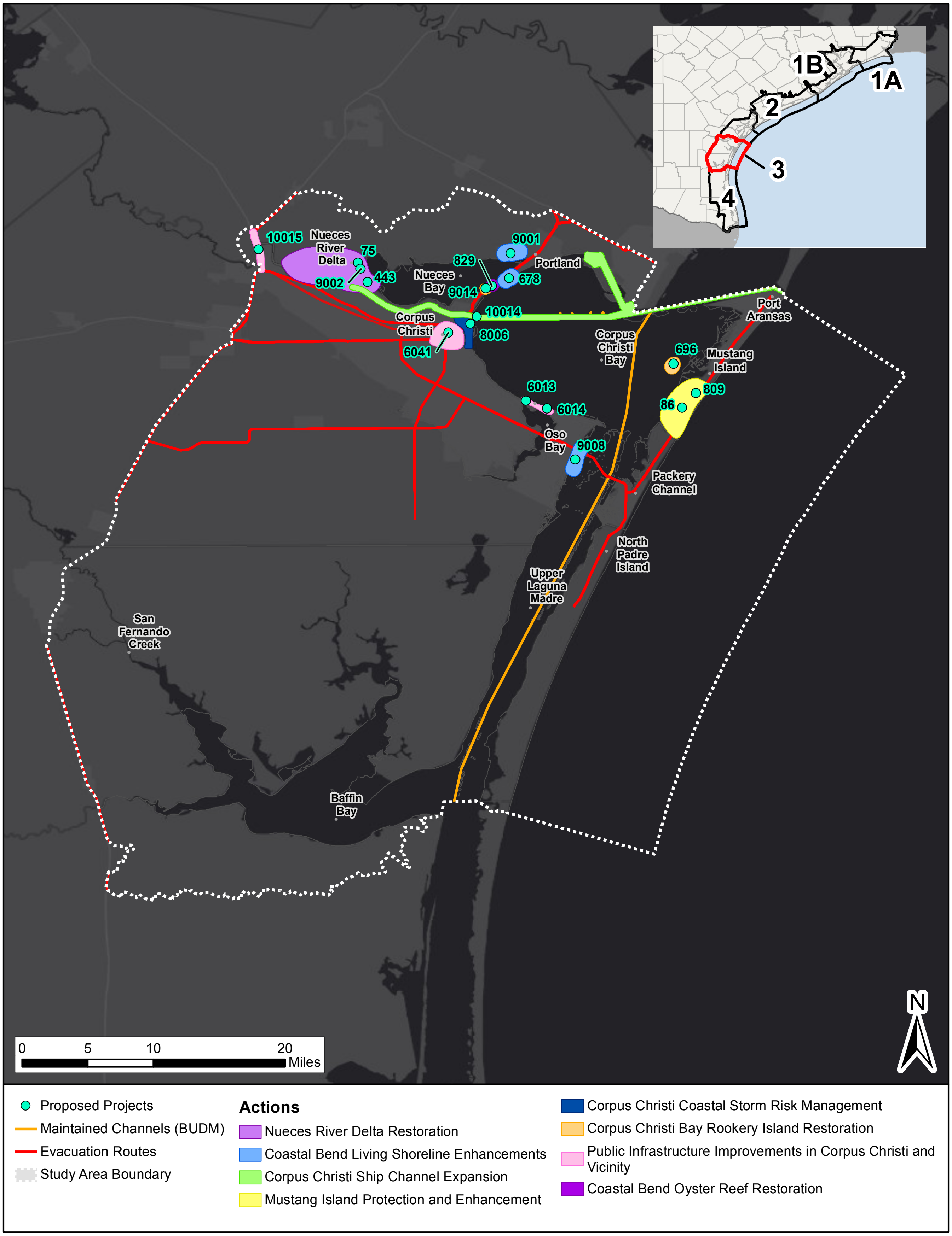
7. The Coastal Bend area includes a significant portion of the network of rookery islands along the Texas coast. These island habitats face vulnerabilities both in the present and the future, including erosion (both natural and anthropogenic) and relative sea level rise. The oyster habitats in this region are similarly vulnerable to water quality and quantity changes impacting the Nueces River Delta.



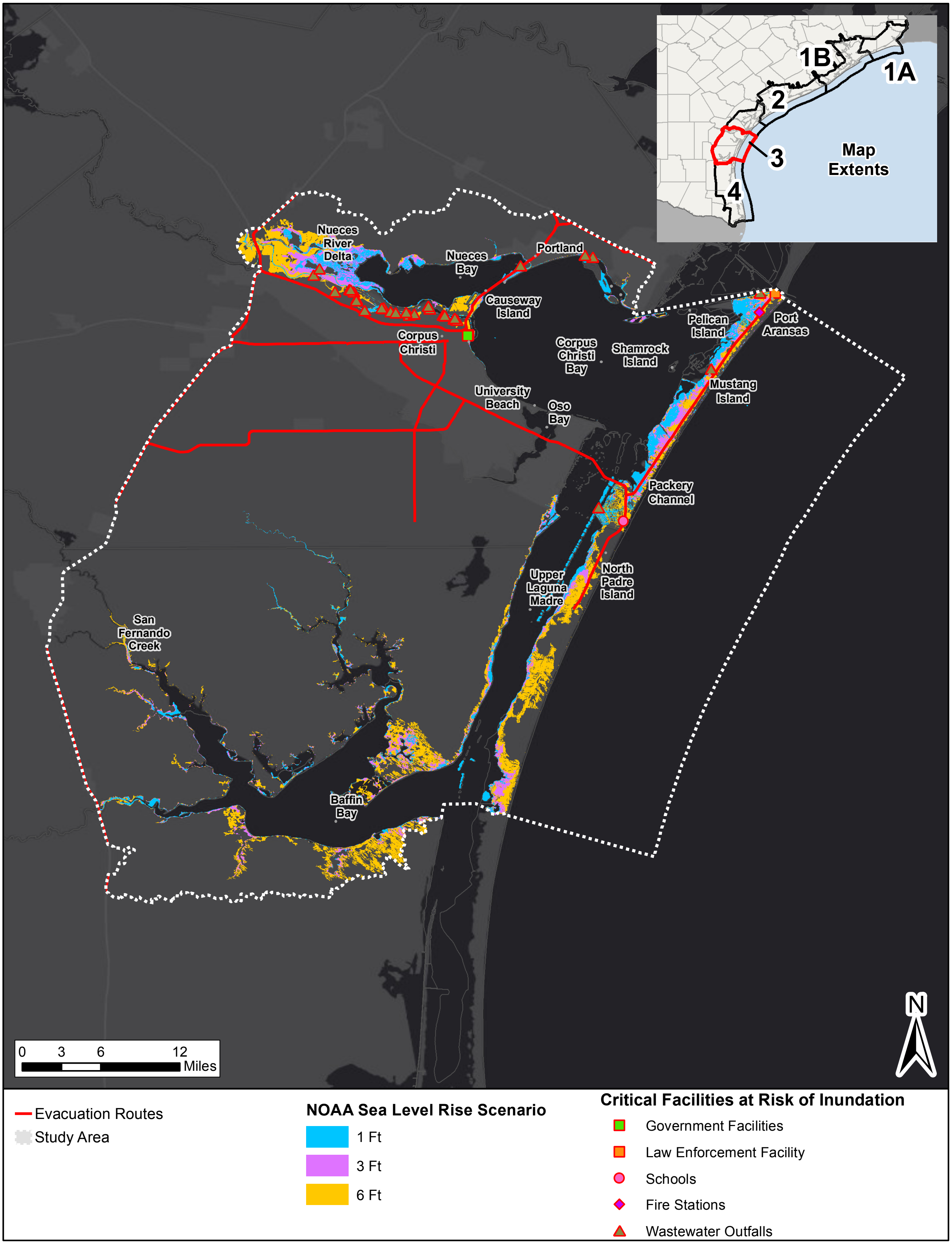
Corpus Christi Bay Proposed Actions and Projects

Resiliency Category	ID	Projects	Status and Funding Notes
Nueces River Delta Restoration	443	Nueces County Hydrologic Restoration Study	
	9002	Lower Nueces River Freshwater Inflows	
	75	Nueces River Delta Shoreline Stabilization	CBBEP purchased 2000 acres in January 2016.
Coastal Bend Living Shoreline Enhancements	9008	Flour Bluff / Laguna Shores Road Living Shoreline	
	678	Indian Point Shoreline Protection – Phase 2	Pending $2,199,000 in NRDA funding.
	9001	Nueces Bay Living Shoreline and Marsh Enhancement	
Corpus Christi Ship Channel Expansion	10014	Corpus Christi Ship Channel Deepening and Widening	The Port of Corpus Christi recently elected to provide $32.2 million to fund work on the entrance channel.
Mustang Island Protection and Enhancement	809	Barrier Island Habitat Conservation – Coastal Bend	
	86	Mustang Island State Park Acquisition	
Corpus Christi Coastal Storm Risk Management	8006	Corpus Christi Hurricane Flood Protection System	
Corpus Christi Bay Rookery Island Restoration	696	Shamrock Island Restoration – Phase 2	Audubon Texas published a study in Fall 2016 that can help inform prioritization of projects.
	9014	Causeway Island Rookery Habitat Protection	
Public Infrastructure Improvements in Corpus Christi and Vicinity	6013	Texas A&M Ocean Drive Bridge Improvements	
	6014	Naval Base Ocean Drive Bridge Improvements	
	6041	Drinking Water Supply System Corpus Christi	
	10015	Construct Additional Travel Lanes at I-37 to US-77 Interchange	TxDOT Project #007405099
Coastal Bend Oyster Reef Restoration	829	Oyster Reef Restoration in Nueces and Corpus Christi Bays	

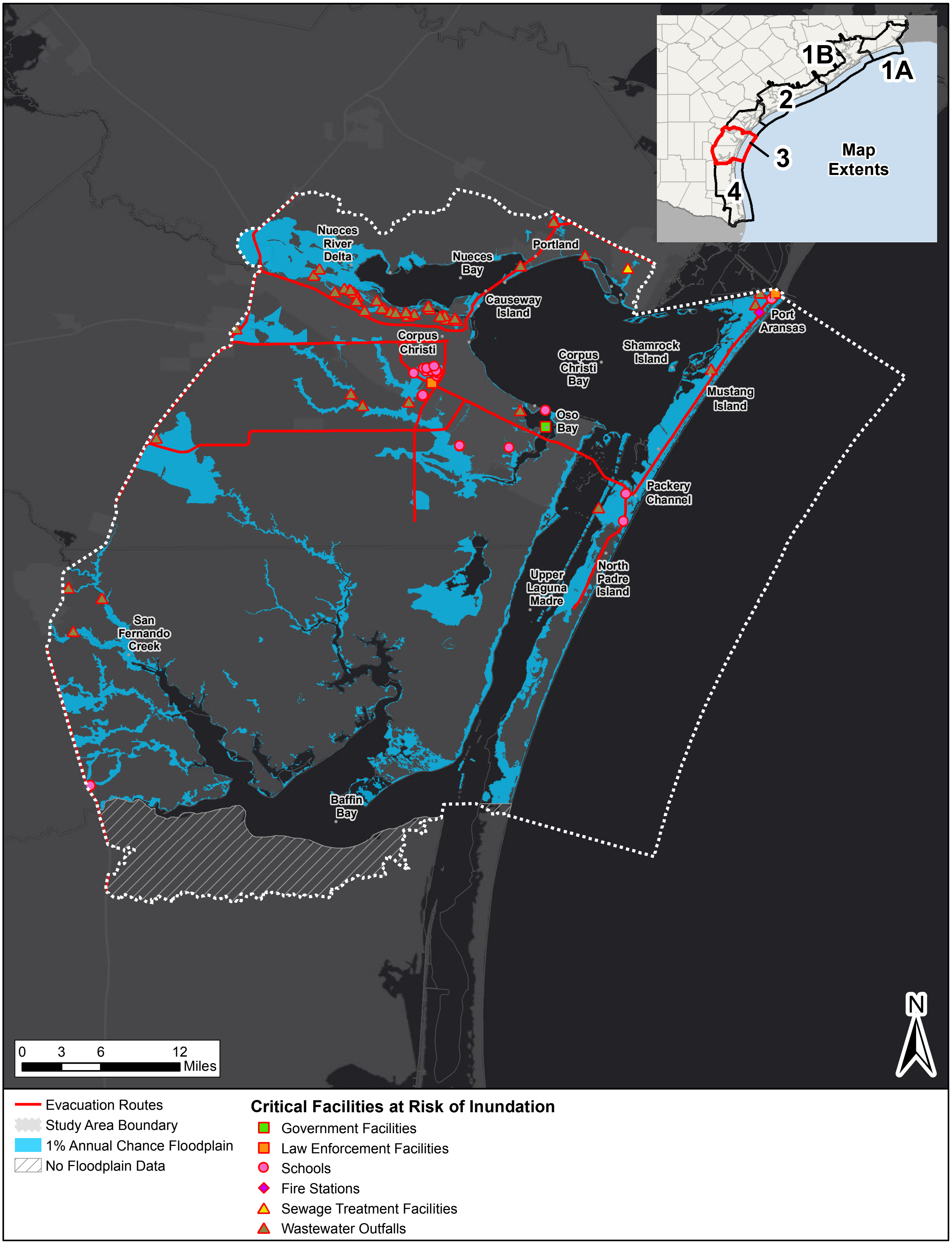
Corpus Christi Bay Proposed Actions and Projects



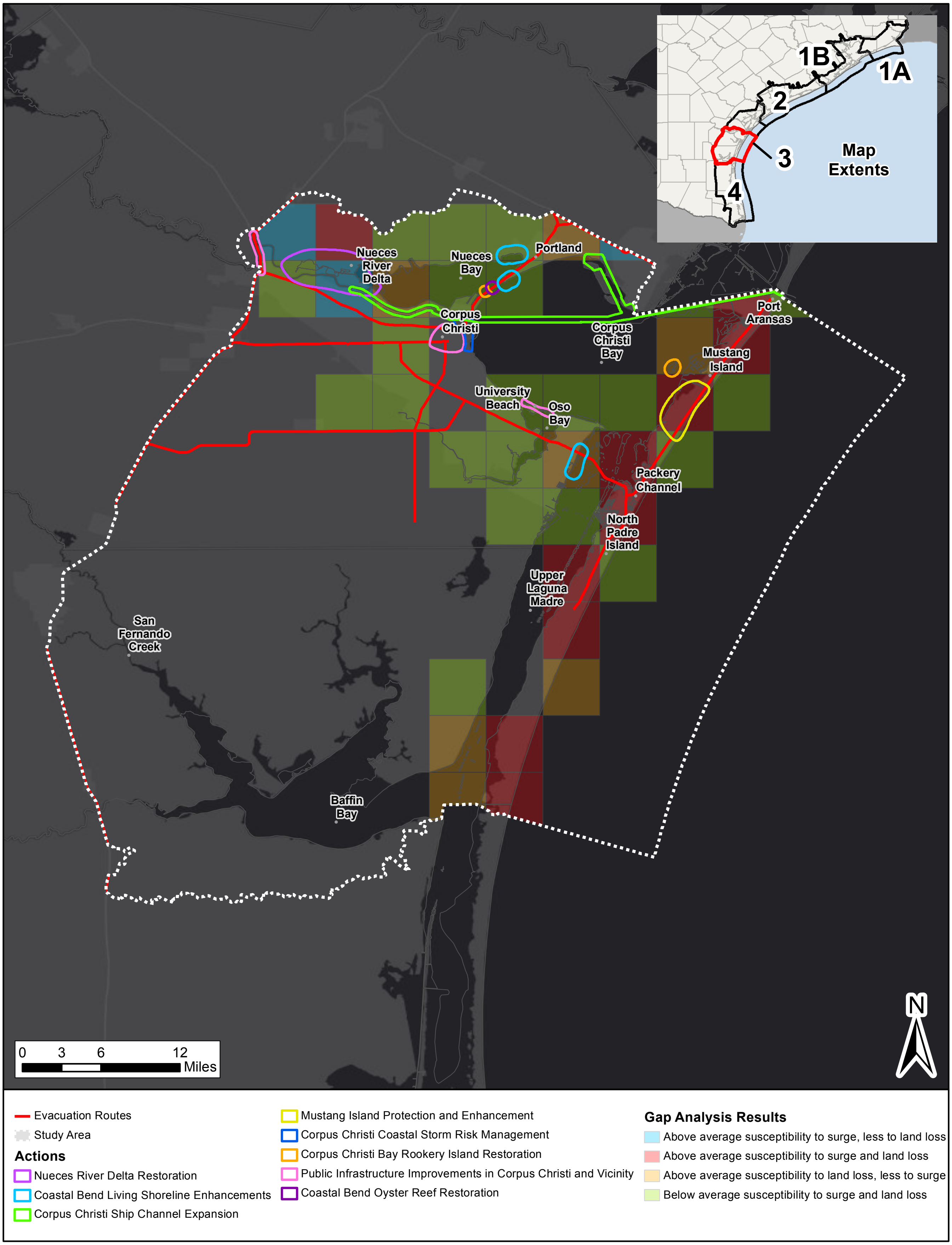
Corpus Christi Bay Vulnerabilities



Corpus Christi Bay 1% Annual Chance Floodplain



Corpus Christi Bay Gap Analysis Results and Actions



Individual Feedback Form

Region 3 – Corpus Christi

Name: ______________________________

Email: ______________________________

Phone: ______________________________

Group Color: ________________________

Study Area: San Antonio Bay

In this study area, identify actions that incorporate nature-based and infrastructure projects working collectively to further enhance the resiliency of coastal communities.

Please consider the following questions while brainstorming.

1. Does the proposed project address the Issues of Concern in the area?
2. Are there existing projects that could be improved or enhanced to incorporate more than one resiliency strategy to provide multiple lines of defense against coastal hazards?
3. What is the feasibility of the proposed actions? What elements could be adjusted to improve their feasibility?

Individual Feedback Form

Region 3 – Corpus Christi

Name: ____________________________

Email: ____________________________

Phone: ____________________________

Group Color: ______________________

Study Area: Aransas Bay & Copano Bay

In this study area, identify actions that incorporate nature-based and infrastructure projects working collectively to further enhance the resiliency of coastal communities.

Please consider the following questions while brainstorming.

1. Does the proposed project address the Issues of Concern in the area?
2. Are there existing projects that could be improved or enhanced to incorporate more than one resiliency strategy to provide multiple lines of defense against coastal hazards?
3. What is the feasibility of the proposed actions? What elements could be adjusted to improve their feasibility?

Individual Feedback Form

Region 3 – Corpus Christi

Name: ____________________________

Email: ____________________________

Phone: ____________________________

Group Color: ______________________

Study Area: Corpus Christi Bay

In this study area, identify actions that incorporate nature-based and infrastructure projects working collectively to further enhance the resiliency of coastal communities.

Please consider the following questions while brainstorming.

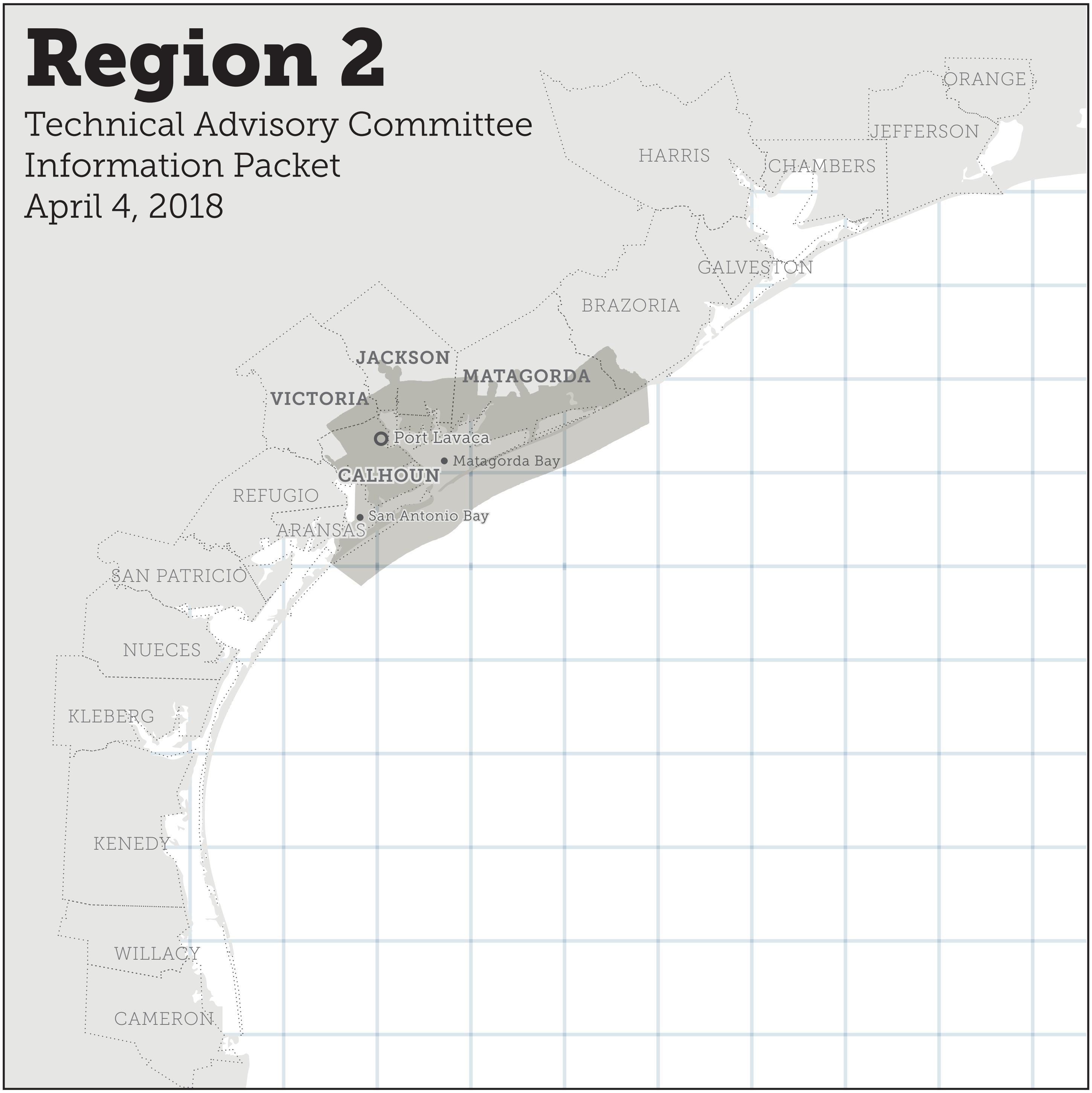
1. Does the proposed project address the Issues of Concern in the area?
2. Are there existing projects that could be improved or enhanced to incorporate more than one resiliency strategy to provide multiple lines of defense against coastal hazards?
3. What is the feasibility of the proposed actions? What elements could be adjusted to improve their feasibility?

Round 2 TAC Meeting Materials Example

Texas General Land Office

Region 2

Technical Advisory Committee
Information Packet
April 4, 2018



Contents

Abbreviations

BUDM	Beneficial Use of Dredged Material
FEMA	Federal Emergency Management Agency
GEBF	Gulf Environmental Benefit Fund
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
IOC	Issue of Concern
NFWF	National Fish and Wildlife Foundation
NWI	National Wetlands Inventory
TAC	Technical Advisory Committee
TSP	Tentatively Selected Plan
USACE	U.S. Army Corps of Engineers

Introduction to the 2019 Texas Coastal Resiliency Master Plan

The Texas General Land Office (GLO) issued the first iteration of the Texas Coastal Resiliency Master Plan (2017 Plan) in March 2017 as the initial step towards achieving a comprehensive plan for the State of Texas. Using the framework from the 2017 Plan as a starting point, the second iteration of the Texas Coastal Resiliency Master Plan (2019 Plan) will continue to build and improve upon the information presented in 2017. As a steward of the Texas coast, the GLO will use the Plans to provide coastal communities with ecological and infrastructure protection from coastal Issues of Concern (IOCs), such as flooding, storm surge, erosion and habitat loss. The 2019 Plan will be published and presented to the 86th Texas State Legislature.

Key Framework Definitions

The 2017 Plan laid a foundation for the GLO's planning efforts. In the 2017 Plan, several key concepts were defined that will continue to contribute to the framework used in the 2019 Plan.

Actions: One or more proposed projects that work to mitigate coastal Issues of Concern or the IOC's underlying Pressures.

Issues of Concern: Natural and human-induced disturbances which, if left unaddressed, will have or will continue to have adverse impacts on infrastructure, natural resources, economic activities, and the health and safety of residents and tourists. The Issues of Concern include: Altered, Degraded or Lost Habitat; Bay Shoreline Erosion, Coastal Flood Damage; Existing and Future Coastal Storm Surge Damage; Gulf Beach Erosion and Dune Degradation; Impact on Coastal Resources; Impact on Water Quality and Quantity; and Abandoned or Derelict Vessels, Structures and Debris.

Planning Area: The planning area of the Texas Coastal Resiliency Master Plan is the Texas Coastal Zone Boundary from the Texas Coastal Management Program, which is the area the GLO is required to regulate through state and federal laws.

Regions: Four regions spanning the Texas coast are used to present overall Plan results, beginning with Region 1 on the northeast part of the coast and moving to Region 4 towards the southwest part of the coast.

Resiliency: The ability of a given system (e.g., ecological, socio-economic, infrastructure) to absorb natural and/or anthropogenic disturbances, and retain or quickly rebound to a desired state.

Resiliency Strategy: A method of restoration and protection measures for coastal resiliency. Collectively, the Resiliency Strategies and the proposed projects address the Issues of Concern identified during the planning process.

Subregion: Sub-areas within the four regions, which are defined by watershed boundaries.

Technical Advisory Committee (TAC): A group of statewide and regional coastal decision makers and technical experts working in state and federal agencies, universities, local governments, non-profit organizations, engineering firms, ports, and regional trusts, foundations and partnerships. The TAC meets regularly to provide expert feedback on the GLO's development of the 2017 and 2019 Plans.

Tier 1 Projects: Projects that represent the most resilient and actionable project solutions recommended for the state.

Technical Advisory Committee Process

The GLO will continue to meet regularly with the TAC to evaluate current and future coastal Texas needs. For the 2019 Plan, the schedule is as follows:

TAC Meetings	Schedule	Meeting Overview
Round 1	October– December 2017	To solicit qualitative feedback on integrating new infrastructure and nature-based resiliency considerations to the planning process (e.g., transportation infrastructure).
Round 2	February – April 2018	To solicit quantitative feedback on new, proposed projects and actions.
Round 3	Fall 2018	To present interim results and request comments.

Resiliency Strategy Framework

The key framework definitions are shown graphically in the Resiliency Strategy Framework (Figure 1). The framework, which was created for the 2017 Plan, is updated for the 2019 Plan to incorporate the combination of green and gray projects that can address the Issues of Concern in a holistic manner. This undertaking will create a more resilient coast and enhance the existing Texas Coastal Resiliency Master Plan.

Additions to the 2019 framework include:

- **Resiliency Strategies** – Revised the Resiliency Strategies to clarify 2017 Plan strategies and to add new strategies related to infrastructure.
- **Actions** – One or more proposed projects that work to mitigate coastal IOCs or an IOC's underlying Pressure.
- **Gap Analysis & Modeling (Future Conditions)** – Evaluating future conditions for the coast will better inform locations of future needs, as well as where proposed Actions will have the greatest chance of success.
- **TAC Input and Evaluation** – Remains a central part of the planning process; added to the framework to reflect its importance.
- **Monitoring & Adaptive Management** – Incorporating monitoring and adaptive management into the planning process.

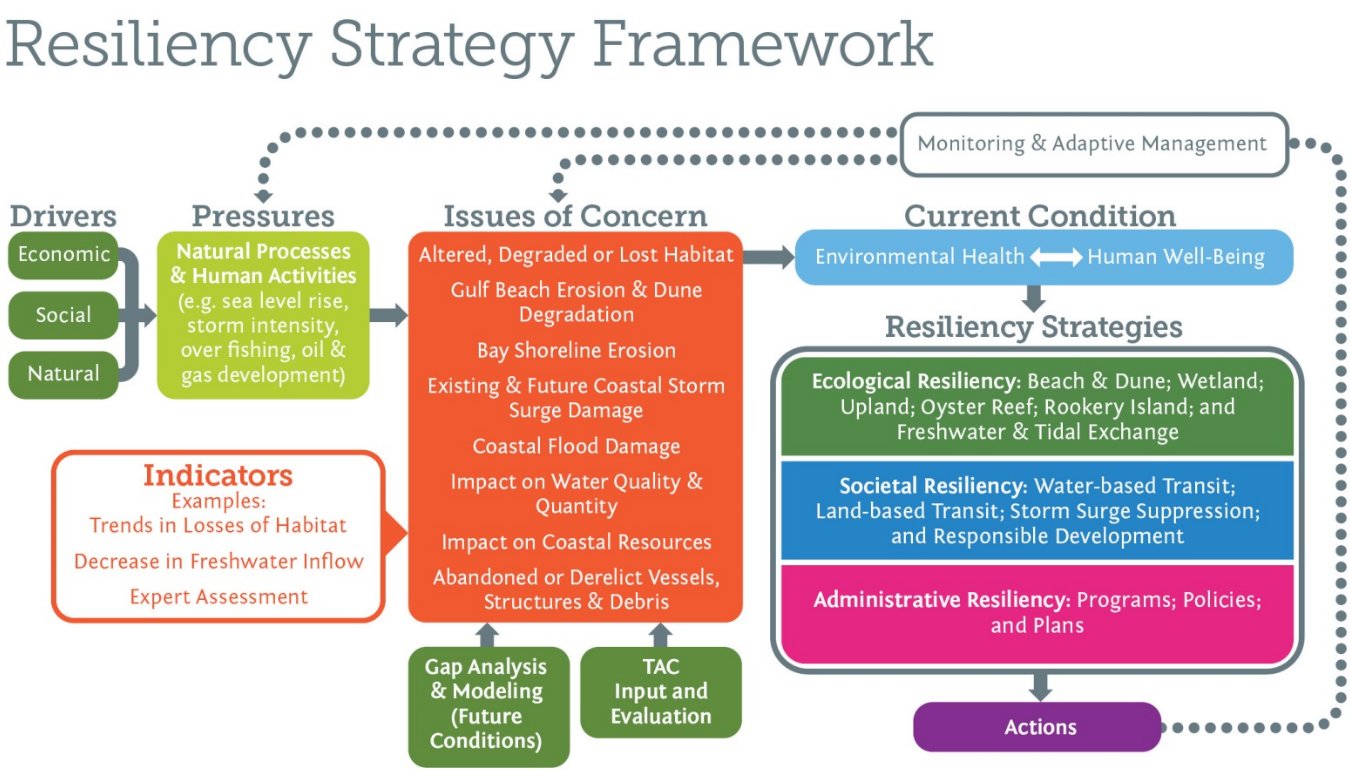


Figure 1: Resiliency Strategy Framework

Issues of Concern

The Issues of Concern represent the problems introduced by the dominant Drivers and Pressures facing the Texas coast. Addressing these IOCs is the primary goal when evaluating methods to improve coastal resiliency. Projects and actions that, as illustrated in the Resiliency Framework, can mitigate or eliminate the IOCs in a feasible and cost effective manner are considered the most resilient solutions for the coast. Identifying where specific IOCs exist and the severity to which they impact Texas' environments at the time of this study, provided the basis to analyze projects for inclusion in the 2017 and 2019 Plans.

Altered, Degraded or Lost Habitat

Healthy bays, wetlands and estuaries provide the critical foundation for sustainable environments and thriving economies. These coastal habitats help maintain wildlife and plant populations, improve water quality, support fishing activities, enhance local tourism and maintain community resilience by reducing the impact of coastal hazards, such as flooding and storm surge. Coastal population growth, development and relative sea level rise adversely impact coastal habitats. This effect will continue unless mitigation projects are implemented.

Gulf Beach Erosion and Dune Degradation

Approximately 65 percent of the Texas Gulf shoreline is considered an eroding area. An eroding area is defined by state regulation as a portion of the shoreline eroding at a rate of greater than 2 feet per year. Natural or restored Gulf beaches and dunes provide recreation areas and habitat for wildlife, including threatened and endangered species, such as sea turtles and piping plovers. Beaches and dunes also serve as a natural first line of defense from storm surge for inland populations and infrastructure by absorbing the impact of high waves and by stopping or delaying intrusion of water inland. Erosion is a threat to public beach use and access, public and private property and infrastructure, fish and wildlife habitat, and public health and safety. The combined effects of erosion are amplified by coastal population growth and increased development.

Bay Shoreline Erosion

Bay shorelines are experiencing many of the same issues as the Gulf-facing shorelines. Bay shore areas function as buffers, protecting upland habitats from erosion and storm damage, and adjacent wetlands and waterways from water quality degradation. The loss of these bay shorelines from coastal development, vessel wakes along the Gulf Intracoastal Waterway, relative sea level rise, and wind and wave erosion contributes to habitat loss, water quality degradation, loss of property, and reduced protection from storm surge and other coastal hazards.

Existing and Future Coastal Storm Surge Damage

Maintaining the coast's natural protective features is critical to minimizing the impact of future storms and hurricanes, and their associated human, infrastructure and economic losses. Coastal storms present a major threat to people and property, with many long-lasting impacts on community infrastructure, the natural environment and the local, state and national economies. Increased coastal development, erosion, relative sea level rise and wetland loss contribute to increased risk and exposure to coastal storm events.

Coastal Flood Damage

Much of the Texas coastal zone lies in a floodplain susceptible to storm and nuisance flooding that impacts and disrupts coastal communities, damages property and natural environments, and poses risks to human health and safety. The impact of coastal flooding may be exacerbated by increased floodplain development, wetland loss and ongoing processes such as erosion, subsidence and sea level rise. Continued landscape changes increase risk and exposure to hazards, even in areas not previously prone to flooding.

Impact on Water Quality and Quantity

Increased urban development and water use places demands on water resources, and can negatively impact water quality and quantity. Poor water quality leads to habitat and wildlife degradation, health and safety issues, and negative economic impacts on coastal communities, tourism, recreation and fishing. When coupled with the fact that Texas is a drought-prone state, freshwater inflows to Texas' watersheds and bays are threatened. Adequate inflows are essential to support healthy coastal habitats and wildlife, water quality, salinity, recreation, and commercial activities, such as farming and fishing.

Impact on Coastal Resources

The coastal zone of Texas boasts an abundance of resources, including oysters, turtles, birds, fish, crabs and several endangered species that are sensitive to environmental changes. These resources are important to maintain the health of coastal systems, but also for the economy, as they support ecotourism and recreational and commercial fisheries. All of which generate tax revenue for the coastal communities and the state. These resources are impacted by various natural and human disturbances, including population growth, increased resource extraction, habitat loss from development, degraded habitat and water quality from pollution, reduced freshwater inflows, invasive species, disease, storms and salinity changes.

Abandoned or Derelict Vessels, Structures and Debris

Abandoned and derelict vessels, structures and other debris are hazards to navigation as well as natural resources, and can restrict and alter coastal processes. When left neglected, these vessels and structures can sink or move during storms, and disperse oil and toxic chemicals. This will destroy marine and coastal habitats, and affect the health and safety of residents and visitors of the coastal communities.

Resiliency Strategies

The 2017 Resiliency Strategies are enhanced for the 2019 Plan to capture the more comprehensive range of nature-based and infrastructure projects. The below table lays out the three new 2019 Resiliency Strategy groupings: Ecological Resiliency, Societal Resiliency and Administrative Resiliency. Within each resiliency grouping are corresponding Resiliency Strategies.

	Resiliency Strategy	Description
Ecological Resiliency	Beach and Dune Enhancement	Renourishment of sediment to beach and dune complexes to address erosion and limited sediment supply. This includes Gulf-facing and back bay beaches.
	Wetland Enhancement	Restores, conserves and protects ecologically significant wetlands through shoreline protection, material placement, hydrologic restoration, and other conservation and restoration practices.
	Upland Enhancement	Restores, conserves and protects ecologically significant coastal uplands through land acquisition, hydrologic restoration, and other conservation and restoration practices.
	Freshwater Inflow and Tidal Exchange Enhancement	Mitigation of hydrologic and water quality impairments within the major delta, lagoon and bay systems along the coast.
	Oyster Reef Enhancement	Restoration or re-establishment of productive oyster reefs.
	Rookery Island Enhancement	Restoration or re-establishment of rookery island nesting habitats to support colonial waterbird populations.
Societal Resiliency	Water-Based Transit Enhancement	Addresses water-based navigation infrastructure improvement needs along the coast. Identifies new opportunities to support the beneficial use of dredged materials in state-owned waters.
	Land-Based Transit Enhancement	Addresses land-based transit infrastructure improvement needs in and around coastal communities. Identifies opportunities to incorporate future conditions and ecological considerations into final design.
	Storm Surge Suppression	Relays results of federal, state and regional storm surge suppression studies and identifies how other projects in the Plan interact with the proposed protections. Proposes new or follow-on storm surge suppression studies and projects, if needed.
	Responsible Development	Proposes proactive, resilient planning opportunities in coastal communities. Identifies projects to support communities' current needs while considering future conditions.
Administrative Resiliency	Plans	Identifies completed, ongoing or proposed plans that guide the screening, design and/or implementation of proposed coastal resiliency projects.
	Policies	Identifies legislative and/or administrative changes to uphold coastal resiliency principles.
	Programs	Identifies GLO-administrated or supported programs related to coastal management.

Project Evaluation/Categories

In an effort to inform the GLO's project evaluation process, the TAC will be asked to review and assess identified potential projects within each coastal region. These evaluations will serve as a key dataset for the GLO's reference when determining project merits and applicability to address the Issues of Concern and improve coastal resiliency in Texas. For this evaluation process, the projects are categorized in a manner that speaks to their development status or fundamental implementation method.

For discussion purposes only, projects will be evaluated based on four categories: conceptual projects, planning-level projects, detailed projects and 2017 Tier 1 projects. These categories do not represent the merit of individual projects, but give the reviewer a sense of project refinement, timeline, and/or implementation method towards the project in question. Descriptions of the four project categories are as follows:

- **Conceptual Projects**

  These projects are intended for future construction or implementation, but do not currently have a sufficient level of detail to be able to determine a reasonable cost estimate or timeline. Projects in this category are typically new ideas, concepts, or have not historically had a local sponsor to advance them. Conceptual projects are often more difficult to assess feasibility or other tangible attributes.

- **Planning Projects**

  These projects are not intended for construction, but achieve an administrative or non-structural result for coastal resiliency. Project costs may be estimated based on similar plans or studies that are completed. These are typically coastwide or regional-scaled projects.

- **Detailed Projects**

  These projects have a sufficient level of detail to be able to determine a reasonable cost estimate, feasibility and timeline. They may or may not have a permit or design in place. However, there is reasonable certainty of the project's attributes (for instance: project location, defined project type and subtype, general understanding of extents and construction outputs, etc.). Often these projects will fit into a category of shovel-ready or nearly so.

- **2017 Tier 1 Projects**

  These projects were previously reviewed by the Technical Advisory Committee during the 2017 planning process. As a result, these projects are considered readily achievable in the near future. Because of the existing support of these projects, the TAC will now provide status updates or reasoning for demotion of these projects' Tier 1 status, if such cases exist.

Project Types

Similar to the 2017 Plan evaluations, the projects evaluated for the 2019 Plan will be categorized by the following project types and subtypes. The Community Infrastructure (Structural) project type is a new addition to the 2019 Plan.

Conceptual Project Types	Category	Project Type	Project Subtypes	
Conceptual Project Types	Nature-Based	**Habitat Creation & Restoration**	• Estuarine Wetlands • Freshwater Wetlands • Oyster Reefs • Barrier Islands • Coastal Uplands • Coastal Prairies	• Rookery Islands • Dredge Placement Islands • Sea Grasses • Tidal Flats • Fisheries
	Nature-Based	**Wildlife**	• Fish • Birds • Oysters	• Sea Turtles • Invasive Species
	Nature-Based	**Environmental**	• Freshwater Inflow	• Hydrologic Restoration
	Nature-Based	**Beach Nourishment**	• Bay	• Gulf
	Nature-Based	**Dune Restoration**	• Dune	
	Structural	**Shoreline Stabilization**	• Seawall • Bulkhead • Revetment • Breakwater	• Misc. Wave Break • Jetty • Groin
	Structural	**Flood Risk Reduction**	• Levees • Flood Wall	• Storm Surge Barrier
	Structural	**Community Infrastructure**	• Drainage • Utilities • Roadway/Bridge Repair	• Roadway/Bridge Elevation • Critical Facilities • Structure Raising
	Structural	**Structure/Debris Removal**	• Structures on Public's Easement • Abandoned Oil and Gas Wells • Abandoned Boats	• Dock Pilings • Post Storm Cleanup
	Non-Structural	**Land Acquisitions**	• Acquisitions • Conservation Easements	• Fee Simple
	Non-Structural	**Public Access & Improvements**	• ADA Accessibility • Walkovers	• Piers, Boat Ramps
	Non-Structural	**Studies, Policies & Programs**	• Erosion Response Plans • Setbacks • Buyouts	• Modeling • Sediment Management

Actions

The individual projects selected for the 2019 Plan will be chosen for their effectiveness in building up the resilience of the Texas coast. Each individual project should therefore fit into a larger overall Action for improving the state of the coast. As a result, the 2019 Plan will include Actions that frame the concept of multiple projects functioning together to benefit coastal resiliency. These Actions are established based on distinct areas of planning needs, derived from concerns that arose during regional discussions with the TAC for the development of the 2017 Plan and the Round 1 TAC meetings for the 2019 Plan. The Actions can be used by the TAC to guide project evaluations. Each Action will include multiple projects that work together to mitigate the same coastal Pressures and associated Issues of Concern. This will provide a synergistic end goal for the group of projects as an Action mitigates one or more IOC's. For Region 2, the following Actions are identified:

- **Guadalupe River Delta Comprehensive Planning**

  The Guadalupe River is the starting point for the health of San Antonio Bay. The water quality and supply that the river provides to the bays can alter sediment supply, salinity, tidal exchange and other bay health factors. The deltaic area of the Guadalupe River is the critical mesh point between the riverine and bay systems, and is a valuable ecosystem that can also provide water quality services. This Action proposes a comprehensive planning effort that includes both ecological and infrastructure-based enhancements to stabilize and improve the health of this system. An adaptive management process would be utilized to enhance the resiliency of the delta under both current and future conditions.

- **Matagorda Bay Hydrologic Planning and Management**

  Matagorda Bay is home to notable oyster reef, seagrass and wetlands, as well as several communities that thrive off of the coastal habitats for recreational and commercial purposes. While Matagorda Bay is not subject to the extreme development pressures seen across much of the Texas coast, the bay is vulnerable to hydrologic stresses. Matagorda Bay has a complex hydrologic regime, consisting of multiple significant freshwater sources and two coastal inlets in Pass Cavallo and the Matagorda Ship Channel Entrance Inlet. The primary freshwater riverine sources are the Colorado River, which is heavily utilized in Central Texas by urban communities, and to a lesser extent the Lavaca River. The water quality and supply that the rivers provide to the bay can alter sediment supply, salinity, tidal exchange and other bay health factors. This Action proposes a comprehensive planning and management effort that includes an adaptive management process that would be utilized to enhance the resiliency of the bay under both current and future conditions that reflect volatility in freshwater inflow quantities.

- **Matagorda Bay Oyster Reef Restoration, Monitoring and Planning**

  Oyster reefs are a critical ecological habitat of Matagorda Bay, both historically and currently. While salinity is more variable under current hydrologic patterns, oyster reefs have proven to still be viable in targeted portions of the bay system. As demonstrated through past oyster reef restoration projects, the reefs not only prove to support oyster development, but also have significant, positive impacts on fish and associated populations. This, in turn, supports the recreational-focused economics of local communities. Restoration and monitoring of oyster reefs in the Matagorda Bay complex, in coordination with hydrologic planning, is a key component of maintaining long-term resiliency of the bay. This Action proposes the continuation of collecting data on current reef systems, planning future restoration efforts and furthering the viability of these key habitats within Matagorda Bay. This would be accomplished in coordination with the local communities.

- **Powderhorn Lake and Vicinity Comprehensive Planning**

  Calhoun County is home to an area of wetlands and coastal habitat critical to fish and migratory birds. Powderhorn Lake and surrounding coastal lands historically function as a diverse wetland complex, supporting a range of habitats given the freshwater and brackish conditions of the area. Beyond the ecological values of the area, Powderhorn Lake also serves as a critical location of water storage during both riverine and storm surge flood events. This provides flood risk reduction for surrounding communities. While portions of this area are part of the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge, much of the area has been altered historically for agricultural or other human-induced purposes, changing hydrologic characteristics and vegetation. Given the current efforts underway or already completed in the vicinity, this Action proposes to comprehensively plan for maintaining and restoring the regional area to natural conditions, and working to adapt the area to changing future conditions to maintain the region coastal resiliency.

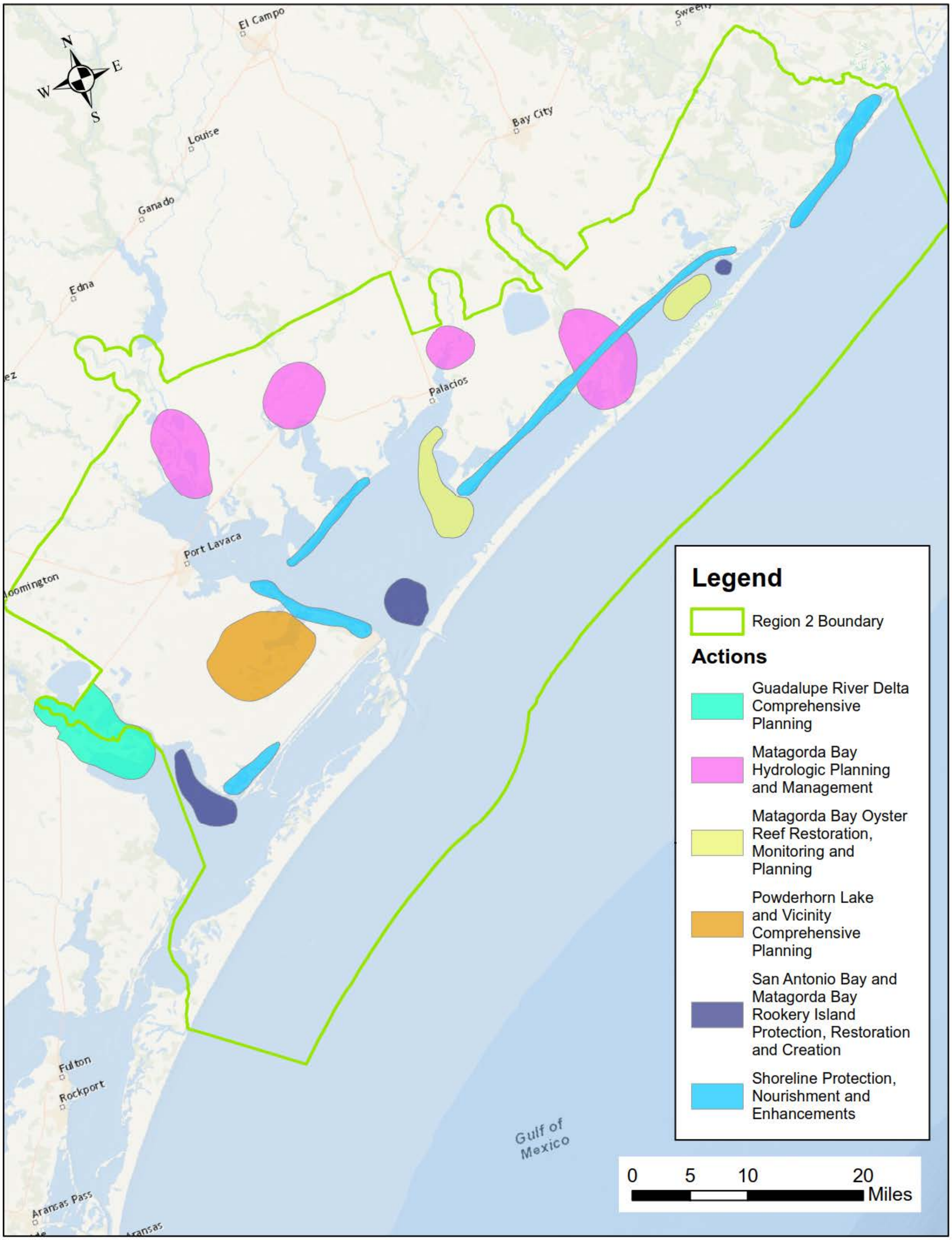
- **San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation**

  San Antonio Bay and Matagorda Bay are part of a critical migratory path and seasonal home for a range of bird species. These bays have relatively few rookery islands, with many of the islands at risk of converting to open water. This Action proposes working to restore, protect and build rookery islands, primarily near existing ship channels to allow for a sustainable source of sediment. This would maintain and grow critical habitat, while also serving as a cost efficient method for dredge material placement in the region.

- **Shoreline Protection, Nourishment and Enhancements**

  Throughout the region, bay and Gulf shorelines are at risk of erosion. This exposes upland habitat and development to continued erosion and coastal Issues of Concern. This Action proposes to reduce the risk of erosion and land loss for both ecological and built environments through a means that combines “gray” and “green” stabilization techniques.

Region 2 Actions



Project Evaluations

Worksheet Example and Instructions for Detailed Projects, Conceptual Projects and Planning Projects

Each TAC member will be provided worksheets for completion for each category of project. An example of the worksheet for the **detailed**, **conceptual** and **planning** projects is shown below, with instructions given in the blue highlighted boxes.

The provided ID and project name allow for cross-referencing with the more detailed information provided in the Information Packet.

Please fill in the IOC boxes below with the corresponding level of benefit achieved by this project.
0 – no benefit 1 – slight benefit 2 - moderate benefit 3 - high benefit 4 - essential

ID 9062:	Restore Upper and Lower Laguna Madre Dredge Placement and Rookery Islands						
ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
Feasibility (0-4)	Notes:						
Priority (Y/N)							

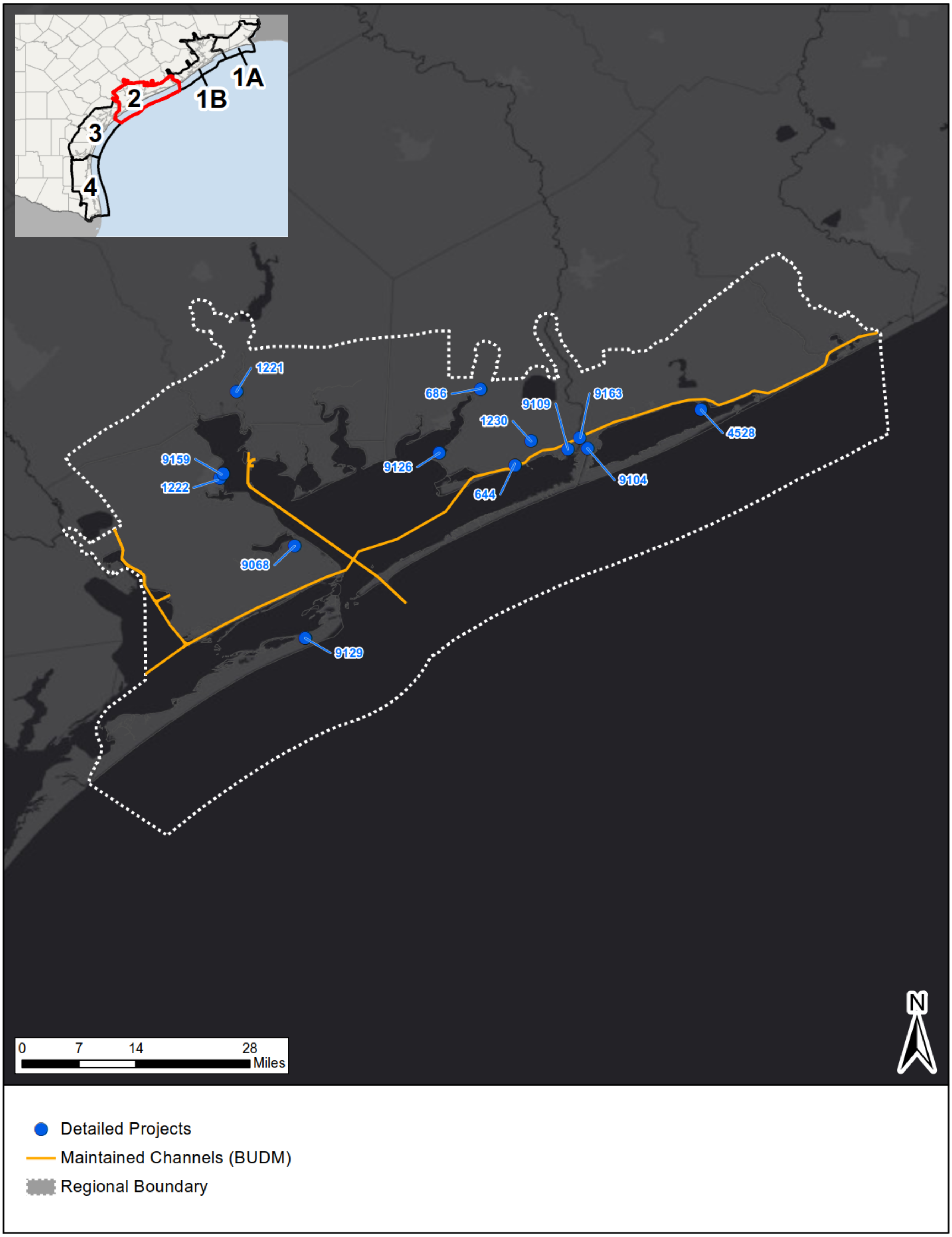
Would you consider this project a <u>priority</u> for coastal resiliency in this region? (Y/N)

What is the <u>feasibility</u> of executing this project?
0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Under **"Notes,"** provide additional information. For example, additional project details, known impediments to implementing this project, ways the project could be improved, and thoughts on project goals or intent.

Project Evaluations – Detailed Projects

ID	Name	Resiliency Strategy	Action
644	Mad Island Shoreline Protection and Ecosystem Restoration	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
686	Matagorda Bay Tributary Inflow Protection	Freshwater Inflow and Tidal Exchange Enhancement	Shoreline Protection, Nourishment and Enhancements
1221	Lavaca River Abandoned Oil Well Project	Water-Based Transit Enhancement	N/A
1222	City of Port Lavaca Shoreline Clean Up, Debris and Submerged Structures Removal	Water-Based Transit Enhancement	N/A
1230	Matagorda Bay System Priority Landscape Conservation	Wetland Enhancement	N/A
4528	Dressing Point Rookery Island Protection	Rookery Island Enhancement	San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation
9068	Powderhorn Ranch Wetland Acquisition and Restoration - Phase 2	Wetland Enhancement	Powderhorn Lake and Vicinity Comprehensive Planning
9104	Farm-to-Market 2031 and State Highway 60 Improvements	Land-Based Transit Enhancement	N/A
9109	Colorado River Delta – Matagorda Bay Acquisition	Wetland Enhancement	Matagorda Bay Hydrologic Planning and Management
9126	Coon Islands Restoration	Rookery Island Enhancement	San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation
9129	Demolish Old Military Airfield	Responsible Development	Shoreline Protection, Nourishment and Enhancements
9159	City of Port Lavaca Harbor Channel Beneficial Use of Dredge Material, Sediment Investigations and Habitat Restoration	Water-Based Transit Enhancement	Shoreline Protection, Nourishment and Enhancements
9163	Colorado River Locks	Water-Based Transit Enhancement	N/A


1A
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1221
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9129
0
7
14
28
Miles
N
Detailed Projects
Maintained Channels (BUDM)
Regional Boundary

ID	Name	Project Subtype (Type)	Current Funding Sources
644	Mad Island Shoreline Protection and Ecosystem Restoration	Shoreline Stabilization (Breakwater) Habitat Creation and Restoration (Estuarine Wetlands)	NFWF NFWF-GEBF $100,000
Status			
Proposed / Shovel Ready			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Detailed	Wetland Enhancement

Description
This alternatives analysis, engineering design and permitting project is ongoing in an effort to protect over 6,000 acres of critically important coastal prairie and marsh ecosystem. The ultimate goal of the project is to install a 2.3-mile nearshore breakwater to stem the persistent erosion and habitat loss at The Nature Conservancy's Mad Island Marsh Preserve along the mid-coast of Texas in Matagorda Bay. Slowing the shoreline loss at the mouth of the Mad Island Lake Bayou is critical to maintain the salinity gradient of this estuarine system. The Mad Island Preserve includes approximately 7,100 acres of salt marshes, open water estuaries, freshwater and brackish lakes, wetlands and coastal prairies along a high priority area of the Texas mid-coast. Mad Island Lake is an ecologically significant portion of the Mad Island system, providing crucial nursery habitat for marine life from the adjacent Matagorda Bay. The entire complex has been impacted by shoreline erosion at a rate of 5 to 10 feet per year since the initial construction of the Gulf Intracoastal Waterway (GIWW).

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>686</td><td>Matagorda Bay Tributary Inflow Protection</td><td colspan="2" rowspan="3">Environmental
(Freshwater Inflow)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Conceptual</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Shoreline Protection, Nourishment and Enhancements</td><td>Detailed</td><td colspan="2">Freshwater Inflow and Tidal Exchange Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">Freshwater inflows to the Matagorda Bay system continue to decline dramatically from historical levels as more and more water is impounded and withdrawn for use upstream of the coast. In the near term, options are limited to restore flows from the Colorado River, which is the largest inflow source. Therefore, restoration of inflows from smaller tributaries offers more immediate potential. This project involves purchasing existing water rights on tributary streams – water that would otherwise be withdrawn to prevent the loss of that freshwater inflow. By protecting tributary inflows, especially during drought periods, this project would improve conditions, including salinity levels, and help protect oyster reefs and other key habitats and species in one or more smaller bays that contribute to the resiliency of the larger Matagorda Bay system.</td></tr>
</table>

ID	Name	Project Subtype (Type)	Current Funding Sources
1221	Lavaca River Abandoned Oil Well Project	Structure/Debris Removal (Abandoned Oil and/or Gas Well)	N/A
Status			
Proposed / Engineering & Design			

Action	Category	Resiliency Strategy
N/A	Detailed	Water-Based Transit Enhancement

Description
The Jackson County Navigation District is seeking funding to remove two abandoned oil well heads located in the Lavaca River and along its banks immediately adjacent to sensitive environmental marshlands. The abandoned well heads are navigation hazards for boaters, anglers, water skiers and people recreating in and around the area. The abandoned well heads are liable to cause pollution in Lavaca River, Redfish Lake and/or the nearby marshlands if they are not capped and are damaged during a hurricane or coastal storm.

ID	Name	Project Subtype (Type)	Current Funding Sources
1222	City of Port Lavaca Shoreline Clean Up, Debris and Submerged Structures Removal	Structure/Debris Removal (Abandoned Boats, Post-Storm Clean Up)	N/A

Status
Proposed / Shovel Ready

Action	Category	Resiliency Strategy
N/A	Detailed	Water-Based Transit Enhancement

Description
The City of Port Lavaca Shoreline Clean up, Debris and Submerged Structures Removal project proposes to restore shorelines and bay bottom through debris removal. This activity would remove abandoned debris such as old sunken barges and boats, maritime equipment, broken pipelines, navigation markers and industrial equipment. Previous efforts to clean debris have helped but more needs to be done, as the presence of these submerged structures limit the use of the shorelines for recreational and educational activities, and restrict access to the local marina and boat ramp. The potential presence of fuels in the barges and tanks and the decomposition of metals and paints are a threat to natural habitats, water quality, bay ecosystems and the health of the inhabitants and visitors of Port Lavaca.

<table>
<tr><th>ID</th><th>Name</th><th>Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>1230</td><td>Matagorda Bay System Priority Landscape Conservation</td><td rowspan="3">Land Acquisitions (Acquisitions)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Acquisition Pending</td></tr>
</table>

Action	Category	Resiliency Strategy
N/A	Detailed	Wetland Enhancement

Description
The Matagorda Bay System Priority Landscape Conservation Project aims to conserve strategic lands adjacent to the Matagorda Bay/San Antonio Bay complex to help ensure long-term native diversity, productivity and resiliency of the entire bay estuary complex. Under this project, the State of Texas would acquire and protect approximately 6,200 acres of coastal habitats including emergent marshes, tidal flats, lagoons and coastal prairie with several miles of frontage on the Matagorda Bay system.

ID	Name	Project Subtype (Type)	Current Funding Sources
4528	Dressing Point Rookery Island Protection	Habitat Creation and Restoration (Rookery Islands) Wildlife (Birds)	N/A

Status
Proposed / Engineering & Design

Action	Category	Resiliency Strategy
San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation	Detailed	Rookery Island Enhancement

Description
Dressing Point Island is a natural island formed from the erosion of Dressing Point Peninsula that has decreased in size over the past 30 years from about 13 acres (1984) to about 7 acres (2011). Waterbird use declined as the island size decreased, from an average of 10,000 nesting pairs (early 1970s to late 1980s) to an average of 5,000 pairs in 2015. Despite these declines, Dressing Point Island, part of Big Boggy National Wildlife Refuge, is an important colonial rookery island on the upper coast of Texas and in East Matagorda Bay. The closest islands that provide similar nesting habitat are 40 miles away. The conceptual design for Dressing Point Island would increase the island to 12 acres, plant native vegetation, incorporate shell material on the existing shell knoll and construct protective features, such as armored levees. Improvements to the shell knoll would provide an ideal nesting location for bare ground nesting colonial waterbirds.

ID	Name	Project Subtype (Type)	Current Funding Sources
9068	Powderhorn Ranch Wetland Acquisition and Restoration - Phase 2	Land Acquisitions (Acquisitions) Wildlife (Birds)	N/A

Status
Proposed / Acquisition Pending

Action	Category	Resiliency Strategy
Powderhorn Lake and Vicinity Comprehensive Planning	Detailed	Wetland Enhancement

Description
On the west side of Matagorda Bay, is the 10,000-acre West Powderhorn ranch, with more than 4 miles of frontage on the tidally influenced Powderhorn Lake, and healthy native prairie, live oak forest, tidal marsh, tidal flat and palustrine freshwater wetlands. Acquisition of the West Powderhorn site would expand the Powderhorn Ranch Wildlife Management Area and State Park to well over 27,000 acres. This would assure management of landscape-scale ecosystem functions and sufficient habitat for whooping cranes, as well as a myriad of resident and migratory coastal species such as shore and wading birds and waterfowl, many of which are already identified by the state as species of greatest conservation need. A living shoreline on the eastern edge of Powderhorn Lake would be beneficial as a future restoration effort.

ID	Name	Project Subtype (Type)	Current Funding Sources
9104	Farm to Market Road 2031 and State Highway 60 Improvements	Shoreline Stabilization (Revetment) Community Infrastructure (Roadway/Bridge Elevation)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
N/A	Detailed	Land-Based Transit Enhancement

Description
Improve Farm to Market Road 2031 from consistent flooding through road elevation and armor the shoreline in this area to prevent erosion of the adjacent channel that could put the roadway at risk. In addition, elevate State Highway 60, the evacuation route out of Matagorda, which experiences similar flooding issues.

ID	Name	Project Subtype (Type)		Current Funding Sources
9109	Colorado River Delta – Matagorda Bay Acquisition	Land Acquisitions (Acquisitions) Wildlife (Birds)	 	N/A

Status
Proposed / Acquisition Pending

Action	Category	Resiliency Strategy
Matagorda Bay Hydrologic Planning and Management	Detailed	Wetland Enhancement

Description

The project would acquire and protect 2,000 acres of highly productive fresh and saltwater marsh near the mouth of the Colorado River in West Matagorda Bay. This estuary provides habitat for a vast number of shorebirds, wading birds, waterfowl and Neotropical migrants. As the whooping crane population expands beyond Aransas National Wildlife Refuge, large marsh areas like this would be extremely important to provide the blue crabs and other food sources this critically endangered species requires during the winter months. This is a vibrant marsh area that has grown due to the nutrient-rich and sediment-rich freshwater overflow of the Colorado River. This portion of West Matagorda Bay was enhanced with the diversion of the river back to the bay, accomplished in 1992 as a joint effort between the U.S. Army Corps of Engineers and state resource agencies.

ID	Name	Project Subtype (Type)	Current Funding Sources
9126	Coon Islands Restoration	Habitat Creation and Restoration (Rookery Islands) Wildlife (Birds, Fish)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation	Detailed	Rookery Island Enhancement

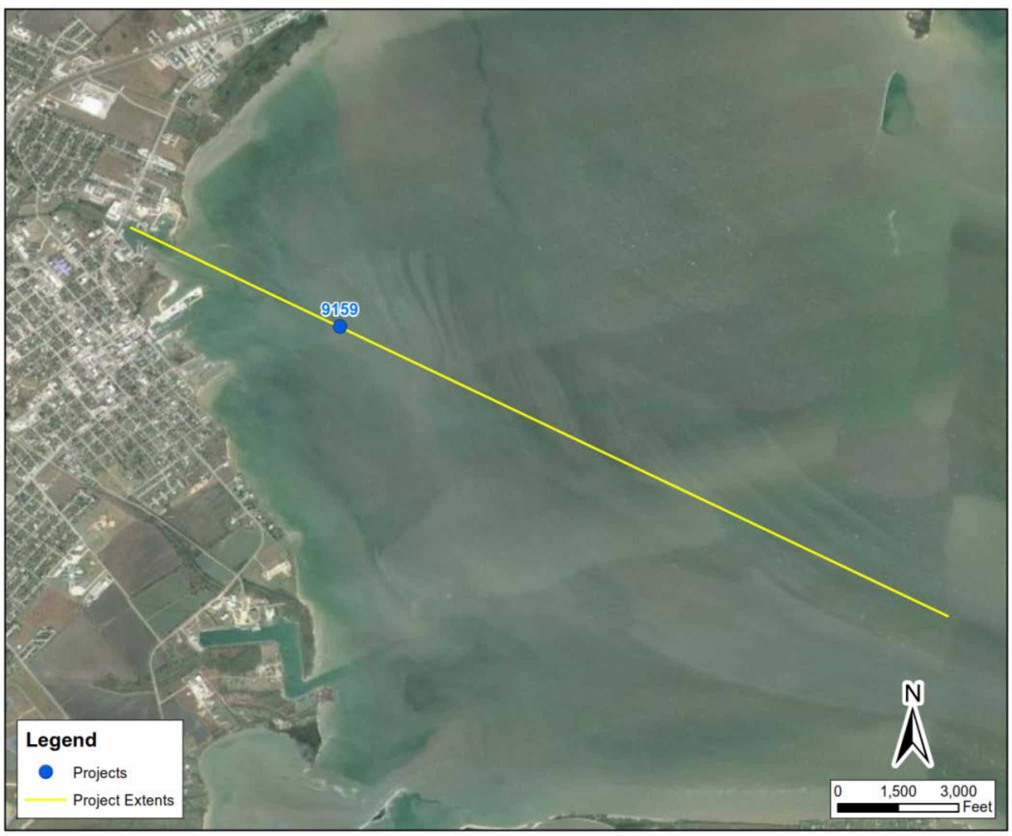
Description
The Coon Islands subsided and lost their linear connection, which makes the island more vulnerable to erosion in the future. The project would restore the elevation and connectivity of Coon Islands. It also would protect Coon Island Bay and, by serving as a wave break from the larger Tres Palacios bay, improve the shallow water habitat that supports nursery habitat for recreational and commercially-important species.

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>9129</td><td>Demolish Old Military Airfield</td><td colspan="2" rowspan="3">Habitat Creation and Restoration (Coastal Uplands)

Structure/Debris Removal (Structure on Public Easement)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Conceptual</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Shoreline Protection, Nourishment and Enhancements</td><td>Detailed</td><td colspan="2">Responsible Development</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">The goal of this project is to responsibly demolish the defunct military airfield to return this land to native upland habitat. Returning this land to its native habitat is a responsible development practice that would allow the barrier island to respond to natural processes, such as rolling over, in the long-term. The enhanced habitat would also benefit birds and wildlife in the short-term.</td></tr>
</table>

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>9159</td><td>City of Port Lavaca Harbor Channel Beneficial Use of Dredge Material, Sediment Investigations and Habitat Restoration</td><td colspan="2" rowspan="3">Habitat Creation and Restoration (Dredge Placement Islands, Estuarine Wetlands)

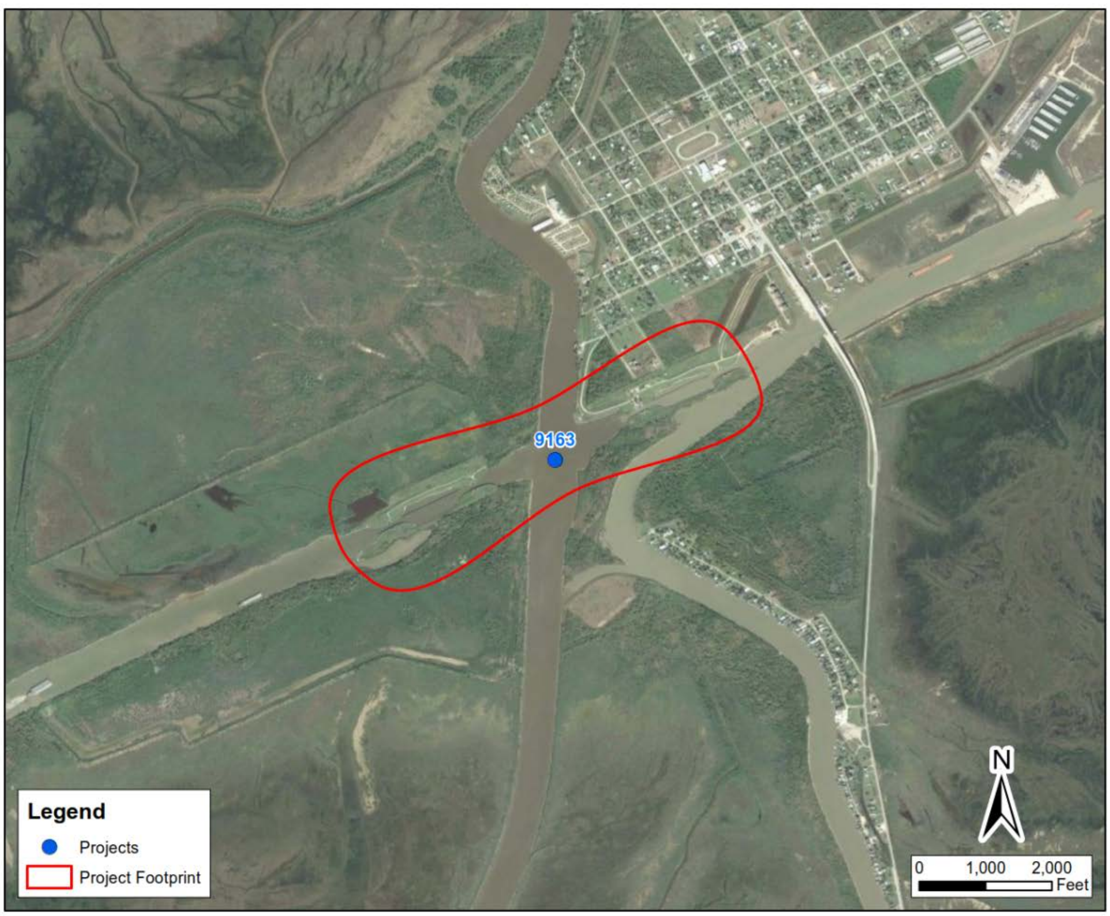
Studies, Policies and Programs (Studies)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Engineering and Design</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Shoreline Protection, Nourishment and Enhancements</td><td>Detailed</td><td colspan="2">Water-Based Transit Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">This project would dredge the Port Lavaca Channel and the Harbor of Refuge Channel (both part of the Matagorda Ship Channel navigation system), and would beneficially use the sediments available on the channels to re-establish marshes and critical aquatic habitats affected by the impacts of past environmental accidents. The U.S. Army Corps of Engineers and the Calhoun Port Authority manage the maintenance dredging of the Matagorda Ship Channel, but funding has been limited in previous dredging cycles to include small channels in the navigation system. Several private entities are committed to return and re-develop the harbors, if the channels are re-opened. A sediment source investigation would also be conducted to identify the best viable and ecologically practical sediment source in relation to the needs of the restoration. Parallel to this investigation, specific assessments of other sediment sources coming from adjacent submerged dredge material placement areas located on the sides of the navigation channels would be conducted. The City of Port Lavaca and its partners are committed to restoring the environment for generations to come and improve the quality of life of the local residents and visitors.</td></tr>
</table>



ID	Name	Project Subtype (Type)	Current Funding Sources
9163	Colorado River Locks	Structure/Debris Removal (Obstacles)	N/A
Status			
Proposed / Tentatively Selected Plan			

Action	Category	Resiliency Strategy
N/A	Detailed	Water-Based Transit Enhancement

Description
The U.S. Army Corps of Engineers, along with the study partner, the Texas Department of Transportation, prepared a Draft Integrated Feasibility Report and Environmental Impact Statement for the Gulf Intracoastal Waterway (GIWW) Colorado River Locks system. The report includes analysis of several alternatives and presents the Tentatively Selected Plan (TSP), which proposes structural modifications to the existing Colorado River Locks to improve safety and navigation along the GIWW. The TSP recommends removing the existing 75-foot-wide east and west floodgates and rehabilitating the existing 75-foot-wide GIWW-side floodgates. A temporary bypass channel would result in an open channel throughout the proposed 1.25 year construction period. The preliminary cost estimate for the project is $36,862,000. No significant environmental impacts are anticipated, and impacts to wetlands would be restored and/or mitigated in coordination with natural resource agencies.



Worksheet Example and Instructions for Detailed Projects, Conceptual Projects and Planning Projects

Each TAC member will be provided worksheets for completion for each category of project. An example of the worksheet for the **detailed**, **conceptual** and **planning** projects is shown below, with instructions given in the blue highlighted boxes.

The provided ID and project name allow for cross-referencing with the more detailed information provided in the Information Packet.

Please fill in the IOC boxes below with the corresponding level of benefit achieved by this project.
0 – no benefit 1 – slight benefit 2 - moderate benefit 3 - high benefit 4 - essential

ID 9062:	Restore Upper and Lower Laguna Madre Dredge Placement and Rookery Islands						
ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
Feasibility (0-4)	Notes:						
Priority (Y/N)							

Would you consider this project a <u>priority</u> for coastal resiliency in this region? (Y/N)

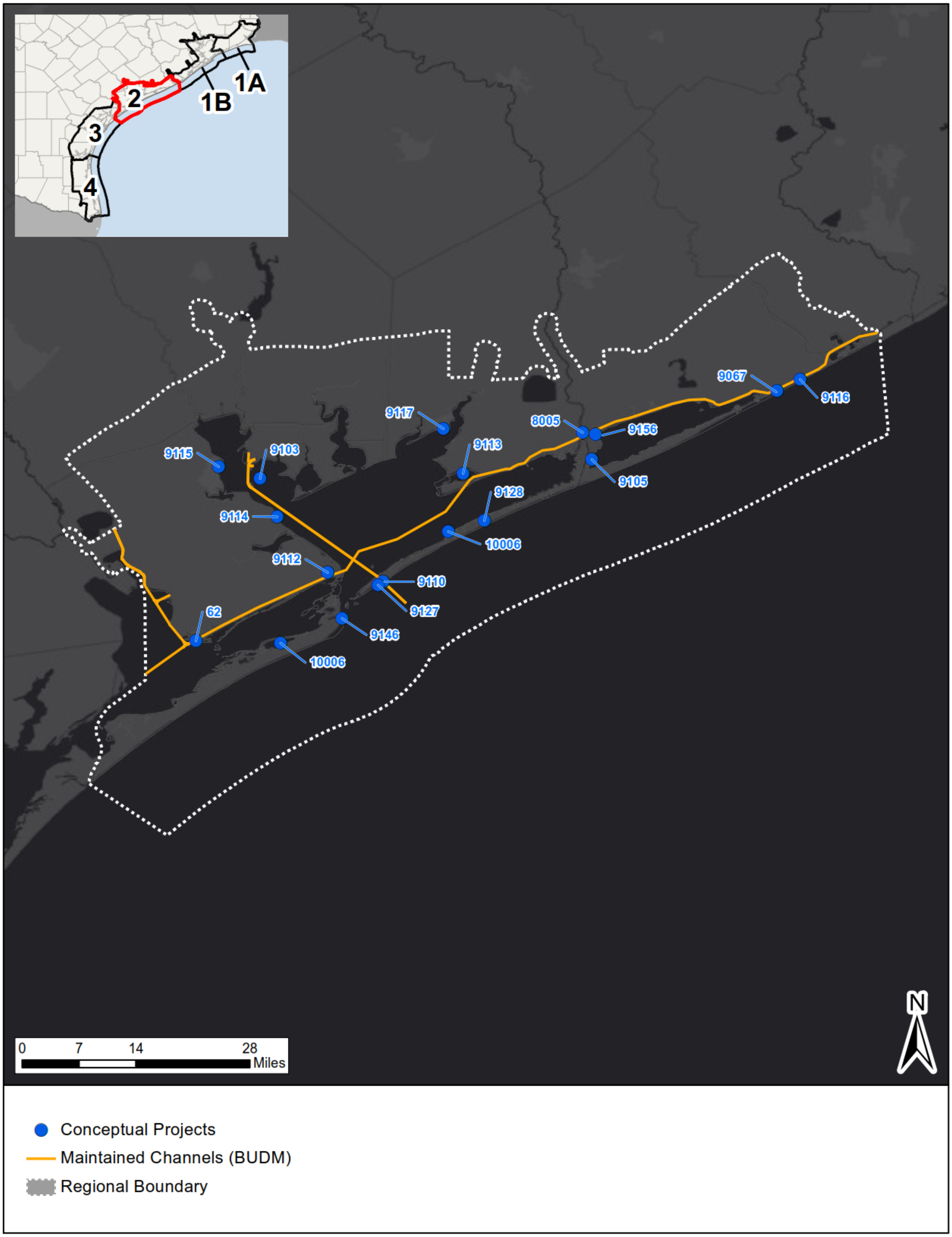
What is the <u>feasibility</u> of executing this project?
0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Under **"Notes,"** provide additional information. For example, additional project details, known impediments to implementing this project, ways the project could be improved, and thoughts on project goals or intent.

Project Evaluations – Conceptual Projects

ID	Name	Resiliency Strategy	Action
62	Welder Flats Wildlife Management Area	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
8005	Matagorda Levee Drainage System Upgrades	Responsible Development	N/A
9067	Stabilize County Road 457 East of Mitchell's Cut	Land-Based Transit Enhancement	N/A
9103	Lavaca Bay Oyster Reef Restoration	Oyster Reef Enhancement	Matagorda Bay Oyster Reef Restoration, Monitoring and Planning
9105	Restore East Matagorda Bay Wetlands	Wetland Enhancement	N/A
9110	Stabilize Entrance to the Matagorda Ship Channel	Water-Based Transit Enhancement	N/A
9112	State Highway 185 Improvements	Land-Based Transit Enhancement	N/A
9113	Oyster Lake - Matagorda Bay Shoreline Stabilization	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
9114	Ocean Drive Living Shoreline	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
9115	Port Lavaca Living Shoreline	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
9116	Remove or Retrofit USACE Revetment	Upland Enhancement	Shoreline Protection, Nourishment and Enhancements
9117	Palacios Shoreline Revitalization Project	Responsible Development	Shoreline Protection, Nourishment and Enhancements
9127	Beach Stabilization South of Matagorda Ship Channel Jetties	Beach and Dune Enhancement	Shoreline Protection, Nourishment and Enhancements
9128	Matagorda Bay Regional Acquisition Program	Upland Enhancement	Matagorda Bay Hydrologic Planning and Management
9146	Restore Breach at Fish Pond on Matagorda Island	Upland Enhancement	Shoreline Protection, Nourishment and Enhancements
9156	Freshwater Delivery from Colorado River to East Matagorda Bay	Freshwater Inflow and Tidal Exchange Enhancement	Matagorda Bay Hydrologic Planning and Management
10006	Monitoring and Future Maintenance of Barrier Island Backside Wetlands on Matagorda Island and Matagorda Peninsula	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements

Region 2 Conceptual Projects



ID	Name	Project Subtype (Type)	Current Funding Sources
62	Welder Flats Wildlife Management Area	Shoreline Stabilization (Breakwater)  Habitat Creation and Restoration (Freshwater Wetlands)  Wildlife (Birds) 	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Wetland Enhancement

Description
The Welder Flats Wildlife Management Area has 1,480 acres of submerged coastal wetlands that provide habitat for the endangered Whooping Crane, and numerous other species of waterfowl and wading birds. To help mitigate shoreline erosion caused by boats travelling along the GIWW, rock breakwaters and/or a living shoreline are proposed for this area.

ID	Name	Project Subtype (Type)	Current Funding Sources
8005	Matagorda Levee Drainage System Upgrades	Community Infrastructure (Drainage) Flood Risk Reduction (Levee)	N/A

Status
Proposed / Study

Action	Category	Resiliency Strategy
N/A	Conceptual	Responsible Development

Description
Recent levee inspections of the Matagorda levee system confirm that height and condition of the levees are adequate for the 1 percent annual chance storm event in both the present condition and in 2085, assuming 1.86 feet of sea level rise. However, the gravity drainage system could be upgraded to improve the overall system performance and to mitigate flooding that has been noted in the area. The specific need is an enhancement of the culvert and drainage components of the levee systems. This could also include the addition of detention areas in the drainage network or constructing a pumping station near the outfall.

ID	Name	Project Subtype (Type)	Current Funding Sources
9067	Stabilize County Road 457 East of Mitchell's Cut	Community Infrastructure (Roadway/Bridge Elevation)	N/A

Status
Proposed / Conceptual

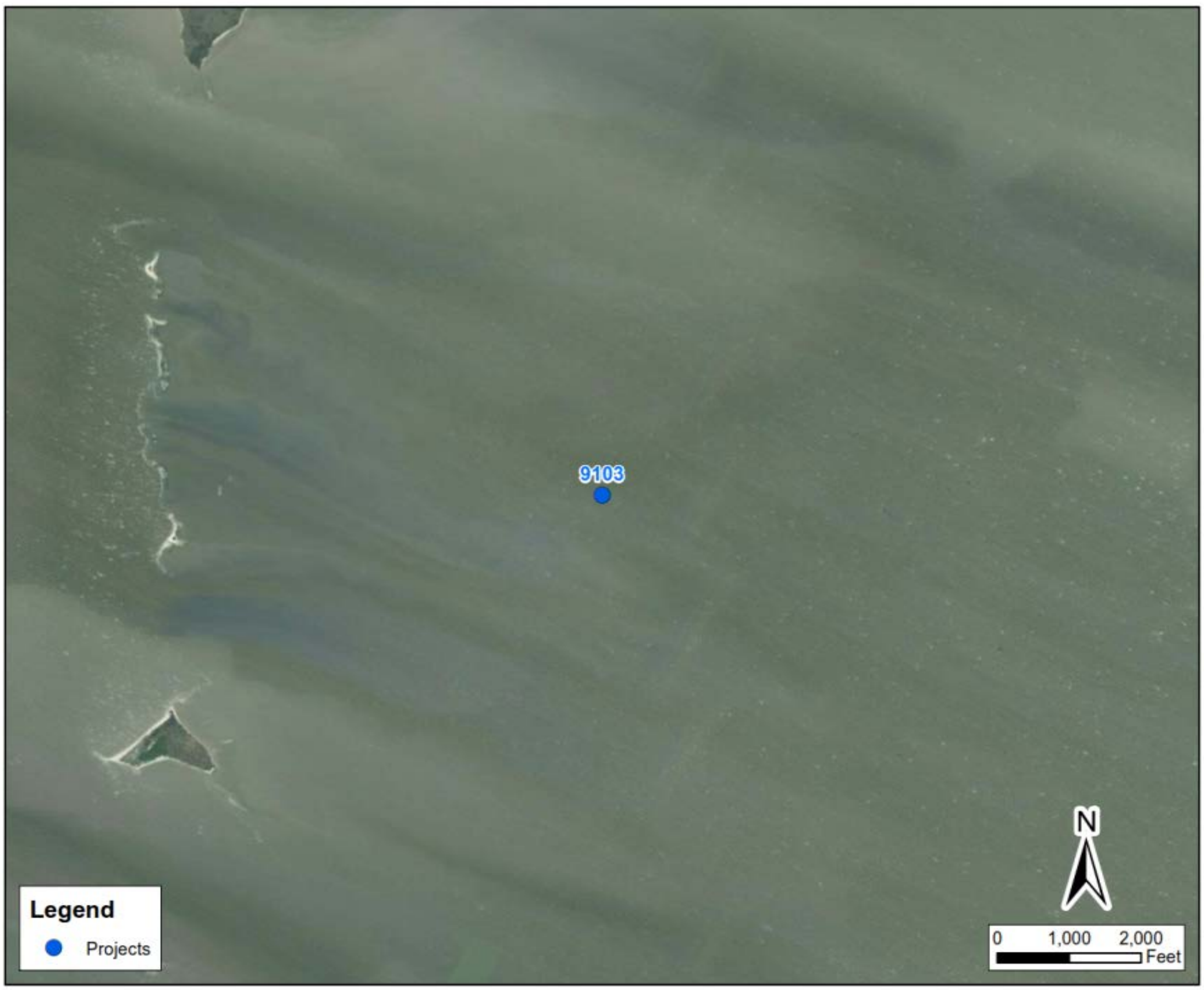
Action	Category	Resiliency Strategy
N/A	Conceptual	Land-Based Transit Enhancement

Description
Evaluate County Road 457 near Sargent for needed improvements, such as elevation and improved drainage under the roadway, as it is the primary evacuation route for this area. An alternative to elevating the roadway could be to stabilize the shoreline by restoring the beaches seaward of the roadway. This is a low lying area at risk for inundation during storms and due to future sea level rise.

ID	Name	Project Subtype (Type)	Current Funding Sources
9103	Lavaca Bay Oyster Reef Restoration	Habitat Creation and Restoration (Oyster Reef)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Matagorda Bay Oyster Reef Restoration, Monitoring and Planning	Conceptual	Oyster Reef Enhancement

Description
This project proposes oyster reef restoration/creation, as well as fish habitat restoration in Lavaca Bay. This would help with overall water quality and shoreline protection. This also could enhance the local economy through recreational fishing opportunities.



ID	Name	Project Subtype (Type)	Current Funding Sources
9105	Restore East Matagorda Bay Wetlands	Habitat Creation and Restoration (Estuarine Wetlands)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
N/A	Conceptual	Wetland Enhancement

Description
This project proposes to restore the wetlands in East Matagorda Bay, which were damaged during Hurricane Harvey. These wetlands are key birding, fishing and recreational areas.

ID	Name	Project Subtype (Type)	Current Funding Sources
9110	Stabilize Entrance to the Matagorda Ship Channel	Shoreline Stabilization (Jetty) Studies, Policies and Programs (Studies)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
N/A	Conceptual	Water-Based Transit Enhancement

Description
This project would design and make necessary modifications to the Matagorda Ship Channel entrance and tidal prism reduction to allow for stability of the jetties and through the overall pass. Currently, studies show that the currents in this area are volatile and dangerous to vessel transportation. A permanent solution would need to be determined and constructed.

ID	Name	Project Subtype (Type)	Current Funding Sources
9112	State Highway 185 Improvements	Community Infrastructure (Roadway/Bridge Repairs)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
N/A	Conceptual	Land-Based Transit Enhancement

Description
This project proposes storm hardening the State Highway 185 evacuation route for future storms and relative sea level rise predictions in Port O'Connor. A viable solution, such as improved culvert conveyance or road elevation, needs to be determined. Other storm hardening techniques include installing resilient pole and cable designs, relocating trees and undergrounding utilities.

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>9113</td><td>Oyster Lake - Matagorda Bay Shoreline Stabilization</td><td colspan="2" rowspan="3">Shoreline Stabilization (Misc. Wave Break)

Habitat Creation and Restoration (Estuarine Wetlands)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Conceptual</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Shoreline Protection, Nourishment and Enhancements</td><td>Conceptual</td><td colspan="2">Wetland Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">In the face of relative sea level rise, this project would protect the shoreline between Oyster Lake and Matagorda Bay. The land bridge between Oyster Lake and Matagorda Bay is in danger of erosion, which would entail losing the lake and surrounding area to the larger bay. Living shorelines may be a solution to build up the shoreline and prevent eventual breaching.</td></tr>
</table>

ID	Name	Project Subtype (Type)	Current Funding Sources
9114	Ocean Drive Living Shoreline	Shoreline Stabilization (Misc. Wave Break) Community Infrastructure (Roadway/Bridge Repairs) Habitat Creation and Restoration (Estuarine Wetlands)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Wetland Enhancement

Description
This project proposes to add a living shoreline or other stabilization / storm surge protection along Ocean Dr. near Indianola, heading north. Protecting the shoreline would also help protect the roadway, which serves as an evacuation route for the community.

ID	Name	Project Subtype (Type)		Current Funding Sources
9115	Port Lavaca Living Shoreline	Shoreline Stabilization (Misc. Wave Break)		N/A
		Habitat Creation and Restoration (Estuarine Wetlands)		

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Wetland Enhancement

Description
This project proposes to add a living shoreline at Port Lavaca to enhance wetlands and improve the quality of runoff into Lavaca Bay. The wetlands in this area have experienced minor erosion and degradation. A living shoreline in this area would be very visible to the public and could be used to help educate the public on the benefits of wetlands to stormwater treatment.

ID	Name	Project Subtype (Type)	Current Funding Sources
9116	Remove or Retrofit USACE Revetment	Shoreline Stabilization (Revetment) Habitat Creation and Restoration (Estuarine Wetlands)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Upland Enhancement

Description
Remove and/or replace the U.S. Army Corps of Engineers' revetment on the mainland with permeable materials to allow vegetation to establish. The 8-mile long revetment was constructed in 1998 to prevent both erosion of the shoreline and breaching of the GIWW. Devising a new solution for this area would improve the aesthetics of the shoreline. A solution that allows vegetation to establish and capture sand on the shoreline could improve the Gulf shoreline, which has been historically erosive.

ID	Name	Project Subtype (Type)	Current Funding Sources
9117	Palacios Shoreline Revitalization Project	Shoreline Stabilization (Seawall) Habitat Creation and Restoration (Estuarine Wetlands) Community Infrastructure (Drainage)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Responsible Development

Description
There are several ongoing activities in Palacios that may be combined into a multi-faceted project: 1) Repair of the seawall, which was damaged during hurricane Harvey; 2) Enhancements to the existing educational pavilion to expand and revitalize this section of shorefront; 3) Improvements to SH 35, which would benefit from improved green infrastructure, such as bioswales or multi-use lanes; and, 4) Marsh restoration along the shorefront to benefit stormwater runoff into Tres Palacios Bay.

ID	Name	Project Subtype (Type)	Current Funding Sources
9127	Beach Stabilization South of Matagorda Ship Channel Jetties	Beach Nourishment (Gulf)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Beach and Dune Enhancement

Description
The beach south of the Matagorda Ship Channel jetties is eroding rapidly and needs nourishment or stabilization. This project proposes to stabilize the shoreline using beach nourishment.

ID	Name	Project Subtype (Type)	Current Funding Sources
9128	Matagorda Bay Regional Acquisition Program	Land Acquisitions (Acquisitions) Habitat Creation and Restoration (Coastal Uplands)	N/A
Status			
Proposed / Conceptual			

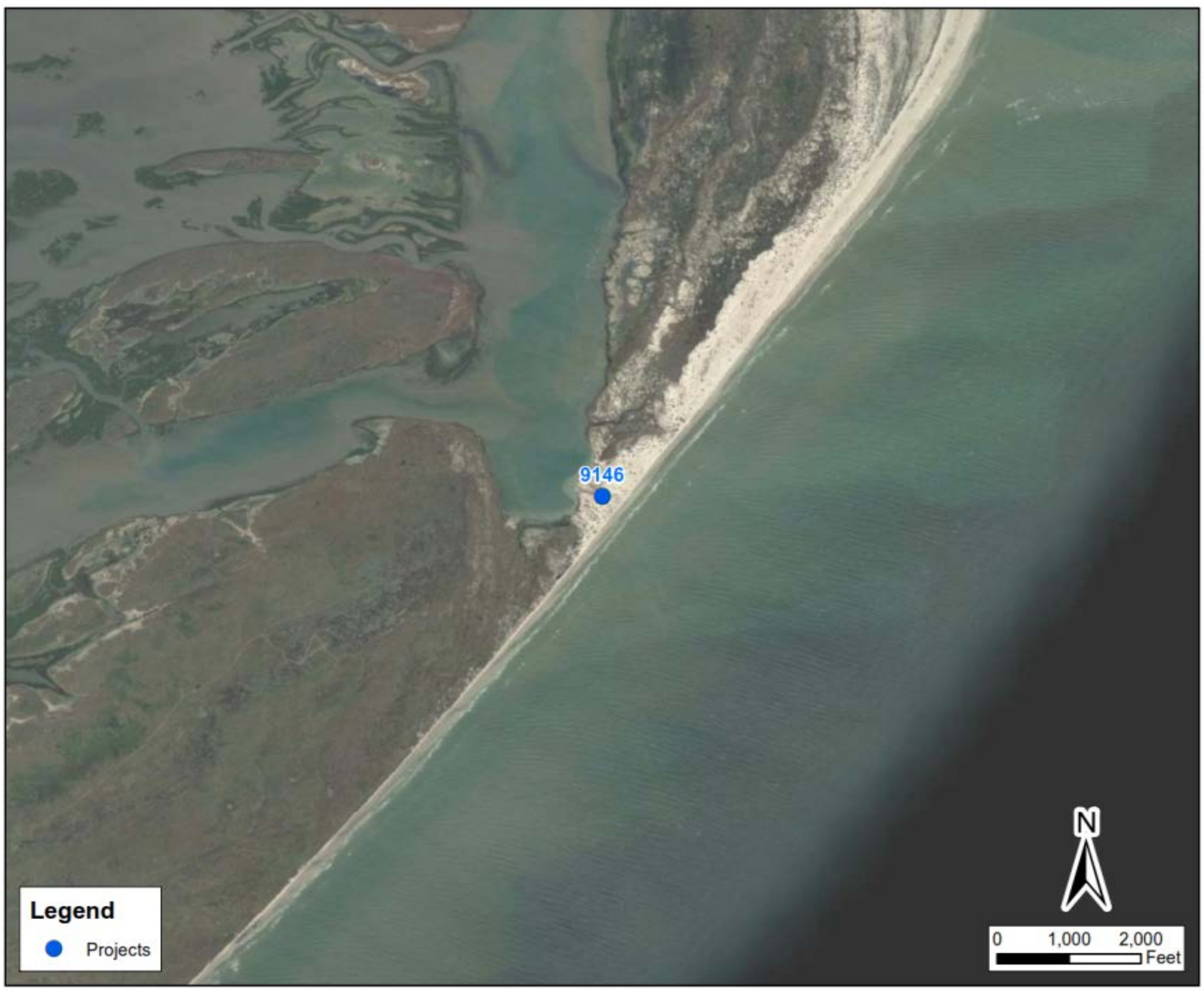
Action	Category	Resiliency Strategy
Matagorda Bay Hydrologic Planning and Management	Conceptual	Upland Enhancement

Description
This project proposes to acquire available properties on the mainland and on Matagorda Peninsula. Priority would be given to strategic properties, such as those that adjoin existing conservation areas or support the non-development of river deltas and floodplains.

ID	Name	Project Subtype (Type)	Current Funding Sources
9146	Restore Breach at Fish Pond on Matagorda Island	Environmental (Hydrologic Restoration)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Upland Enhancement

Description
This project proposes to restore the area near Fish Pond on Matagorda Island, which breached during Hurricane Harvey. The breach impacts the only barrier between the inland bay and the Gulf of Mexico, which could contribute to more saline waters flowing through the pass, and larger waves, which could lead to erosion of the habitats inland of the pass. This project would also be an opportunity to maintain the fish passes between Matagorda Bay and Espiritu Santo Bay, which are susceptible to closing when not maintained.



<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>9156</td><td>Freshwater Delivery from Colorado River to East Matagorda Bay</td><td colspan="2" rowspan="3">Environmental (Freshwater Inflow)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Conceptual</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Matagorda Bay Hydrologic Planning and Management</td><td>Conceptual</td><td colspan="2">Freshwater Inflow and Tidal Exchange Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">This project proposes delivering fresh water from the Lower Colorado River to East Matagorda Bay via re-routing gravity flow from the natural creeks and drainage ditches into the marshes on the north side of the GIWW. Delivering fresh water in this way would benefit the region’s ecology to a greater extent than pumping water directly into East Matagorda Bay. The length of pipeline needed for this scenario would be much less than a pump-fed scenario and the water would be delivered into nursery areas, rather than the middle of the bay.</td></tr>
</table>

ID	Name	Project Subtype (Type)	Current Funding Sources
10006	Monitoring and Future Maintenance of Barrier Island Backside Wetlands on Matagorda Island and Matagorda Peninsula	Habitat Creation and Restoration (Estuarine Wetlands) Shoreline Stabilization (Breakwaters)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Conceptual	Wetland Enhancement

Description
This project proposes to monitor the wetlands on the back side of Matagorda Island and Matagorda Peninsula that are vulnerable to future relative sea level rise. Monitoring will inform if there are long-term needs to maintain the wetland system in the future by depositing sediment, planting and/or constructing rock breakwaters. Maintaining these wetlands would provide a healthy ecological system over the long-term.

Worksheet Example and Instructions for Detailed Projects, Conceptual Projects and Planning Projects

Each TAC member will be provided worksheets for completion for each category of project. An example of the worksheet for the **detailed**, **conceptual** and **planning** projects is shown below, with instructions given in the blue highlighted boxes.

The provided ID and project name allow for cross-referencing with the more detailed information provided in the Information Packet.

Please fill in the IOC boxes below with the corresponding level of benefit achieved by this project.
0 – no benefit 1 – slight benefit 2 - moderate benefit 3 - high benefit 4 - essential

ID 9062:	Restore Upper and Lower Laguna Madre Dredge Placement and Rookery Islands						
ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
Feasibility (0-4)	Notes:						
Priority (Y/N)							

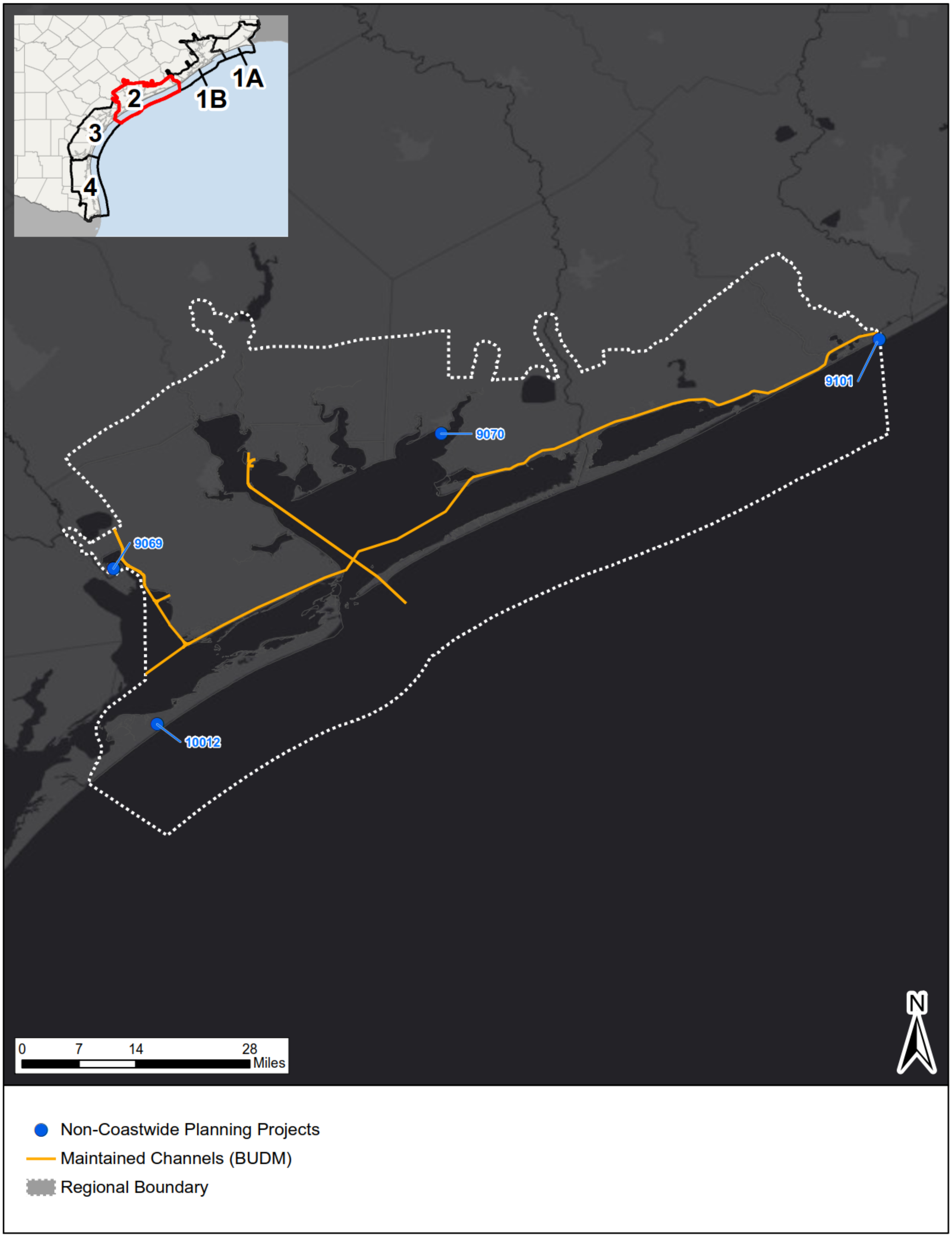
Would you consider this project a <u>priority</u> for coastal resiliency in this region? (Y/N)

What is the <u>feasibility</u> of executing this project?
0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Under **"Notes,"** provide additional information. For example, additional project details, known impediments to implementing this project, ways the project could be improved, and thoughts on project goals or intent.

Project Evaluations – Planning Projects

ID	Project Name	Resiliency Strategy	Action
9069	San Antonio Bay Hydrologic Regional Watershed Plan	Freshwater Inflow and Tidal Exchange Enhancement	Guadalupe River Delta Comprehensive Planning
9070	Matagorda Bay Regional Inflow Study	Freshwater Inflow and Tidal Exchange Enhancement	Matagorda Bay Hydrologic Planning and Management
9090	Coastwide Subsidence Studies and Monitoring	Programs	Coastwide Planning
9093	Coastwide Dune Management and Access Plan	Plans	Coastwide Planning
9095	Coastwide Evacuation Route Study for Coastal Resilience	Land-Based Transit Enhancement	Coastwide Planning
9097	Coastwide Longshore Transport Modeling	Beach and Dune Enhancement	Coastwide Planning
9101	Brazos River and San Bernard River Restoration Strategy and Management Plan	Freshwater Inflow and Tidal Exchange Enhancement	Matagorda Bay Hydrologic Planning and Management
9111	Coastwide Community Drainage and Responsible Development Program	Responsible Development	Coastwide Planning
9118	Coastwide Long-Term Hydrologic Monitoring Program	Programs	Coastwide Planning
9151	Coastwide Emergency Response Boat Access Initiative	Programs	Coastwide Planning
9164	Coastwide Texas Seagrass Restoration	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
10012	Hurricane Harvey Recovery Maintenance and Monitoring on San Jose Island and Matagorda Island	Beach and Dune Enhancement	Shoreline Protection, Nourishment and Enhancements
10013	Coastwide Data Collection to Support Continual Updates to the National Wetlands Inventory Dataset	Programs	Coastwide Planning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Miles
N
Non-Coastwide Planning Projects
Maintained Channels (BUDM)
Regional Boundary

ID	Name	Project Subtype (Type)	Current Funding Sources
9069	San Antonio Bay Hydrologic Regional Watershed Plan	Studies, Policies and Programs (Plans) Environmental (Freshwater Inflow)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Guadalupe River Delta Comprehensive Planning	Planning	Freshwater Inflow and Tidal Exchange Enhancement

Description
Regional watershed planning is needed for large-scale storm events, based on experience from flooding during Hurricane Harvey. This plan would investigate the viability of alternative options for water quality and stormwater volumes. This could include relocating sediment buildup behind dams, collaborating with industry to create strategies for natural infrastructure to improve treatment and mitigate pollution, outreach or incentives for farming communities to use vegetative buffers between agricultural lands and the bays, and installing piping to redirect and retain floodwaters upstream. This plan would also identify locations for permanent monitoring stations to allow for monitoring and adaptive management throughout the watershed.

ID	Name	Project Subtype (Type)	Current Funding Sources
9070	Matagorda Bay Regional Inflow Study	Studies, Policies and Programs (Studies) Environmental (Freshwater Inflow)	N/A
Status			
Proposed / Study			

Action	Category	Resiliency Strategy
Matagorda Bay Hydrologic Planning and Management	Planning	Freshwater Inflow and Tidal Exchange Enhancement

Description
This project proposes to conduct a regional drainage study to describe current conditions and propose management solutions to freshwater inflow concerns. Particular areas of concern include freshwater flows to Lake Austin, Boggy Bayou, Matagorda Bay, and Caney Creek watershed to Sargent.

ID	Name	Project Subtype (Type)	Current Funding Sources
9090	Coastwide Subsidence Studies and Monitoring	Studies, Policies and Programs (Programs)	N/A
Status			
Proposed / Study			

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Programs

Description
Enhance or fund subsidence studies and subsidence monitoring efforts, particularly in Houston-Galveston and Rockport areas. There are limited amounts of data currently available. These efforts would help coastal communities to understand historical subsidence and future patterns of subsidence. This data would also be useful for modeling past, present and future conditions along the coast, and can then be used to guide policy and management in light of coastal resiliency.

ID	Name	Project Subtype (Type)	Current Funding Sources
9093	Coastwide Dune Management and Access Plan	Studies, Policies and Programs (Plans) Public Access and Improvements (Public Access) Dune Restoration (Dune)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Plans

Description
Develop a comprehensive dune management plan and identify a set of desired future conditions that would support adequate dune protection. This plan would take concepts from existing Erosion Response Plans from various coastal communities, and consolidate them into a coastwide management strategy. The plan's developers would identify opportunities to coordinate with state and regulatory agencies to prepare for current and future needs of dune restoration along the coast, while keeping Open Beaches Act and other statutes in mind. This plan would also include recommendations for dune management based on FEMA data and storm surge modeling.

ID	Name	Project Subtype (Type)	Current Funding Sources
9095	Coastwide Evacuation Route Study for Coastal Resilience	Studies, Policies and Programs (Study) Community Infrastructure (Roadway/Bridge Elevation)	N/A
Status			
Proposed / Study			

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Land-Based Transit Enhancement

Description
Conduct a coastwide study to ensure evacuation routes are improved and up-to-date with future conditions.

ID	Name	Project Subtype (Type)	Current Funding Sources
9097	Coastwide Longshore Transport Modeling	Studies, Policies and Programs (Study) Beach Nourishment (Gulf)	N/A
Status			
Proposed / Study			

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Beach and Dune Enhancement

Description
Model longshore transport mechanisms to better understand where, when and how beach nourishment projects occur. This would assist the broader Texas coastal community in determining the most cost effective and viable solutions for improving Texas beaches over the long-term.

ID	Name	Project Subtype (Type)	Current Funding Sources
9101	Brazos River and San Bernard River Restoration Strategy and Management Plan	Studies, Policies and Programs (Studies) Environmental (Hydrologic Restoration)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Matagorda Bay Hydrologic Planning and Management	Planning	Freshwater Inflow and Tidal Exchange Enhancement

Description

This project proposes a management plan and restoration strategy for the Brazos River and the San Bernard River that would include BUDM. The hydrology of the Brazos River, San Bernard River and Caney Creek has been disrupted by the GIWW and by the redirection of the Brazos River. This has resulted in modifications to openings to the Gulf of Mexico and sedimentary processes. Specific issues include sediment starvation of Sargent Beach, increased sediment deposition in the Cedar Lakes system, closure of the San Bernard River mouth, opening and closing of Cedar Lake Cut, and increased deltaic processes in East Matagorda Bay at Mitchell's Cut. While these changes have both positive and negative impacts on natural resources and the human environment, the region’s hydrologic interactions are not well understood. As such, an evaluation of the network as a whole should occur, with the development of long-term solutions. A restoration strategy should have three components. First, develop a study plan that would provide meaningful information about the behavior of the network and provide a foundation that would support long-term solutions to restore the San Bernard River mouth, reduce sedimentation in the GIWW and Cedar Lakes System, improve nearshore sediment transport to Sargent, and minimize maintenance and repeated investments that yield the same results. Second, conduct a feasibility study to develop a restoration plan that includes structural and non-structural solutions to address the issue. Third, implement the restoration plan.

ID	Name	Project Subtype (Type)	Current Funding Sources
9111	Coastwide Community Drainage and Responsible Development Program	Studies, Policies and Programs (Programs) Environmental (Hydrologic Restoration)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Responsible Development

Description

Implement a program to assist coastal communities with improving existing infrastructure, planning for future development, and creating financial strategies to fund improvements and future work. Particular emphasis would be given to improving stormwater management and drainage.

ID	Name	Project Subtype (Type)	Current Funding Sources
9118	Coastwide Long-Term Hydrologic Monitoring Program	Studies, Policies and Programs (Programs)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Coastwide Planning	Conceptual	Programs

Description
Install permanent monitoring stations at key areas to be determined along the coast to collect long-term data for freshwater inflows and other parameters, such as wind speed, rainfall, air quality and water level. Include monitoring components for both surface water and groundwater.

ID	Name	Project Subtype (Type)	Current Funding Sources
9151	Coastwide Emergency Response Boat Access Initiative	Studies, Policies and Programs (Programs) Public Access and Improvements (Public Access)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Programs

Description
Assist communities to construct additional boat ramps for emergency response purposes. Several coastal communities noted areas that would have benefitted from additional boat ramps for evacuation purposes during Hurricane Harvey. The ramps would also be useful for responses to fish kills and oil spills.

ID	Name	Project Subtype (Type)	Current Funding Sources
9164	Coastwide Texas Seagrass Restoration	Habitat Creation and Restoration (Seagrasses) Studies, Policies and Programs (Studies) Wildlife (Fish)	N/A
Status			
Ongoing / Permitted			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Planning	Wetland Enhancement

Description
Strengthening the resilience of Texas shorelines and bay bottom sediments entails revivifying the important services of seagrass ecosystems. In Texas bays, 80 percent or more of seagrass has been destroyed by industrial and urban development. Only 233,000 acres of the seagrass remains from Texas's original 1,922,500 acres of seagrass at the turn of the last century (the greatest seagrass total loss for a U.S. state in the Gulf of Mexico). Texas needs an overall plan to restore the ecosystem services provided by seagrasses, which include stabilizing bay shorelines, enhancing fish nurseries, nutrient recycling, creating clearer water and producing buried carbon. This buried carbon is a natural seagrass process of handling excess carbon dioxide by extracting excess carbon dioxide from air and water (from excess CO2 emissions of power plants, oil refineries and vehicles). There are goals of this project. 1.) To stabilize areas proximate to shorelines. 2.) To create lost fish nurseries, which are beneficial to Texas citizens and tourism, and the fishing industry. 3.) To create long-term carbon sequestration at sites and sell as carbon credits to offset the Texas carbon emission footprint. This project has some permits in hand and is shovel-ready where testing for seagrass restoration has been completed (Laguna Madre, Corpus Christi Bay, Galveston Bay, St. Charles Bay and Aransas Bay).

ID	Name	Project Subtype (Type)	Current Funding Sources
10012	Hurricane Harvey Recovery Maintenance and Monitoring on San Jose Island and Matagorda Island	Dune Restoration (Dune) Studies, Policies and Programs (Studies)	N/A
Status			
Proposed / Monitoring			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Planning	Beach and Dune Enhancement

Description
Provide shoreline maintenance (for instance, relocating sand, beach and dune nourishment, installing sand fences and planting) and monitoring to support recovery of the dunes that were impacted by Hurricane Harvey. This would assist dune re-establishment in the short-term, and provide data to support future rebuilding efforts for shorelines impacted by storms in the long-term. This project would allow the island to continue to provide storm surge protection to this portion of the coast, now and into the future.

ID	Name	Project Subtype (Type)	Current Funding Sources
10013	Coastwide Data Collection to Support Continual Updates to the National Wetlands Inventory Dataset	Studies, Policies and Programs (Programs) Habitat Creation and Restoration (Estuarine and Freshwater Wetlands)	N/A

Status
Proposed / Monitoring

Action	Category	Resiliency Strategy
Coastwide Planning	Planning	Programs

Description
Implement a program to collect data along the coast to allow for continual updates to the National Wetlands Inventory (NWI). The NWI is a key dataset that is used coastwide to support academic research, modeling, permitting, engineering, and design of coastally significant projects.

Worksheet Example and Instructions for 2017 Tier 1 Projects

An example of the worksheet for the **2017 Tier 1** projects category is shown below, with instructions shown in the blue highlighted boxes.

The provided ID and project name allow for cross-referencing with the more detailed information provided in the information packet.

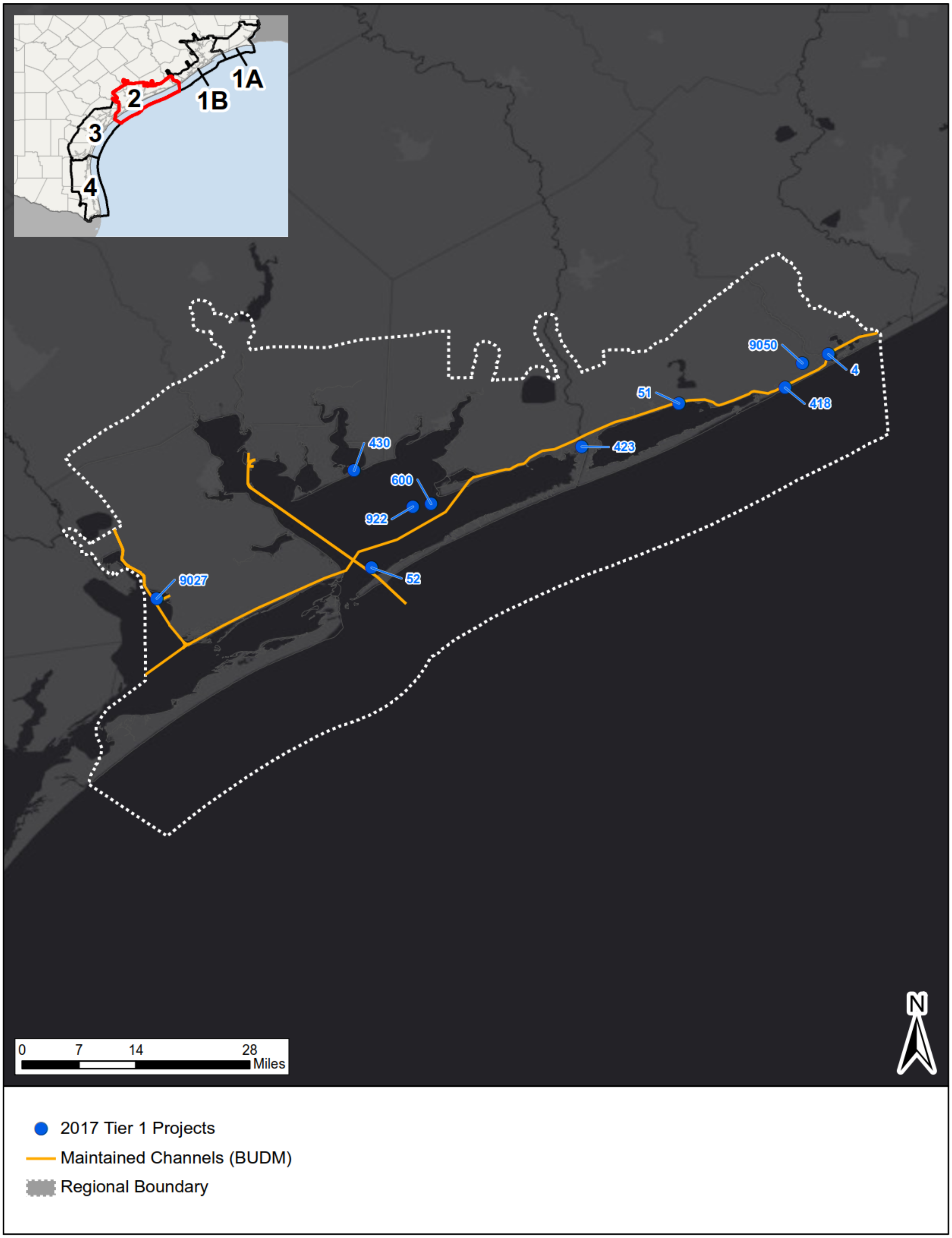
ID 96:	Bahia Grande Hydrologic Restoration
Agree (Y/N)	Notes:

2017 Tier 1 projects are considered high priority under the 2019 Plan unless noted otherwise. Use this worksheet to document whether you agree with the project remaining a Tier 1 project (Y/N). If your response is "no" (N), please provide additional information on why you think it should change using the "Notes" section.

Some considerations include: Is the project no longer feasible? If so, why not? Is the project complete? Is new information available that influences your decision? What is that information (e.g., Phase 1 is complete; Phase 2 and 3 still need funding)?

Project Evaluations – Tier 1 (2017) Projects

ID	Name	Resiliency Strategy	Action
4	Brazos River to Cedar Lake Creek GIWW Stabilization	Water-Based Transit Enhancement	Shoreline Protection, Nourishment and Enhancements
51	Boggy Cut GIWW Stabilization	Water-Based Transit Enhancement	Shoreline Protection, Nourishment and Enhancements
52	Chester's Island Restoration	Rookery Island Enhancement	San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation
418	Sargent Beach & Dune Restoration	Beach and Dune Enhancement	Shoreline Protection, Nourishment and Enhancements
423	Matagorda Bay System Hydrologic Restoration Study	Freshwater Inflow and Tidal Exchange Enhancement	Matagorda Bay Hydrologic Planning and Management
430	Redfish Lake Living Shoreline	Wetland Enhancement	Shoreline Protection, Nourishment and Enhancements
600	Half Moon Oyster Reef Restoration - Phase 3	Oyster Reef Enhancement	Matagorda Bay Oyster Reef Restoration, Monitoring and Planning
922	Oliver Point and Chinquapin Oyster Reef Restoration	Oyster Reef Enhancement	Matagorda Bay Oyster Reef Restoration, Monitoring and Planning
9027	San Antonio Bay Rookery Island Restoration	Rookery Island Enhancement	San Antonio Bay and Matagorda Bay Rookery Island Protection, Creation and Restoration
9050	Sargent Ranch Addition to San Bernard National Wildlife Refuge	Upland Enhancement	N/A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Miles
N
2017 Tier 1 Projects
Maintained Channels (BUDM)
Regional Boundary

ID	Name	Project Subtype (Type)	Current Funding Sources
4	Brazos River to Cedar Lake Creek GIWW Stabilization	Shoreline Stabilization (Breakwaters) Habitat Creation and Restoration (Estuarine Wetlands)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Tier 1 (2017)	Water-Based Transit Enhancement

Description
The project would allow for the construction of breakwaters or a living shoreline along approximately 20 miles of the GIWW, and the restoration of wetlands adjacent to the GIWW. Both sides of the GIWW require restoration, but restoring the southern side would provide some secondary benefits to the northern side. The proposed project methodology would be evaluated closely to avoid adverse impacts on water circulation patterns and oyster habitat within the lakes. Shoreline erosion along the GIWW is creating frequent shoaling in the channel and increasing erosion of adjacent, inland wetlands. The erosion of these barrier islands threatens not only the GIWW, but also reduces habitat to important and diverse aquatic and avian species.

ID	Name	Project Subtype (Type)	Current Funding Sources
51	Boggy Cut GIWW Stabilization	Shoreline Stabilization (Breakwaters) Habitat Creation and Restoration (Estuarine Wetlands) Land Acquisitions (Acquisitions)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Tier 1 (2017)	Water-Based Transit Enhancement

Description
To mitigate erosion caused by wind, waves and ship wakes in the GIWW near Boggy Cut, the project proposes up to 20 miles of barrier island restoration or construction of breakwaters and wetland restoration where island restoration is not feasible. The project could also include acquisition of private property adjacent to the GIWW, if willing sellers can be located, in an effort to restore coastal habitats and develop a more resilient coastline in the area. If the project does not occur, erosion in this area would worsen, and the GIWW would be further exposed to breaching from the adjacent bay systems, lowering the efficiency of its use to transport cargo.

ID	Name	Project Subtype (Type)	Current Funding Sources
52	Chester's Island Restoration	Shoreline Stabilization (Misc. Wave Break) Habitat Creation and Restoration (Rookery Islands) Wildlife (Birds, Invasive Species)	N/A

Status
Proposed / Shovel Ready

Action	Category	Resiliency Strategy
San Antonio Bay and Matagorda Bay Rookery Island Protection, Restoration and Creation	Tier 1 (2017)	Rookery Island Enhancement

Description
The project would slow the erosion of the rookery island and add 30 acres of land using nearshore breakwaters. Additional work could include invasive species control. Funding is available for a feasibility study and a nourishment template. This project is designed and permitted, and identifies potential sites for beneficial use materials to be used to rebuild eroded land. The enhancement of this habitat is critical for the millions of migrating birds that fly through Texas semi-annually, and also provides nesting areas for colonial waterbirds.

ID	Name	Project Subtype (Type)	Current Funding Sources
418	Sargent Beach & Dune Restoration	Beach Nourishment (Gulf)	N/A
Status			
Proposed / Conceptual			

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Tier 1 (2017)	Beach and Dune Enhancement

Description
The project would nourish and restore approximately 8 miles of beach shoreline and dunes on Sargent Beach. This solution could include constructing groins or detached breakwaters to retain sediment on the beach to slow the natural processes of offshore transport. The nourishment efforts would primarily rely on sand sources that developed nearshore along the Brazos and San Bernard River deltas, with the additional possibility of a source offshore in the Colorado River Delta. A recommendation of phased 2-mile stretches of shoreline, focused on critical needs, is proposed to account for sediment and budget limitations, as opposed to addressing the full project length in a single phase of work.

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>423</td><td>Matagorda Bay System Hydrologic Restoration Study</td><td colspan="2" rowspan="3">Studies, Policies and Programs (Studies)

Environmental (Hydrologic Restoration)

Habitat Creation and Restoration (Estuarine Wetlands, Fisheries)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Study</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Matagorda Bay Hydrologic Planning and Management</td><td>Tier 1 (2017)</td><td colspan="2">Freshwater Inflow and Tidal Exchange Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">The project includes a study or adaptive management plan to develop a path towards restoring healthy inflows to the bays in order to meet environmental flow recommendations for the system. The adaptive management plan would identify how to best restore coastal ecosystems within the delta regime in a manner that is more resilient to freshwater inflow fluctuations. The Matagorda Bay System is experiencing losses of freshwater inflows from the Colorado River and Lavaca River, as well as numerous other small water bodies. This lack of freshwater inflows to Matagorda Bay and its minor bays is a systemic problem that has the potential to undermine the restoration of the rest of the area's coastal habitats, including fisheries and wetlands, by depleting nutrients needed by downstream ecosystems to maintain their functionalities.</td></tr>
</table>

ID	Name	Project Subtype (Type)	Current Funding Sources
430	Redfish Lake Living Shoreline	Shoreline Stabilization (Breakwater) Habitat Creation and Restoration (Estuarine Wetlands)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
Shoreline Protection, Nourishment and Enhancements	Tier 1 (2017)	Wetland Enhancement

Description
The project would allow for the rebuilding and reconnection of the breached bayside hook back to the peninsula with approximately 3 miles of living shoreline. There are depleted oyster reefs in this area, which could be restored as part of the living shoreline. Healthy oyster reefs can create natural wave breaks due to the added elevation and structure of the reef, and can be incorporated into the living shoreline design for additional benefits. The peninsula typically separating Redfish Lake from Matagorda Bay is breached, causing saltwater intrusion into Redfish Lake that is degrading wetlands, seagrasses and other marine habitats in the area.

ID	Name	Project Subtype (Type)	Current Funding Sources
600	Half Moon Oyster Reef Restoration - Phase 3	Habitat Creation and Restoration (Oyster Reefs) Wildlife (Fish)	N/A

Status
Proposed / Shovel Ready

Action	Category	Resiliency Strategy
Matagorda Bay Oyster Reef Restoration, Monitoring and Planning	Tier 1 (2017)	Oyster Reef Enhancement

Description
Under this project, 30 acres of reef habitat would be restored at Half Moon Oyster Reef in Matagorda Bay. The project is shovel-ready (designed, permitted and leased) and would support a high economic value, popular recreational fishing area. The Nature Conservancy's 2016 study of 54 previously restored acres at Half Moon Reef showed that the oyster reef restoration caused recreational fishing activity to surge, resulting in an increase of $691,000 of the state's gross domestic product per year and over $1.2 million in annual economic activity.

<table>
<tr><th>ID</th><th>Name</th><th colspan="2">Project Subtype (Type)</th><th>Current Funding Sources</th></tr>
<tr><td>922</td><td>Oliver Point and Chinquapin Oyster Reef Restoration</td><td colspan="2" rowspan="3">Habitat Creation and Restoration (Oyster Reefs)</td><td rowspan="3">N/A</td></tr>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Proposed / Conceptual</td></tr>
<tr><th colspan="2">Action</th><th>Category</th><th colspan="2">Resiliency Strategy</th></tr>
<tr><td colspan="2">Matagorda Bay Oyster Reef Restoration, Monitoring and Planning</td><td>Tier 1 (2017)</td><td colspan="2">Oyster Reef Enhancement</td></tr>
<tr><th colspan="5">Description</th></tr>
<tr><td colspan="5">The project would allow for the restoration of approximately 10 acres of the legacy Oliver Point Oyster Reef in Matagorda Bay and approximately 10 acres of oyster reef restoration on the legacy Chinquapin Reef in East Matagorda Bay. The proximity of the reef to the GIWW would be considered during restoration planning. The East Matagorda Bay oyster reefs are harvestable, and are a public resource and a popular fishing location. Improved water quality, increased recreational fishing opportunities, enhanced marine biodiversity and other ecosystem benefits are anticipated with a completed project.</td></tr>
</table>

ID	Name	Project Subtype (Type)	Current Funding Sources
9027	San Antonio Bay Rookery Island Restoration	Habitat Creation and Restoration (Rookery Islands)	N/A

Status
Proposed / Conceptual

Action	Category	Resiliency Strategy
San Antonio Bay and Matagorda Bay Rookery Island Protection, Creation and Restoration	Tier 1 (2017)	Rookery Island Enhancement

Description
The loss of nesting habitat in San Antonio Bay has led to a decline in herons, egrets, black skimmers and brown pelicans. This impacts the entire Texas Gulf coast rookery island chain and the local economy. An initial site assessment of San Antonio Bay identified five locations of previously functioning rookery islands that are suitable for reconstruction. This project would allow for the restoration of an historical rookery island utilizing one or more of the five identified locations. Beneficial use of dredged material would be used from the adjacent channels, when possible, for reconstruction.

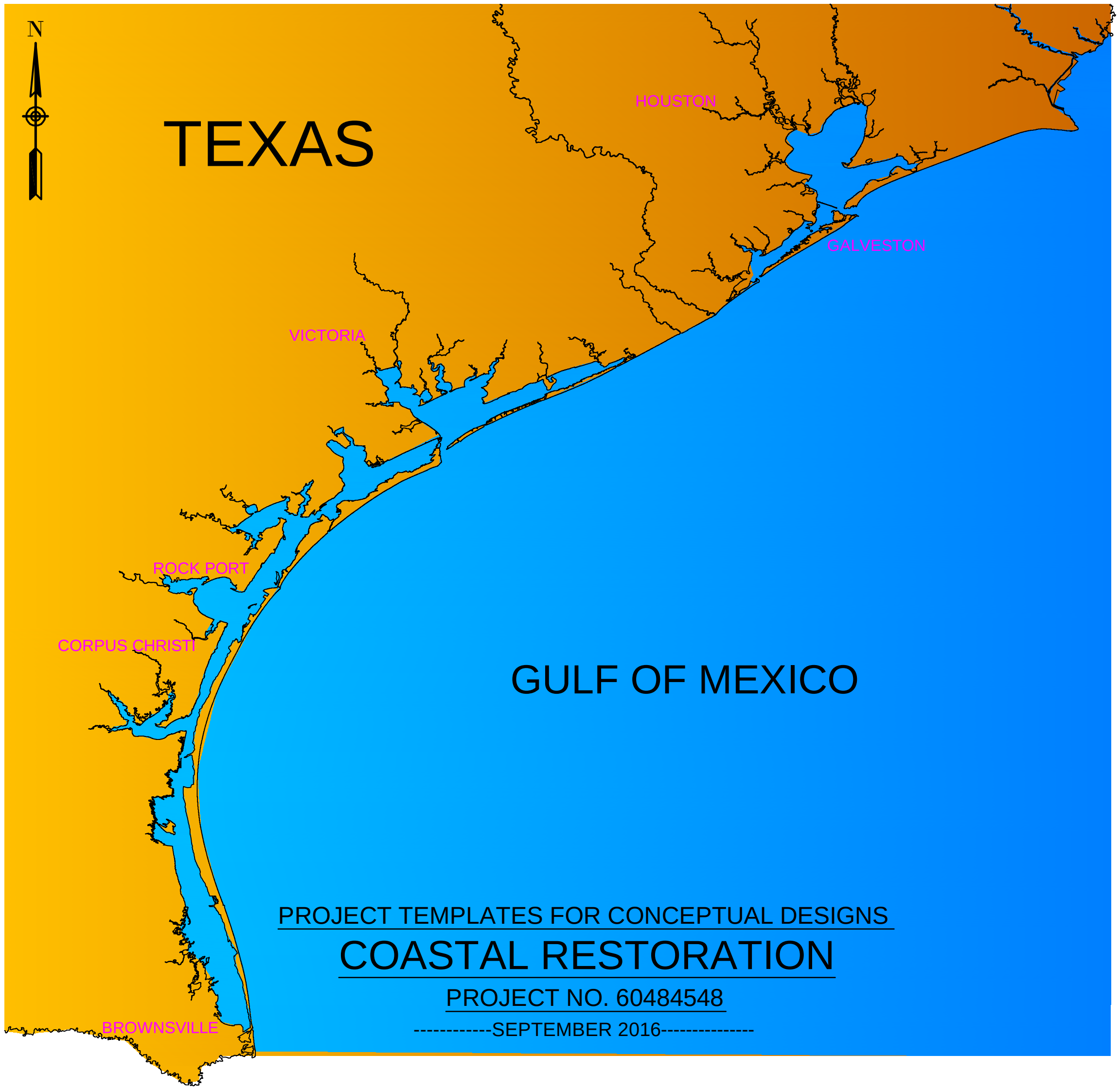
ID	Name	Project Subtype (Type)	Current Funding Sources
9050	Sargent Ranch Addition to San Bernard National Wildlife Refuge	Land Acquisitions (Acquisitions) Habitat Creation and Restoration (Coastal Uplands)	N/A
Status	Proposed / Acquisition Pending		

Action	Category	Resiliency Strategy
N/A	Tier 1 (2017)	Upland Enhancement

Description
The project would allow for the acquisition of Sargent Ranch, approximately 8,000 acres of habitat surrounded by the San Bernard National Wildlife Refuge, by the U.S. Fish and Wildlife Service. The acquisition of Sargent Ranch would connect large portions of the refuge and make it possible to manage and protect important coastal dune and beach habitat for nesting sea turtles, piping plovers and a great diversity of waterfowl and water birds. The ranch stretches from the Gulf inland and includes beaches, dunes, prairies, extensive estuarine and freshwater wetlands, and Columbia Bottomland forests dominated by large old live oaks. The protection of the beach dunes also would improve the resiliency of this portion of the coast to storms and sea level rise, and allow the natural migration of wetlands and other habitats over time.

Appendix E. Project Cost Assessments

Standard Project Templates for Conceptual Designs



PROJECT TEMPLATES FOR CONCEPTUAL DESIGNS

COASTAL RESTORATION

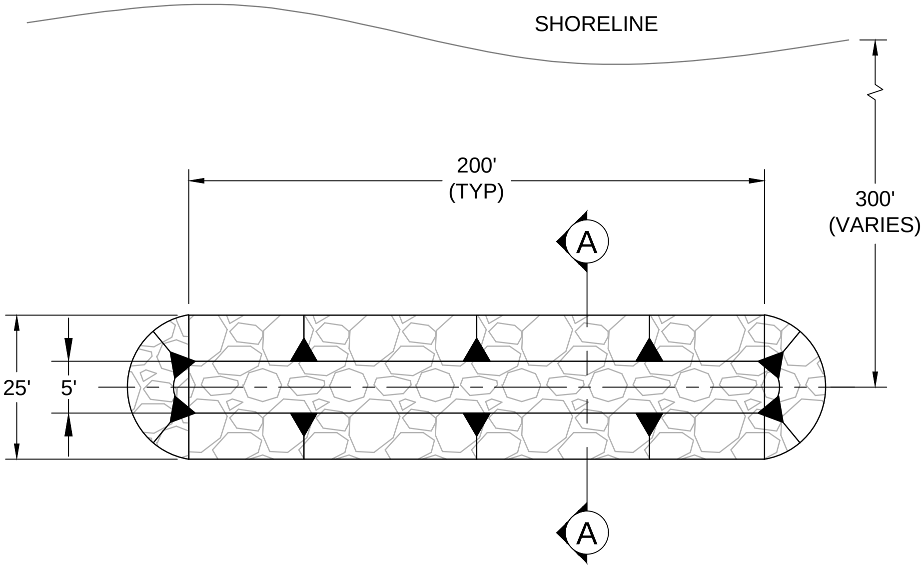
PROJECT NO. 60484548

------------SEPTEMBER 2016---------------

Sheet Index

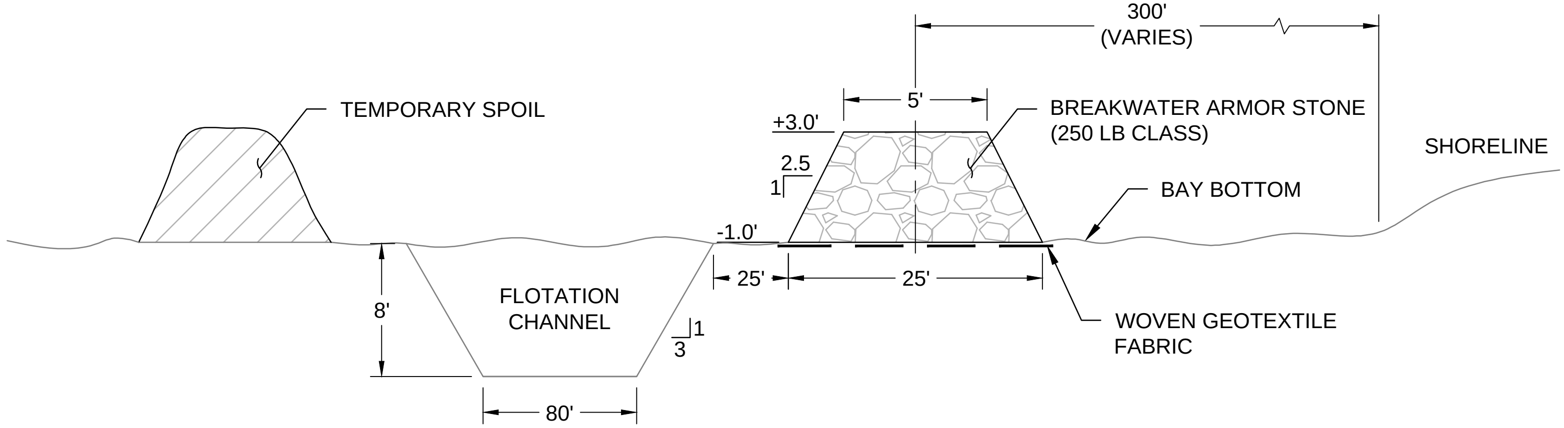
LEGEND

(armor stone pattern)	BREAKWATER ARMOR STONE
— —	WOVEN GEOTEXTILE FABRIC
——	EXISTING BAY BOTTOM



BREAKWATER PLAN VIEW

N.T.S.



BREAKWATER TYPICAL SECTION A-A

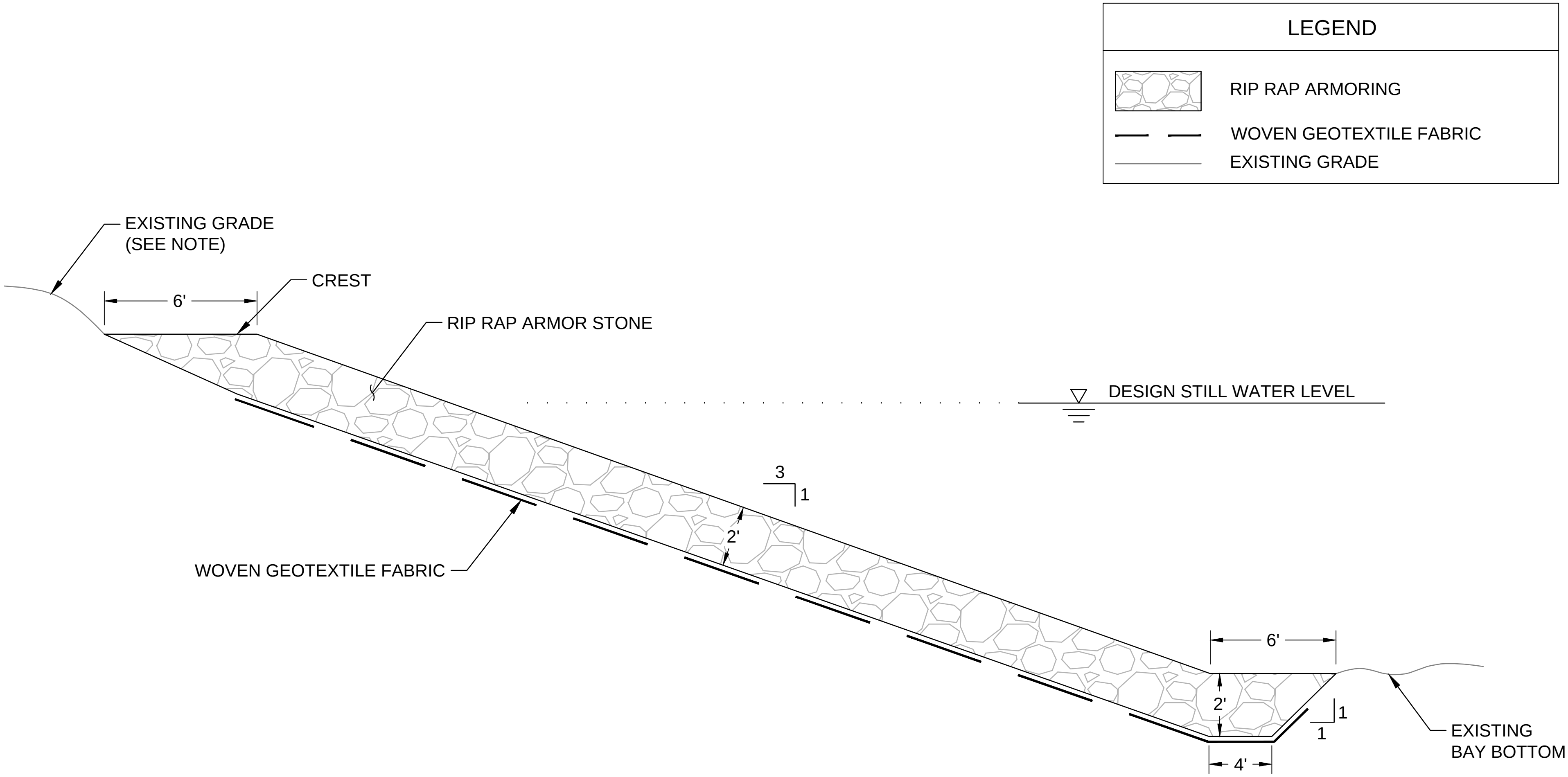
N.T.S.

NOTE:

1. LOCAL, TEXAS ROCK SOURCE PREFERRED.
2. MEASURED TO PROVIDE PROTECTION FROM 3 FOOT WAVE.

BREAKWATERS
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

AECOM
SHEET 02



REVETMENT

N.T.S.

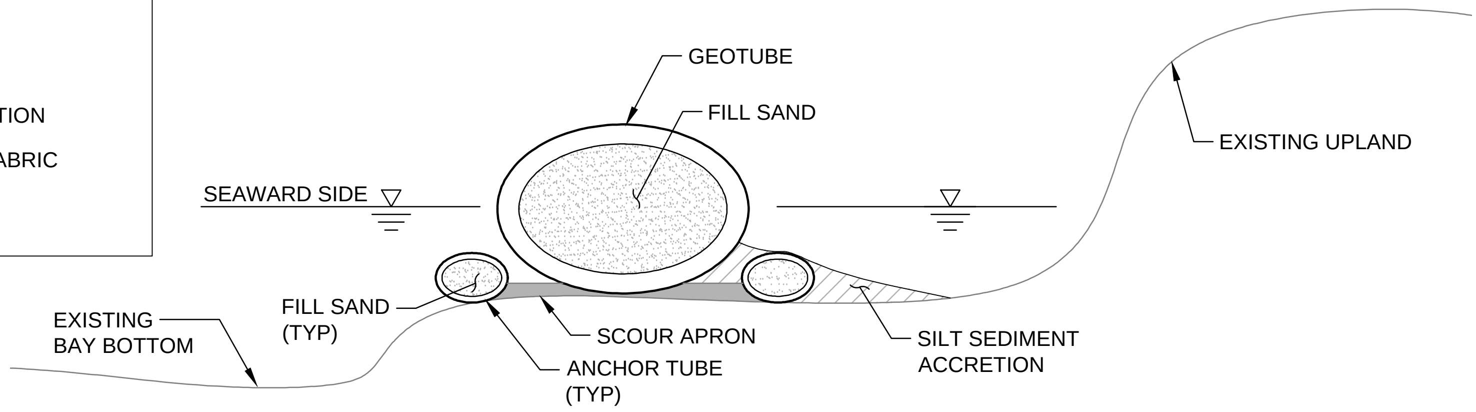
NOTE:

1. SOME EARTHWORK IS ASSUMED NECESSARY TO REGRADE EXISTING SURFACE.

2. LOCAL, TEXAS ROCK SOURCE PREFERRED.

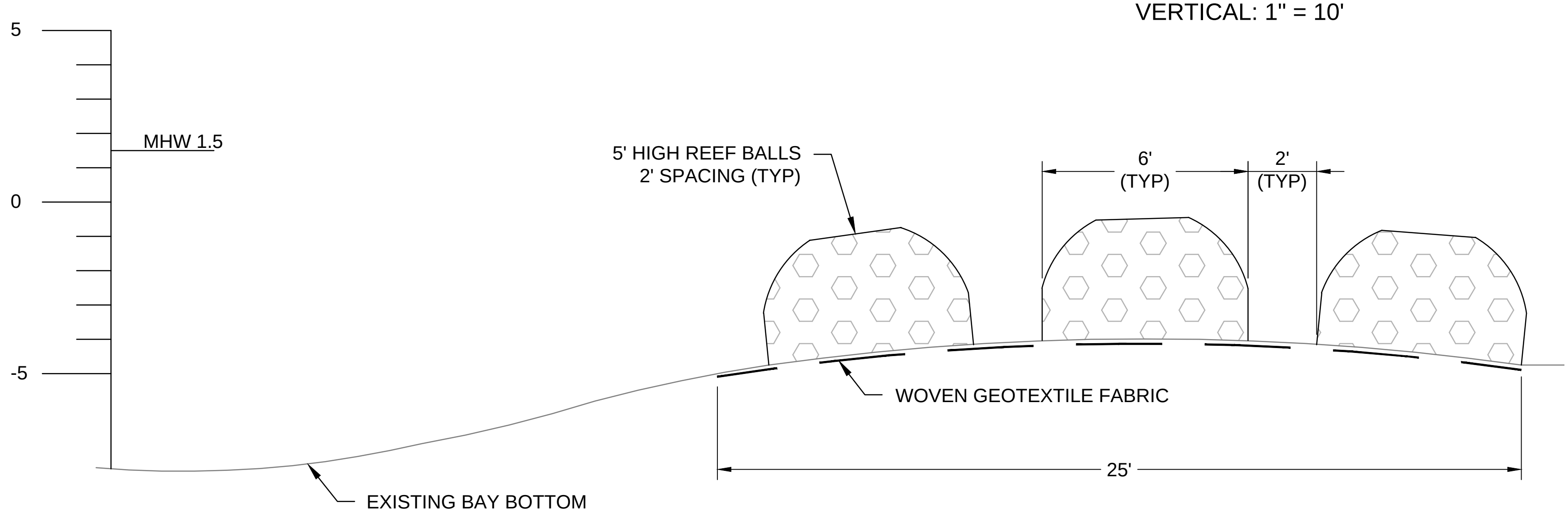
LEGEND

- ARTIFICIAL REEF MATERIAL
- FILL SAND
- SILT SEDIMENT ACCRETION
- WOVEN GEOTEXTILE FABRIC
- GEOTEXTILE TUBE
- EXISTING GRADE



SHORELINE PROTECTION FOR LAKES & BAYS

HORIZONTAL: 1" = 40'
VERTICAL: 1" = 10'



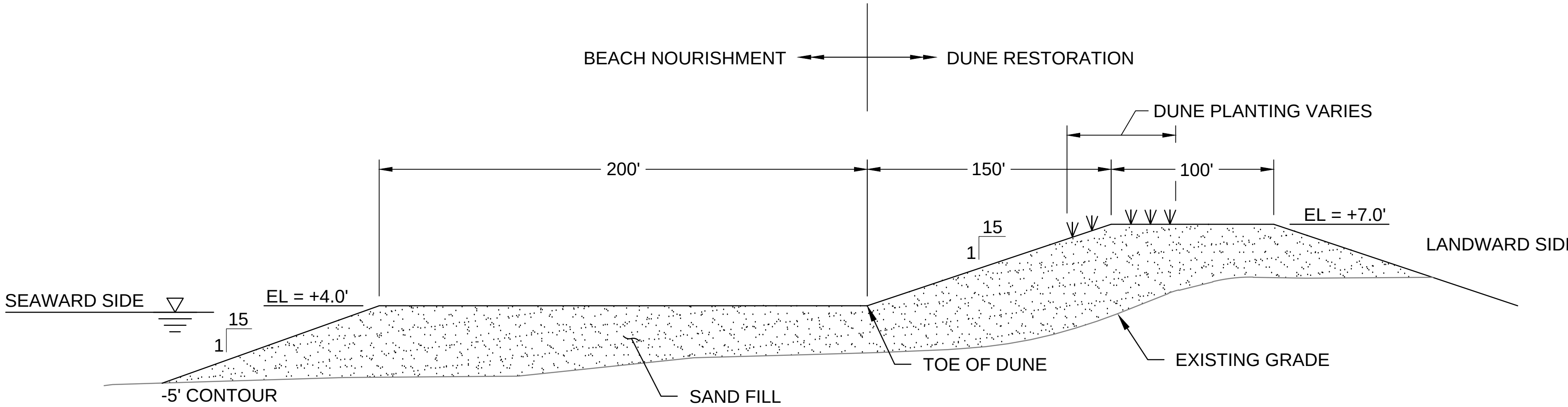
REEF BALLS

HORIZONTAL: 1" = 5'
VERTICAL: 1" = 5'

MISCELLANEOUS SHORELINE STABILIZATION
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

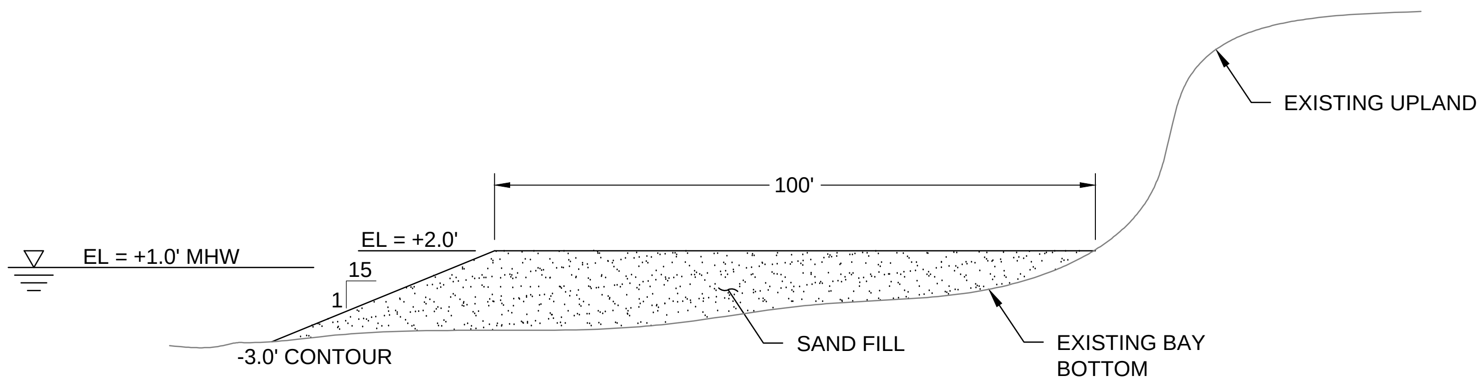
AECOM
SHEET 04

LEGEND	
(pattern)	SAND FILL
(line)	EXISTING GRADE



GULF DUNE & BEACH NOURISHMENT TYPICAL SECTION

N.T.S.



BAY BEACH NOURISHMENT TYPICAL SECTION

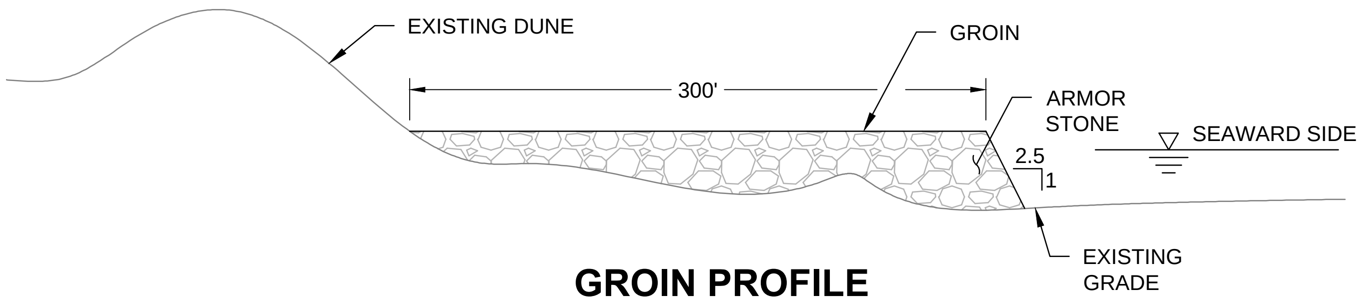
N.T.S.

DUNE & BEACH RESTORATION
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

AECOM
SHEET 05

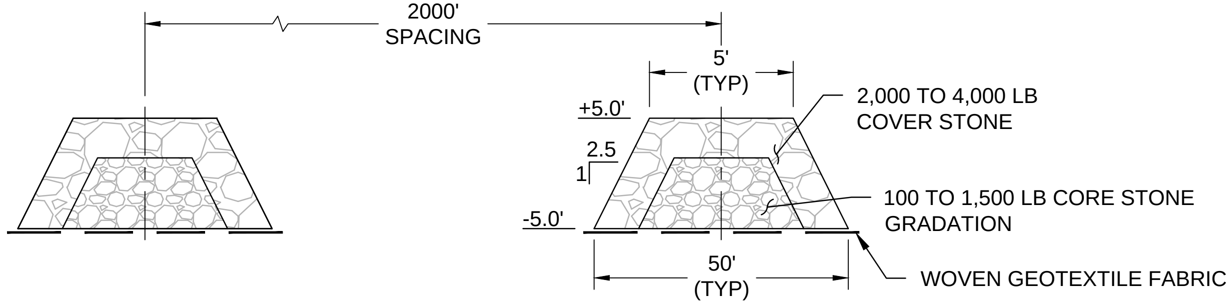
LEGEND

- GROIN COVER ARMOR STONE
- GROIN CORE STONE
- WOVEN GEOTEXTILE FABRIC
- EXISTING GRADE



GROIN PROFILE

N.T.S.



GROIN TYPICAL SECTION

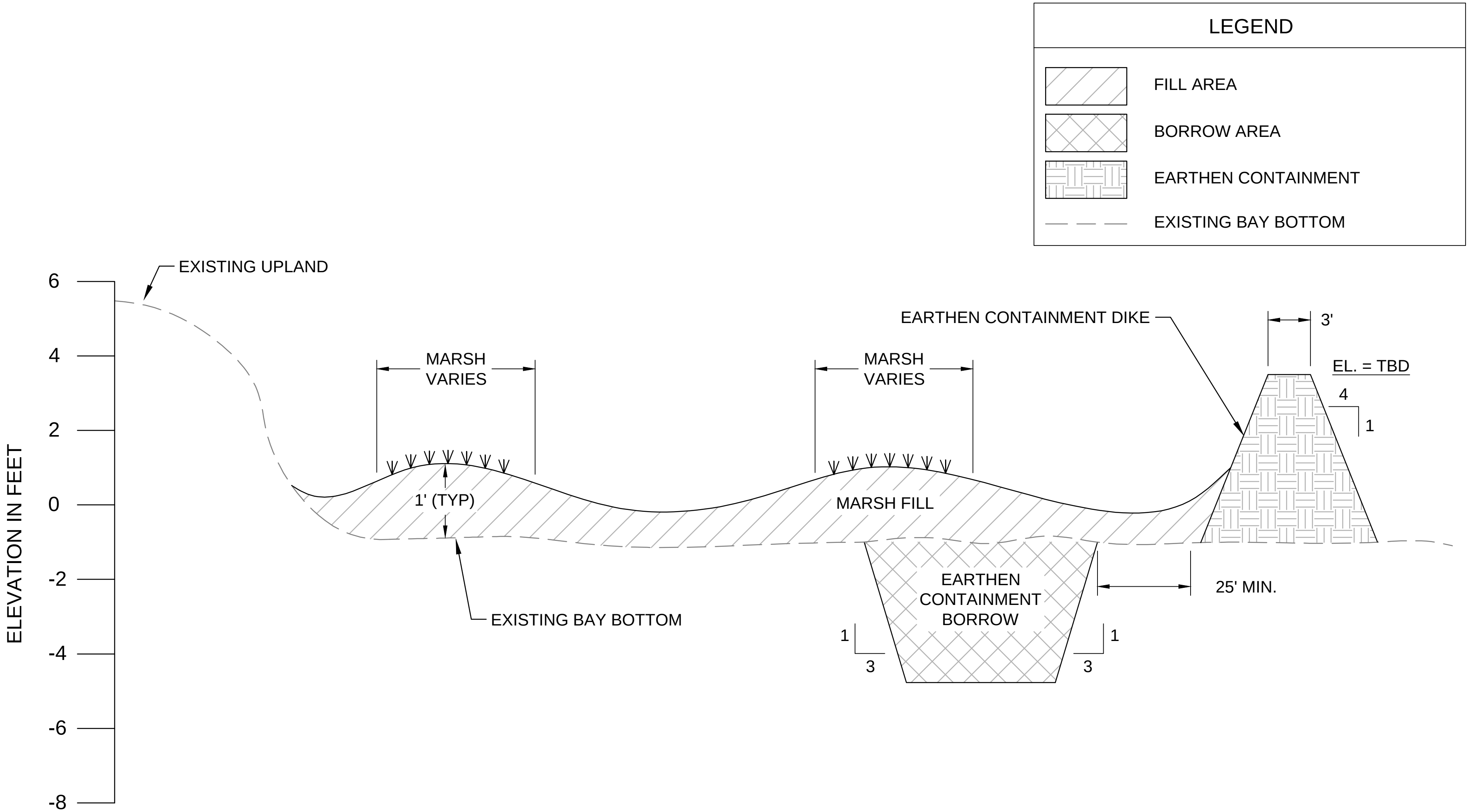
N.T.S.

NOTE:

1. GROINS WILL BE PLACED PERPENDICULAR TO SHORELINE AND SPACED 2,000 FEET ON CENTER.
2. LOCAL, TEXAS ROCK SOURCE PREFERRED.

GROINS
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

AECOM
SHEET 06



MARSH CREATION TYPICAL SECTION

HORIZONTAL: 1" = 40'
VERTICAL: 1" = 10'

NOTE:

1. EARTHEN CONTAINMENT DIKE IS TO BE A TEMPORARY STRUCTURE TO HOLD THE MARSH FILL. THE SLOPES OF THIS DIKE ARE ACHIEVED BY NATURAL SETTLEMENT OF THE DREDGED MATERIAL. THE MATERIAL IS NOT PLACED IN LAYERS OR BENCHED.

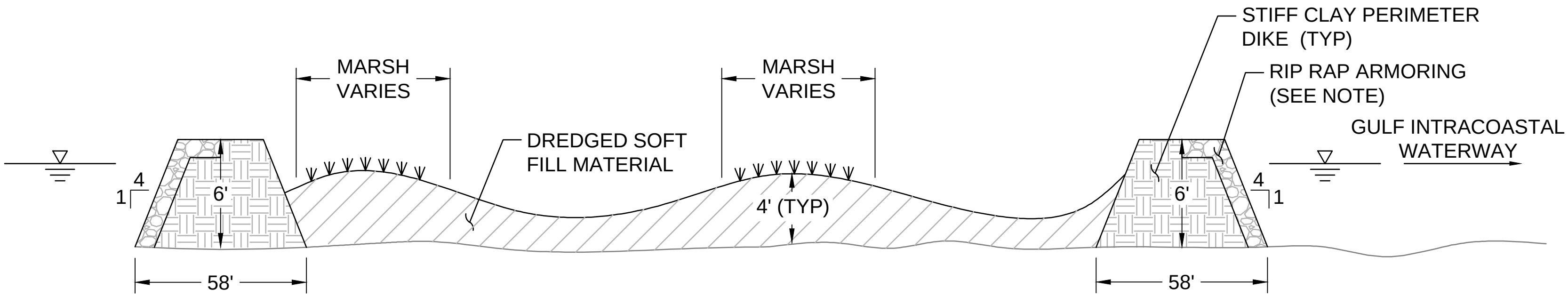
Last saved by: TAYLOR.NORDSTROM(2016-09-14) Last Plotted: 2016-09-14 Project Management Initials: Designer: Checked: Approved: ANSI A 8.5" x 11"
Filename: \\URSHOUSTON.US.IE.URS\HOUSTON\PROJECTS\WTR\60484548_COASTALRES\DWGS\ACAD\SUBTYPE_TEMPLATES\MARSH CREATION, RIDGE CREATION, & SHORELINE PROTECTION TYPICAL DETAILS.DWG

NOTE:

1. RIPRAP ARMORING WILL BE ASSUMED ONLY FOR PROJECTS ESCHEWING ADDITIONAL SHORELINE PROTECTION MEASURES (e.g., BREAKWATERS).

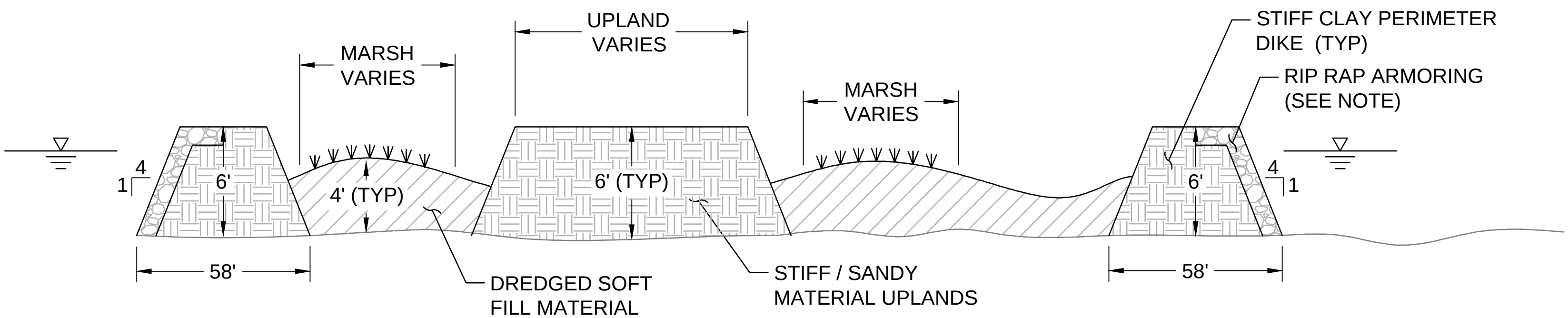
LEGEND

- MARSH FILL
- RIP RAP ARMORING
- DIKE & UPLAND FILL
- EXISTING GRADE



BARRIER ISLAND RESTORATION TYPICAL SECTION

N.T.S.

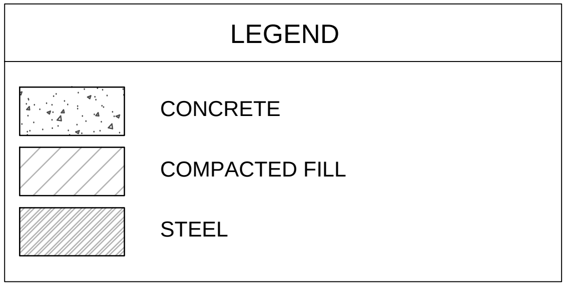


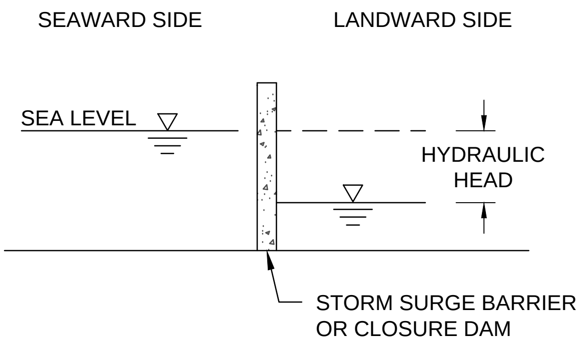
ROOKERY ISLAND RESTORATION TYPICAL SECTION

N.T.S.

ISLAND RESTORATION
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

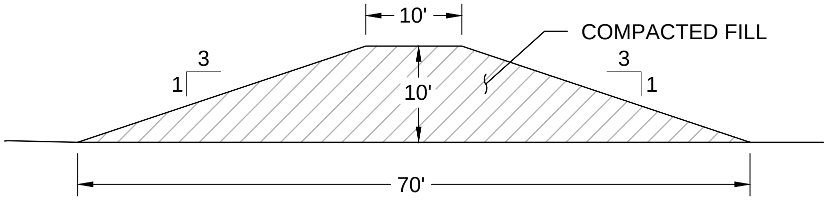
AECOM
SHEET 08





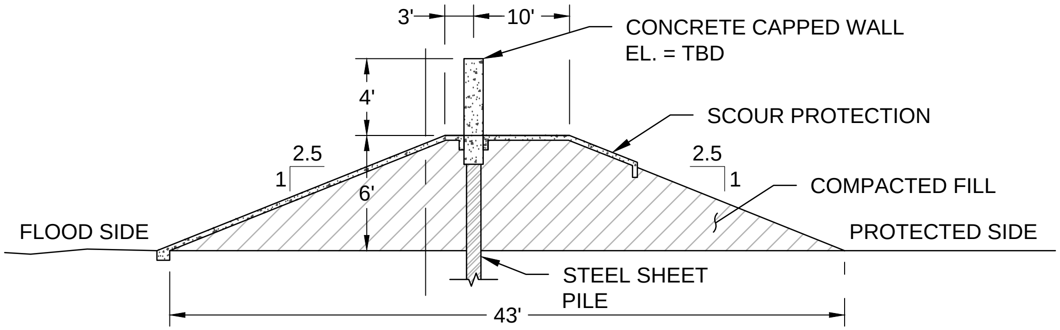
STORM SURGE BARRIER

N.T.S.



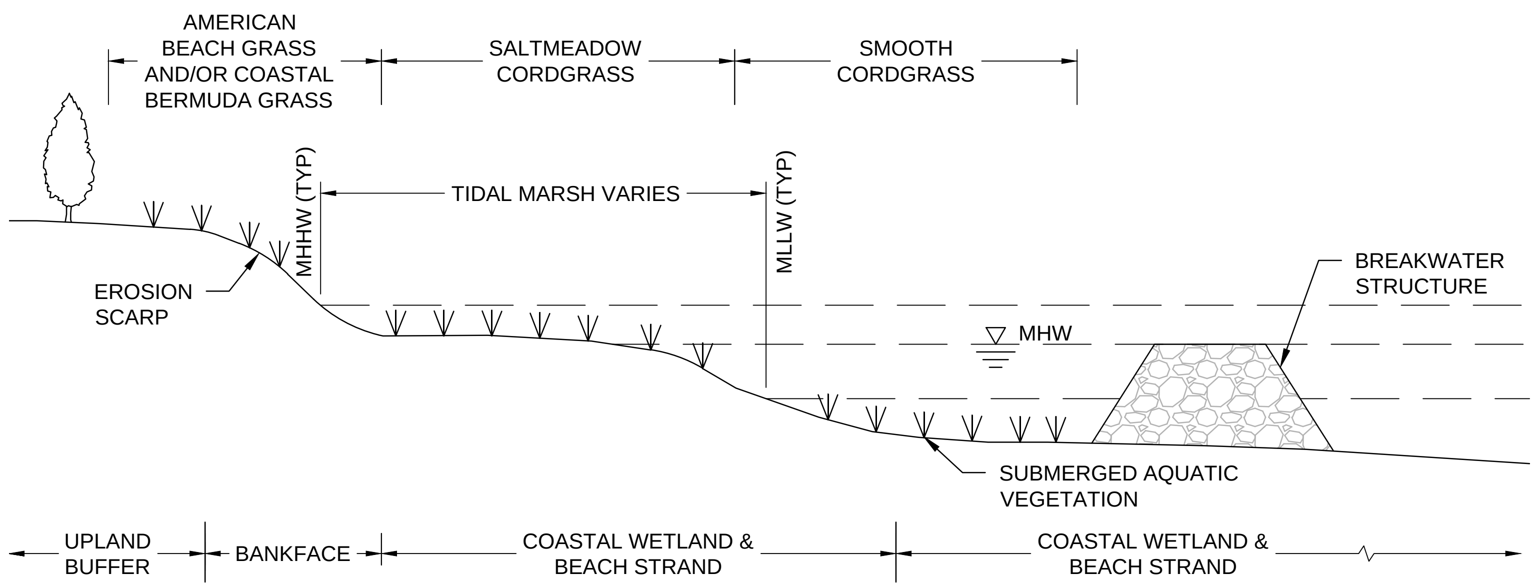
LEVEE

N.T.S.



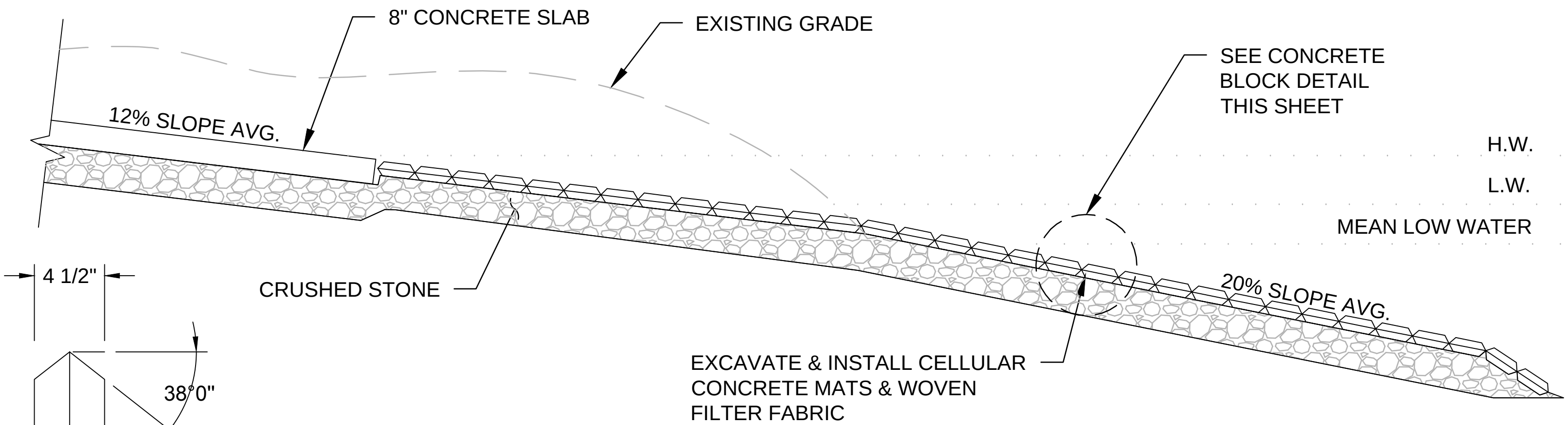
FLOOD WALL

N.T.S.



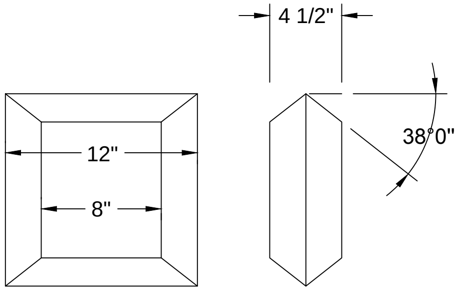
LIVING SHORELINE CONCEPT

N.T.S.



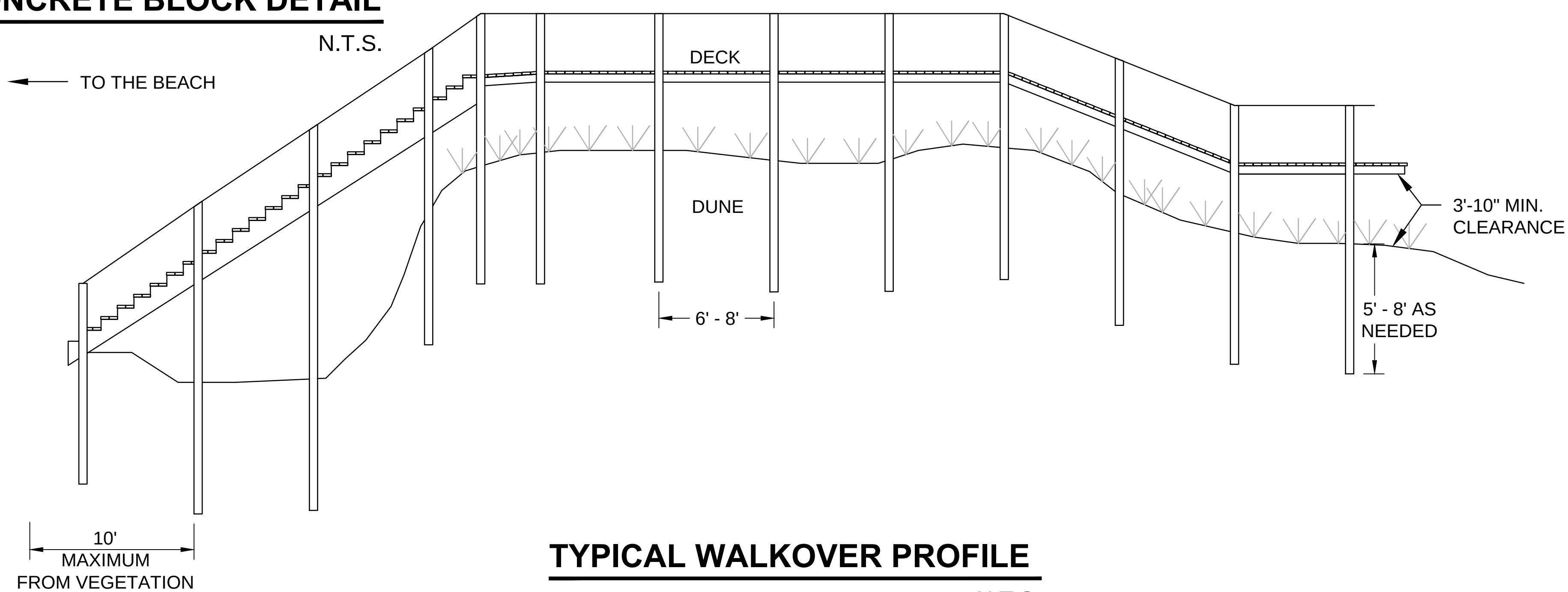
BOAT RAMP DETAIL

N.T.S.



CONCRETE BLOCK DETAIL

N.T.S.



TYPICAL WALKOVER PROFILE

N.T.S.

DETAILED PROJECT COSTS

Project Data Template

Project Details	
Project ID	4
Project Name	Brazos River to Cedar Lake Creek GIWW Stabilization
Region	2
Sub region	24
Start Year	2018
Construction Duration (months)	38
Longevity and Useful Life (years)	15
Project Outputs	100,000 LF of Breakwater, 100 acre Marsh
Brief Description of Work	This project will construct breakwaters or a living shoreline along approximately 20 miles of the GIWW.

Project Cost		
Total Project Cost	$ 35,787,000.00	$ USD
Engineering and Design	$ 60,000.00	$ USD
Construction and Management Cost	$ 30,712,300.00	$ USD
Mobilization/Demobilization	$ 1,761,500.00	$ USD
Subtotal	$ 32,533,800.00	$ USD
Contingency	$ 3,253,000.00	% of subtotal 10%
Annualized Operations and Maintenance	$ 1,234,300.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	168,135	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	100,000	LF
Marsh / Wetland Construction and Restoration	☑	100	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredged material to be beneficially used for marsh construction/restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria	X	Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	5	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	4		
TOTAL	21		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	333,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	277,778	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	6,802	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	161,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	4
Project Name	Brazos River to Cedar Lake Creek GIWW Stabilization
Region	2
Subregion	24
Start Year	2018
Construction Duration (months)	38
Longevity and Useful Life (years)	15
Project Outputs	100,000 LF of Breakwater, 100
Crew Size	31
Brief Description of Work	This project will construct breakwaters or a living shoreline along approximately 20 miles of the GIWW.

Project Feasibility	
Feasibility Index (max. 75)	39
Descriptor (low, med-low, med-high, high)	Medium-High
Construction Contingency	
Contingency (%)	10%

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	168,135	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	100,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	100	acres	$ 200.00	$ 20,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 1,761,495.00	$ 1,761,495.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	333,333	tons	$ 45.00	$ 14,999,985.00
Geotextile	277,778	SY	$ 2.90	$ 805,556.20
Stiff Clay Fill	6,802	CY	$ 25.00	$ 170,050.00
Marsh Fill	161,333	CY	$ 20.00	$ 3,226,660.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	5	EA	$ 10,000.00	$ 1,900,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 30,000.00
Dump Truck	4	EA	$ 15,000.00	$ 2,280,000.00
Excavator	4	EA	$ 15,000.00	$ 2,280,000.00
Tug Boat	4	EA	$ 30,000.00	$ 4,560,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 30,712,300.00
Mobilization and Demobilization	$ 1,761,500.00
Subtotal	$ 32,534,000.00
Project Contingency	$ 3,253,000.00
Total Project Cost	$ 35,787,000.00
Annual Operations and Maintenance (O&M)	$ 1,234,300.00
Total O&M	$ 18,513,800.00

Project Data Template

Project Details	
Project ID	9
Project Name	Brazoria National Wildlife Refuge GIWW Shoreline Protection
Region	1
Sub region	20
Start Year	2018
Construction Duration (months)	33
Longevity and Useful Life (years)	15
Project Outputs	480 acres of marsh, 48,700 LF revetment
Brief Description of Work	This project will reinforce the banks on the bay side to prevent further erosion, create wetland habitat, and more closely monitor erosion along the shoreline.

Project Cost		
Total Project Cost	$ 21,724,000.00	$ USD
Engineering and Design	$ 60,000.00	$ USD
Construction and Management Cost	$ 18,755,800.00	$ USD
Mobilization/Demobilization	$ 933,500.00	$ USD
Subtotal	$ 19,749,300.00	$ USD
Contingency	$ 1,974,930.00	% of subtotal 10%
Annualized Operations and Maintenance	$ 749,200.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	834,013	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	48,700	LF
Marsh / Wetland Construction and Restoration	☑	480	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for marsh creation.

County (check all that apply)			
Aransas		Kenedy	
Brazoria	X	Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	127,918	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	85,557	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	59,613	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	774,400	CY
Earthworks Excavation	☑	28,142	CY
	☐		

Detailed Project Cost

Project ID	9	Project Feasibility	
Project Name	Brazoria National Wildlife Refuge GIWW Shoreline Protection	Feasibility Index (max. 75)	39
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	20	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	33		
Longevity and Useful Life (years)	15		
Project Outputs	480 acres of marsh, 48,700 LF		
Crew Size	29		
Brief Description of Work	This project will reinforce the banks on the bay side to prevent further erosion, create wetland habitat, and more closely monitor erosion along the shoreline.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	834,013	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	48,700	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	480	acres	$ 200.00	$ 96,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 933,507.00	$ 933,507.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	127,918	tons	$ 45.00	$ 5,756,310.00
Geotextile	85,557	SY	$ 2.90	$ 248,115.30
Stiff Clay Fill	59,613	CY	$ 25.00	$ 1,490,325.00
Marsh Fill	774,400	CY	$ 2.90	$ 2,245,760.00
Earthworks Excavation	28,142	CY	$ 30.00	$ 844,260.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ 10,000.00	$ 1,320,000.00
Bulldozer	1	EA	$ 15,000.00	$ 255,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 1,020,000.00
Excavator	4	EA	$ 15,000.00	$ 1,980,000.00
Tug Boat	3	EA	$ 30,000.00	$ 2,970,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 18,755,800.00
Mobilization and Demobilization	$ 933,500.00
Subtotal	$ 19,749,000.00
Project Contingency	$ 1,975,000.00
Total Project Cost	$ 21,724,000.00
Annual Operations and Maintenance (O&M)	$ 749,200.00
Total O&M	$ 11,238,500.00

Project Data Template

Project Details

Project ID	11
Project Name	Follets Island Marsh Restoration
Region	1
Sub region	20
Start Year	2018
Construction Duration (months)	101
Longevity and Useful Life (years)	15
Project Outputs	2,650 Acres of Marsh Restoration
Brief Description of Work	This project proposes 2,650 acres of marsh restoration on Follets Island, on the southwest side of Christmas Bay, to protect critical habitat including estuarine and freshwater wetlands and tidal flats.

Project Cost

Total Project Cost	$ 36,594,000.00	$ USD
Engineering and Design	$ 60,000.00	$ USD
Construction and Management Cost	$ 30,380,200.00	$ USD
Mobilization/Demobilization	$ 1,380,600.00	$ USD
Subtotal	$ 31,820,800.00	
Contingency	$ 4,773,120.00	% of subtotal 15%
Annualized Operations and Maintenance	$ 1,262,100.00	$ USD

Project Activities ✓

Construction		Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	4,415,403	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	2,650	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF

Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS

Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used to create/restore marsh.

County (check all that apply)

Aransas		Kenedy	
Brazoria	X	Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector ✓ / Monitoring, Operations & Maintenance

Sector		Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors

Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	1	Operator	4
Excavator	4	Laborer	4
Front-End Loader	0	TOTAL	22
Tug Boat	1		
TOTAL	11		

Primary Project Materials ✓

Material		Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	140,070	CY

Other: ✓		Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	4,275,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	11	Project Feasibility	
Project Name	Follets Island Marsh Restoration	Feasibility Index (max. 75)	36
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	1		
Subregion	20	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	101		
Longevity and Useful Life (years)	15		
Project Outputs	2,650 Acres of Marsh Restoration		
Crew Size	22		
Brief Description of Work	This project proposes 2,650 acres of marsh restoration on Follets Island, on the southwest side of Christmas Bay, to protect critical habitat including estuarine and freshwater wetlands and tidal flats.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	4,415,403	CY	$ -	$ -
Marsh / Wetland Construction and Restoration	2,650	acres	$ 200.00	$ 530,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 1,380,649.00	$ 1,380,649.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Stiff Clay Fill	140,070	CY	$ 25.00	$ 3,501,750.00
Marsh Fill	4,275,333	CY	$ 2.90	$ 12,398,465.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 2,020,000.00
Bulldozer	1	EA	$ 15,000.00	$ 1,335,000.00
Crane	1	EA	$ 15,000.00	$ 180,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 360,000.00
Dump Truck	1	EA	$ 15,000.00	$ 1,335,000.00
Excavator	4	EA	$ 15,000.00	$ 5,340,000.00
Tug Boat	1	EA	$ 30,000.00	$ 3,030,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 30,380,200.00
Mobilization and Demobilization	$ 1,380,600.00
Subtotal	$ 31,821,000.00
Project Contingency	$ 4,773,000.00
Total Project Cost	$ 36,594,000.00
Annual Operations and Maintenance (O&M)	$ 1,262,100.00
Total O&M	$ 18,931,300.00

Project Data Template

Project Details	
Project ID	19
Project Name	East Galveston Bay Ecosystem Oyster Reefs
Region	1
Sub region	11
Start Year	2018
Construction Duration (months)	18
Longevity and Useful Life (years)	15
Project Outputs	130 acres of oyster reef
Brief Description of Work	The goal of the project is to restore Galveston Bay oyster reef habitats in response to large-scale impacts from Hurricane Ike and increased harvest pressures due to Deepwater Horizon and population growth. The project will also restore a 130 acre oyster reef in East Galveston Bay and collect side scan sonar data to create new GIS maps detailing the locations and aerial extents of restored and natural oyster reefs.

Project Cost			
Total Project Cost	$ 4,342,400.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 3,547,500.00	$ USD	
Mobilization/Demobilization	$ 528,100.00		
Subtotal	$ 4,135,600.00	$ USD	
Contingency	$ 206,780.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 149,800.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	130	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	8
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	42,250	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	19	Project Feasibility	
Project Name	East Galveston Bay Ecosystem Oyster Reefs	Feasibility Index (max. 75)	54
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	11	Construction Contingency	
Start Year	2018	Contingency (%)	5%
Construction Duration (months)	18		
Longevity and Useful Life (years)	15		
Project Outputs	130 acres of oyster reef		
Crew Size	8		
Brief Description of Work	The goal of the project is to restore Galveston Bay oyster reef habitats in response to large-scale impacts from Hurricane Ike and increased harvest pressures due to Deepwater Horizon and population growth. The project will also restore a 130 acre oyster reef in East Galveston Bay and collect side scan sonar data to create new GIS maps detailing the locations and aerial extents of restored and natural oyster reefs.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	130	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 528,125.00	$ 528,125.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	42,250	CY	$ 30.00	$ 1,267,500.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 360,000.00
Crane	1	EA	$ 15,000.00	$ 270,000.00
Excavator	1	EA	$ 15,000.00	$ 270,000.00
Tug Boat	2	EA	$ 30,000.00	$ 1,080,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 3,547,500.00
Mobilization and Demobilization	$ 528,100.00
Subtotal	$ 4,135,600.00
Project Contingency	$ 206,800.00
Total Project Cost	$ 4,342,400.00
Annual Operations and Maintenance (O&M)	$ 149,800.00
Total O&M	$ 2,246,500.00

Project Data Template

Project Details

Project ID	21
Project Name	Galveston Bay Ecosystem Rookery Islands
Region	1
Sub region	17
Start Year	2018
Construction Duration (months)	36
Longevity and Useful Life (years)	15
Project Outputs	40,000 LF breakwater, 600 acres marsh
Brief Description of Work	This project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-Et-Un Islands, Chocolate Point Island, West Bay Bird Island, and Smith Point Island. This project will create additional acres of potential nesting habitat by re-establishing estuarine wetland habitat, which will promote shoreline stabilization.

Project Cost

Total Project Cost	$	37,468,000.00	$ USD	
Engineering and Design	$	150,000.00	$ USD	
Construction and Management Cost	$	31,685,000.00	$ USD	
Mobilization/Demobilization	$	2,226,500.00	$ USD	
Subtotal	$	34,062,000.00	$ USD	
Contingency	$	3,406,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$	1,292,200.00	$ USD	

Project Activities

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	4,970,270	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	600	acres
Marine Construction (e.g., groins, breakwaters)	☑	40,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for island protection and restoration.

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector / Monitoring, Operations & Maintenance

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors

Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	133,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	111,111	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	130,270	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	4,840,000	
	☐		
	☐		

Detailed Project Cost

Project ID	21	Project Feasibility	
Project Name	Galveston Bay Ecosystem Rookery Islands	Feasibility Index (max. 75)	40
Region	1	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	17	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	36		
Longevity and Useful Life (years)	15		
Project Outputs	40,000 LF breakwater, 600 acres		
Crew Size	29		
Brief Description of Work	This project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-Et-Un Islands, Chocolate Point Island, West Bay Bird Island, and Smith Point Island. This project will create additional acres of potential nesting habitat by re-establishing estuarine wetland habitat, which will promote shoreline stabilization.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	4,970,270	CY	$ -	$ -
Island Creation	600.00	acres	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	40,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 30,000.00	$ 30,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Mobilization and Demobilization	1	LS	$ 2,226,522.00	$ 2,226,522.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	133,333	tons	$ 45.00	$ 5,999,985.00
Geotextile	111,111	SY	$ 2.90	$ 322,221.90
Stiff Clay Fill	130,270	CY	$ 25.00	$ 3,256,750.00
Marsh Fill	4,840,000	0	$ 2.90	$ 14,036,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ 10,000.00	$ 1,440,000.00
Bulldozer	1	EA	$ 15,000.00	$ 540,000.00
Crane	2	EA	$ 15,000.00	$ 420,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 420,000.00
Dump Truck	4	EA	$ 15,000.00	$ 840,014.00
Excavator	4	EA	$ 15,000.00	$ 840,014.00
Tug Boat	3	EA	$ 30,000.00	$ 3,240,000.00

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 31,685,000.00
Mobilization and Demobilization	$ 2,226,500.00
Subtotal	$ 34,062,000.00
Project Contingency	$ 3,406,000.00
Total Project Cost	$ 37,468,000.00
Annual Operations and Maintenance (O&M)	$ 1,292,200.00
Total O&M	$ 19,383,400.00

Project Data Template

Project Details	
Project ID	29
Project Name	Anahuac National Wildlife Refuge Living Shoreline
Region	1
Sub region	9
Start Year	2018
Construction Duration (months)	134
Longevity and Useful Life (years)	15
Project Outputs	48,000 LF breakwater, 4,000 acres of marsh
Brief Description of Work	This project will restore marsh habitat along the GIWW using a living shoreline construction for up to 9 miles of eroding shoreline.

Project Cost				
Total Project Cost	$ 60,815,000.00	$ USD		
Engineering and Design	$ 60,000.00	$ USD		
Construction and Management Cost	$ 50,036,900.00	$ USD		
Mobilization/Demobilization	$ 2,786,100.00	$ USD		
Subtotal	$ 52,883,000.00	$ USD		
Contingency	$ 7,932,000.00		% of subtotal	15%
Annualized Operations and Maintenance	$ 2,097,400.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	6,496,355	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	48,000	LF
Marsh / Wetland Construction and Restoration	☑	4,000	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used to create marsh/wetland habitat.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers	X	Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	X
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	160,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	133,333	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	43,022	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	6,453,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	29	Project Feasibility	
Project Name	Anahuac National Wildlife Refuge Living Shoreline	Feasibility Index (max. 75)	38
Region	1	Descriptor (low, med-low, med-high, high)	Medium-Low
Subregion	9	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	134		
Longevity and Useful Life (years)	15		
Project Outputs	48,000 LF breakwater, 4,000		
Crew Size	31		
Brief Description of Work	This project will restore marsh habitat along the GIWW using a living shoreline construction for up to 9 miles of eroding shoreline.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	6,496,355	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	48,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	4,000	acres	$ 200.00	$ 800,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 2,786,116.00	$ 2,786,116.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	160,000	tons	$ 45.00	$ 7,200,000.00
Geotextile	133,333	SY	$ 2.90	$ 386,665.70
Stiff Clay Fill	43,022	CY	$ 25.00	$ 1,075,550.00
Marsh Fill	6,453,333	CY	$ 2.90	$ 18,714,665.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ 10,000.00	$ 720,016.00
Bulldozer	1	EA	$ 15,000.00	$ 2,010,000.00
Crane	2	EA	$ 15,000.00	$ 540,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 540,000.00
Dump Truck	4	EA	$ 15,000.00	$ 8,040,000.00
Excavator	4	EA	$ 15,000.00	$ 8,040,000.00
Tug Boat	3	EA	$ 30,000.00	$ 1,620,016.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 50,036,900.00
Mobilization and Demobilization	$ 2,786,100.00
Subtotal	$ 52,883,000.00
Project Contingency	$ 7,932,000.00
Total Project Cost	$ 60,815,000.00
Annual Operations and Maintenance (O&M)	$ 2,097,400.00
Total O&M	$ 31,461,600.00

Project Data Template

Project Details	
Project ID	30
Project Name	Willow Lake Shoreline Stabilization
Region	1
Subregion	6
Start Year	2019
Construction Duration (months)	8
Longevity and Useful Life (years)	15
Project Outputs	6,000 LF Breakwater, 150 ac Marsh
Brief Description of Work	This project proposes to construct approx. 6,000 linear feet of breakwater structures along the GIWW and more than 20,000 linear feet of marsh terraces. The resulting project would restore more than 150 ac. Of emergent marsh habitat and protect 3,600 ac. of existing coastal marsh from degredation. The project proposes to construct a 1,000 ft

Project Cost				
Total Project Cost	$	6,567,300.00	$ USD	
Engineering and Design	$	175,000.00	$ USD	
Construction and Management Cost	$	5,445,300.00	$ USD	
Mobilization/Demobilization	$	350,000.00	$ USD	
Subtotal	$	5,970,300.00	$ USD	
Contingency	$	597,030.00	% of subtotal	10%
Annualized Operations and Maintenance	$	177,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	10,225	LF
Dredging	☑	250,331	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	6,000	LF
Marsh / Wetland Construction and Restoration	☑	150	acres
Oyster Reef Creation	☐		acres
Planting	☑	150	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The length of the dike/levee construction is assuming that the marsh is square, the number will change depending on the actual shape of the marsh.
Number of plants is an estimated quantity to plant a 10' wide section around the perimeter of the marsh at 3 ft spacing. To plant the entire marsh would require over 726,000 plants.
Material will be beneficially used to restore marsh habitat.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	0.5%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	3%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	90%
Non-Local	% of visitors	10%
Boaters	% of visitors	90%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	3	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	6	Operator	13
Excavator	7	Laborer	15
Front-End Loader	0	TOTAL	45
Tug Boat	4		
TOTAL	27		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	20,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	16,667	SY
Maintenance Dredged Material	☑	242,000	CY
Pipeline	☐		LF
Plants	☑	11,361	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	8,331	CY
Other:	✓	Quantity	Units
Siphon	☑	1000	LF
Diversion Ditch	☑	2200	LF
	☐		
	☐		

Detailed Project Cost

Project ID	30	Project Feasibility	
Project Name	Willow Lake Shoreline Stabilization	Feasibility Index (max. 75)	47
Region	1	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	6	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	8		
Longevity and Useful Life (years)	15		
Project Outputs	6,000 LF Breakwater, 150 ac		
Crew Size	45		
Brief Description of Work	This project proposes to construct approx. 6,000 linear feet of breakwater structures along the GIWW and more than 20,000 linear feet of marsh terraces. The resulting project would restore more than 150 ac. Of emergent marsh habitat and protect 3,600 ac. of existing coastal marsh from degredation. The project proposes to construct a 1,000 ft long inverted siphon as well as a 2,200 foot long diversion ditch on the south side of the GIWW to deliver freshwater to the higher elevations of the lower Willow Lake		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	10,225	LF	$ 30.00	$ 306,750.00
Marine Construction (e.g., groins, breakwaters)	6,000	LF	$ 50.00	$ 300,000.00
Marsh / Wetland Construction and Restoration	150	acres	$ 200.00	$ 30,000.00
Planting	150	acres	$ 100.00	$ 15,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ 20,000.00	$ 20,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 350,000.00	$ 350,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	20,000	tons	$ 45.00	$ 900,000.00
Geotextile	16,667	SY	$ 2.90	$ 48,334.30
Maintenance Dredged Material	242,000	CY	$ 1.95	$ 471,900.00
Plants	11,361	each	$ 25.00	$ 284,025.00
Stiff Clay Fill	8,331	CY	$ 25.00	$ 208,275.00
Siphon	1,000	LF	$ 10.00	$ 10,000.00
Diversion Ditch	2,200	LF	$ 30.00	$ 66,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 320,000.00
Bulldozer	3	EA	$ 15,000.00	$ 180,000.00
Crane	2	EA	$ 15,000.00	$ 240,000.00
Dump Truck	6	EA	$ 15,000.00	$ 360,000.00
Excavator	7	EA	$ 15,000.00	$ 420,000.00
Tug Boat	4	EA	$ 30,000.00	$ 960,000.00

Engineering and Design (E&D)	$ 175,000.00
Construction Cost and Management	$ 5,445,300.00
Mobilization and Demobilization	$ 350,000.00
Subtotal	$ 5,970,300.00
Project Contingency	$ 597,000.00
Total Project Cost	$ 6,567,300.00
Annual Operations and Maintenance (O&M)	$ 177,300.00
Total O&M	$ 2,659,500.00

Project Data Template

Project Details	
Project ID	35
Project Name	McFaddin National Wildlife Refuge Shoreline Protection
Region	1
Sub region	1
Start Year	2018
Construction Duration (months)	30
Longevity and Useful Life (years)	10
Project Outputs	105,600 LF beach nourishment, 105,600 LF dune restoration
Brief Description of Work	This shoreline protection project will reduce the rate of shoreline erosion and loss of 20 miles of existing beach ridge at McFaddin NWR and protect the fresh to brackish water marshes of the refuge from salt water inundation from the Gulf of Mexico. This project would also provide restoration of eroding Gulf facing shoreline, dunes, and associated wetlands.

Project Cost		
Total Project Cost	$ 183,037,000.00	$ USD
Engineering and Design	$ 300,000.00	$ USD
Construction and Management Cost	$ 147,117,300.00	$ USD
Mobilization/Demobilization	$ 5,113,500.00	$ USD
Subtotal	$ 152,530,800.00	$ USD
Contingency	$ 30,506,000.00	% of subtotal 20%
Annualized Operations and Maintenance	$ 2,946,900.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	5,896,000	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☑	850,667	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredged material to be beneficially used to restore shoreline and dunes.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	5	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	2	Operator	10
Excavator	6	Laborer	8
Front-End Loader	0	TOTAL	35
Tug Boat	2		
TOTAL	20		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☑	35,200	LF
Sand or Soil Fill	☑	5,896,000	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Sand Fill - Dunes	☑	850,667	CY
Wetlands/Forested Wetlands	☑	1	each
	☐		

Detailed Project Cost

Project ID	35	Project Feasibility		
Project Name	McFaddin National Wildlife Refuge Shoreline Protection	Feasibility Index (max. 75)	30	
		Descriptor (low, med-low, med-high, high)	Low	
Region	1			
Subregion	1	Construction Contingency		
Start Year	2018	Contingency (%)	20%	
Construction Duration (months)	30			
Longevity and Useful Life (years)	10			
Project Outputs	105,600 LF beach nourishment,			
Crew Size	35			
Brief Description of Work	This shoreline protection project will reduce the rate of shoreline erosion and loss of 20 miles of existing beach ridge at McFaddin NWR and protect the fresh to brackish water marshes of the refuge from salt water inundation from the Gulf of Mexico. This project would also provide restoration of eroding Gulf facing shoreline, dunes, and associated wetlands.			

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	5,896,000	CY	$ -	$ -
Dune Construction and Restoration	850,667	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 25,000.00	$ 25,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 400,000.00	$ 400,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 300,000.00	$ 300,000.00
Mobilization and Demobilization	1	LS	$ 5,113,520.00	$ 5,113,520.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand Fence	35,200	LF	$ 3.00	$ 105,600.00
Sand or Soil Fill	5,896,000	CY	$ 20.00	$ 117,920,000.00
Sand Fill - Dunes	850,667	CY	$ 25.00	$ 21,266,675.00
Wetlands/Forested Wetlands	1	each	$ 50,000.00	$ 50,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 600,000.00
Bulldozer	5	EA	$ 15,000.00	$ 750,000.00
Crane	1	EA	$ 15,000.00	$ 300,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 600,000.00
Dump Truck	2	EA	$ 150,000.00	$ 3,000,000.00
Excavator	6	EA	$ 15,000.00	$ 900,000.00
Tug Boat	2	EA	$ 30,000.00	$ 1,200,000.00

Engineering and Design (E&D)	$ 300,000.00
Construction Cost and Management	$ 147,117,300.00
Mobilization and Demobilization	$ 5,113,500.00
Subtotal	$ 152,530,800.00
Project Contingency	$ 30,506,200.00
Total Project Cost	$ 183,037,000.00
Annual Operations and Maintenance (O&M)	$ 2,946,900.00
Total O&M	$ 29,469,000.00

Project Data Template

Project Details	
Project ID	51
Project Name	Boggy Cut GIWW Stabilization
Region	2
Sub region	24
Start Year	2018
Construction Duration (months)	24
Longevity and Useful Life (years)	15
Project Outputs	10,500 LF Breakwater, 20 Acres Marsh, 20 Acres Acq.
Brief Description of Work	To mitigate erosion caused by wind, waves and ship wakes in the GIWW near Boggy Cut, the project proposes up to 20 miles of barrier island restoration, or construction of breakwaters and wetland restoration where island restoration is not feasible. The project may also include acquisition of private property adjacent to the GIWW, if willing sellers can be located, in an effort to restore coastal habitats and develop a more resilient coastline in the area.

Project Cost			
Total Project Cost	$ 9,270,000.00	$ USD	
Engineering and Design	$ 150,000.00	$ USD	
Construction and Management Cost	$ 6,977,800.00	$ USD	
Mobilization/Demobilization	$ 600,000.00	$ USD	
Subtotal	$ 7,727,800.00	$ USD	
Contingency	$ 1,545,560.00	% of subtotal	20%
Annualized Operations and Maintenance	$ 185,500.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	35,309	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	10,500	LF
Marsh / Wetland Construction and Restoration	☑	20	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The option for a land purchase has not been reflected within this template.
Material will be beneficially used for marsh/wetland construction.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	0.5%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		100
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	9
Front-End Loader	0	TOTAL	33
Tug Boat	4		
TOTAL	20		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	35,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	29,167	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	32,267	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	3,042	CY
Other:	✓	Quantity	Units
Land	☑	96,800	SY
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	51	Project Feasibility	
Project Name	Boggy Cut GIWW Stabilization	Feasibility Index (max. 75)	29
Region	2	Descriptor (low, med-low, med-high, high)	Low
Subregion	24	Construction Contingency	
Start Year	2018	Contingency (%)	20%
Construction Duration (months)	6		
Longevity and Useful Life (years)	15		
Project Outputs	10,500 LF Breakwater, 20 Acres		
Crew Size	33		
Brief Description of Work	To mitigate erosion caused by wind, waves and ship wakes in the GIWW near Boggy Cut, the project proposes up to 20 miles of barrier island restoration, or construction of breakwaters and wetland restoration where island restoration is not feasible. The project may also include acquisition of private property adjacent to the GIWW, if willing sellers can be located, in an effort to restore coastal habitats and develop a more resilient coastline in the area.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	35,309	CY	$ 20.00	$ 706,180.00
Marine Construction (e.g., groins, breakwaters)	10,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	20	acres	$ 200.00	$ 4,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 8,000.00	$ 8,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Mobilization and Demobilization	1	LS	$ 600,000.00	$ 600,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	35,000	tons	$ 45.00	$ 1,575,000.00
Geotextile	29,167	SY	$ 2.90	$ 84,584.30
Sand or Soil Fill	32,267	CY	$ 72.00	$ 2,323,224.00
Stiff Clay Fill	3,042	CY	$ 25.00	$ 76,050.00
Land	96,800	SY	$ 2.90	$ 280,720.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 240,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 180,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 180,000.00
Dump Truck	4	EA	$ 15,000.00	$ 240,000.00
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	4	EA	$ 30,000.00	$ 720,000.00

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 6,977,800.00
Mobilization and Demobilization	$ 600,000.00
Subtotal	$ 7,727,800.00
Project Contingency	$ 1,545,600.00
Total Project Cost	$ 9,270,000.00
Annual Operations and Maintenance (O&M)	$ 185,500.00
Total O&M	$ 2,782,500.00

Project Data Template

Project Details	
Project ID	52
Project Name	Chester's Island Restoration
Region	2
Sub region	7
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	3,000 LF wave break, 30 acres of rookery island restoration
Brief Description of Work	This project will aims to slow the erosion of the rookery island and add 30 acres of land using nearshore breakwaters.

Project Cost				
Total Project Cost	$ 4,492,000.00	$ USD		
Engineering and Design	$ 80,000.00	$ USD		
Construction and Management Cost	$ 3,703,500.00	$ USD		
Mobilization/Demobilization	$ 122,100.00	$ USD		
Subtotal	$ 3,906,000.00	$ USD		
Contingency	$ 586,000.00		% of subtotal	15%
Annualized Operations and Maintenance	$ 154,900.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	277,194	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	3,000	LF
Marsh / Wetland Construction and Restoration	☑	30	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for marsh/wetland construction.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	12,320	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	29,129	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Geotube Fill - Sludge	☑	6,065	CY
Marsh Fill	☑	242,000	CY
Geotubes	☑	3,000	LF

Detailed Project Cost

Project ID	52	Project Feasibility	
Project Name	Chester's Island Restoration	Feasibility Index (max. 75)	38
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	2		
Subregion	7	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	3,000 LF wave break, 30 acres of		
Crew Size	31		
Brief Description of Work	This project will aims to slow the erosion of the rookery island and add 30 acres of land using nearshore breakwaters.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	277,194	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	3,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	30	acres	$ 200.00	$ 6,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 80,000.00	$ 80,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Mobilization and Demobilization	1	LS	$ 122,131.00	$ 122,131.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	12,320	SY	$ 2.90	$ 35,728.00
Stiff Clay Fill	29,129	CY	$ 25.00	$ 728,225.00
Geotube Fill - Sludge	6,065	CY	$ 8.00	$ 48,520.00
Marsh Fill	242,000	CY	$ 8.00	$ 1,936,000.00
Geotubes	3,000	LF	$ 3.00	$ 9,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 30,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 3,703,500.00
Mobilization and Demobilization	$ 122,100.00
Subtotal	$ 3,906,000.00
Project Contingency	$ 586,000.00
Total Project Cost	$ 4,492,000.00
Annual Operations and Maintenance (O&M)	$ 154,900.00
Total O&M	$ 2,323,900.00

Project Data Template

Project Details	
Project ID	62
Project Name	Welder Flats Wildlife Management Area
Region	2
Sub region	39
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	25
Project Outputs	3,000 LF of breakwaters and/or living shoreline
Brief Description of Work	The Welder Flats Wildlife Management Area has 1,480 acres of submerged coastal wetlands that provide habitat for numerous species of waterfowl and wading birds. To help mitigate shoreline erosion caused by boats travelling along the GIWW, rock breakwaters and/or a living shoreline are proposed for this area.

Project Cost				
Total Project Cost	$	1,522,000.00	$ USD	
Engineering and Design	$	90,000.00	$ USD	
Construction and Management Cost	$	1,194,200.00	$ USD	
Mobilization/Demobilization	$	100,000.00	$ USD	
Subtotal	$	1,384,000.00	$ USD	
Contingency	$	138,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$	17,800.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	3,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	X	Cost (% of total project cost)	2%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	20
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	4
Excavator	2	Laborer	3
Front-End Loader	0	TOTAL	10
Tug Boat	2		
TOTAL	10		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	10,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	8,333	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	62	Project Feasibility	
Project Name	Welder Flats Wildlife Management Area	Feasibility Index (max. 4)	3.03
Region	2	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	39	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	25		
Project Outputs	3,000 LF of breakwaters and/or		
Crew Size	10		
Brief Description of Work	The Welder Flats Wildlife Management Area has 1,480 acres of submerged coastal wetlands that provide habitat for numerous species of waterfowl and wading birds. To help mitigate shoreline erosion caused by boats travelling along the GIWW, rock breakwaters and/or a living shoreline are proposed for this area.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	3,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 35,000.00	$ 35,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 100,000.00	$ 100,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	10,000	tons	$ 45.00	$ 450,000.00
Geotextile	8,333	SY	$ 2.90	$ 24,165.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 80,000.00
Crane	1	EA	$ 15,000.00	$ 60,000.00
Dump Truck	3	EA	$ 15,000.00	$ 180,000.00
Excavator	2	EA	$ 15,000.00	$ 120,000.00
Tug Boat	2	EA	$ 30,000.00	$ 240,000.00

Engineering and Design (E&D)	$ 90,000.00
Construction Cost and Management	$ 1,194,200.00
Mobilization and Demobilization	$ 100,000.00
Subtotal	$ 1,384,000.00
Project Contingency	$ 138,000.00
Total Project Cost	$ 1,522,000.00
Annual Operations and Maintenance (O&M)	$ 17,800.00
Total O&M	$ 445,000.00

Project Data Template

Project Details	
Project ID	70
Project Name	Goose Island State Park Living Shoreline
Region	3
Subregion	5
Start Year	2018
Construction Duration (months)	2
Longevity and Useful Life (years)	15
Project Outputs	4,000 LF Breakwater
Brief Description of Work	The project will provide shoreline and habitat protection for the critical estuarine wetland habitat that makes up 25 acres of Goose Island State Park through the constuction of 2,000 feet of living shoreline at the park's Big Tree unit. The project will include close to a quarter of an acre of restoration activities for the wetland habitat.

Project Cost			
Total Project Cost	$ 1,341,000.00	$ USD	
Engineering and Design	$ 130,000.00	$ USD	
Construction and Management Cost	$ 1,037,200.00	$ USD	
Mobilization/Demobilization	$ 51,860.00	$ USD	
Subtotal	$ 1,219,060.00	$ USD	
Contingency	$ 121,906.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 87,200.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	4,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	4
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	4
Excavator	2	Laborer	3
Front-End Loader	0	TOTAL	10
Tug Boat	2		
TOTAL	10		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	13,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	11,111	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	70	Project Feasibility	
Project Name	Goose Island State Park Living Shoreline	Feasibility Index (max. 75)	51
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	5	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	2		
Longevity and Useful Life (years)	15		
Project Outputs	4,000 LF Breakwater		
Crew Size	10		
Brief Description of Work	The project will provide shoreline and habitat protection for the critical estuarine wetland habitat that makes up 25 acres of Goose Island State Park through the constuction of 2,000 feet of living shoreline at the park's Big Tree unit. The project will include close to a quarter of an acre of restoration activities for the wetland habitat.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	4,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 30,000.00	$ 30,000.00
Mobilization and Demobilization	1	LS	$ 204,574.00	$ 204,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	13,333	tons	$ 45.00	$ 599,985.00
Geotextile	11,111	SY	$ 2.90	$ 32,221.90

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 40,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Dump Truck	3	EA	$ 15,000.00	$ 90,000.00
Excavator	2	EA	$ 15,000.00	$ 60,000.00
Tug Boat	2	EA	$ 30,000.00	$ 120,000.00

Engineering and Design (E&D)	$ 130,000.00
Construction Cost and Management	$ 1,037,200.00
Mobilization and Demobilization	$ 51,860.00
Subtotal	$ 1,219,100.00
Project Contingency	$ 121,900.00
Total Project Cost	$ 1,341,000.00
Annualized Operations and Maintenance (O&M)	$ 87,200.00
Total O&M	$ 1,308,000.00

Project Data Template

Project Details	
Project ID	72
Project Name	Long Reef Island Shoreline Stabilization
Region	3
Sub region	5
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	100 acre marsh
Brief Description of Work	The project involves placement of USACE dredged material on the Western tip of the rookery island to raise its elevation, and installation of geotubes to be used as breakwaters and sediment retention structures.

Project Cost				
Total Project Cost	$ 2,680,800.00	$ USD		
Engineering and Design	$ 60,000.00	$ USD		
Construction and Management Cost	$ 2,425,900.00	$ USD		
Mobilization/Demobilization	$ 67,200.00	$ USD		
Subtotal	$ 2,553,100.00	$ USD		
Contingency	$ 127,700.00		% of subtotal	5%
Annualized Operations and Maintenance	$ 92,500.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	136,875	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	2,000	LF
Marsh / Wetland Construction and Restoration	☑	14	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used to raise the elevation of the rookery island.

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	8,213	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	19,899	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Geotube Fill - Sludge	☑	4,043	CY
Marsh Fill	☑	112,933	CY
Geotubes	☑	2,000	LF

Detailed Project Cost

Project ID	72	Project Feasibility	
Project Name	Long Reef Island Shoreline Stabilization	Feasibility Index (max. 75)	52
Region	3	Descriptor (low, med-low, med-high, high)	High
Subregion	5	Construction Contingency	
Start Year	2018	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	100 acre marsh		
Crew Size	31		
Brief Description of Work	The project involves placement of USACE dredged material on the Western tip of the rookery island to raise its elevation, and installation of geotubes to be used as breakwaters and sediment retention structures.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	136,875	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	2,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	14	acres	$ 200.00	$ 2,800.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 67,236.00	$ 67,236.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	8,213	SY	$ 2.90	$ 23,817.70
Stiff Clay Fill	19,899	CY	$ 25.00	$ 497,475.00
Geotube Fill - Sludge	4,043	CY	$ 8.00	$ 32,344.00
Marsh Fill	112,933	CY	$ 8.00	$ 903,464.00
Geotubes	2,000	LF	$ 3.00	$ 6,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 30,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 2,425,900.00
Mobilization and Demobilization	$ 67,200.00
Subtotal	$ 2,553,100.00
Project Contingency	$ 127,700.00
Total Project Cost	$ 2,680,800.00
Annual Operations and Maintenance (O&M)	$ 92,500.00
Total O&M	$ 1,386,900.00

Project Data Template

Project Details	
Project ID	75
Project Name	Nueces River Delta Shoreline Stabilization
Region	3
Subregion	10
Start Year	2018
Construction Duration (months)	6
Longevity and Useful Life (years)	15
Project Outputs	10,560 LF breakwater
Brief Description of Work	The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy that is causing estuarine wetland losses. The GLO and the Coastal Bend Bays and Estuaries Program sponsored an alternatives analysis in 2014 for the feasibility, assessment and permitting of the shoreline protections structures.

Project Cost			
Total Project Cost	$ 3,625,300.00	$ USD	
Engineering and Design	$ 85,000.00	$ USD	
Construction and Management Cost	$ 2,339,100.00	$ USD	
Mobilization/Demobilization	$ 871,600.00	$ USD	
Subtotal	$ 3,295,700.00	$ USD	
Contingency	$ 329,570.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 235,600.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	10,560	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	X
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	4
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	4
Excavator	2	Laborer	3
Front-End Loader	0	TOTAL	10
Tug Boat	2		
TOTAL	10		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	35,200	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	29,333	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	75	Project Feasibility	
Project Name	Nueces River Delta Shoreline Stabilization	Feasibility Index (max. 75)	40
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	10	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	15		
Project Outputs	10,560 LF breakwater		
Crew Size	10		
Brief Description of Work	The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy that is causing estuarine wetland losses. The GLO and the Coastal Bend Bays and Estuaries Program sponsored an alternatives analysis in 2014 for the feasibility, assessment and permitting of the shoreline protections structures.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	10,560	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	35,200	tons	$ 45.00	$ 1,584,000.00
Geotextile	29,333	SY	$ 2.90	$ 85,065.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 80,000.00
Crane	1	EA	$ 15,000.00	$ 60,000.00
Dump Truck	3	EA	$ 15,000.00	$ 135,000.00
Excavator	2	EA	$ 15,000.00	$ 90,000.00
Tug Boat	2	EA	$ 30,000.00	$ 240,000.00

Engineering and Design (E&D)	$ 85,000.00
Construction Cost and Management	$ 2,339,100.00
Mobilization and Demobilization	$ 871,600.00
Subtotal	$ 3,295,700.00
Project Contingency	$ 329,600.00
Total Project Cost	$ 3,625,300.00
Annual Operations and Maintenance (O&M)	$ 235,600.00
Total O&M	$ 3,534,000.00

Project Data Template

Project Details	
Project ID	96
Project Name	Bahia Grande Hydrologic Restoration
Region	4
Sub region	8
Start Year	2018
Construction Duration (months)	5
Longevity and Useful Life (years)	10
Project Outputs	Widening and Deepening Existing Channel inlet
Brief Description of Work	This project is to widen and deepen the existing inlet channel for tidal exchange to fully restore the natural biological functions of the wetlands.

Project Cost				
Total Project Cost	$ 5,208,500.00	$ USD		
Engineering and Design	$ 225,000.00	$ USD		
Construction and Management Cost	$ 4,160,000.00	$ USD		
Mobilization/Demobilization	$ 350,000.00	$ USD		
Subtotal	$ 4,735,000.00	$ USD		
Contingency	$ 473,500.00		% of subtotal	10%
Annualized Operations and Maintenance	$ 125,500.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	800,000	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	8,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	x	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	4
Navigation		Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	0	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	3
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	21
Tug Boat	5		
TOTAL	12		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☑	800,000	CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	20,000	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	96	Project Feasibility	
Project Name	Bahia Grande Hydrologic Restoration	Feasibility Index (max. 75)	40
Region	4	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	8	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	6		
Longevity and Useful Life (years)	10		
Project Outputs	Widening and Deepening Existing		
Crew Size	21		
Brief Description of Work	This project is to widen and deepen the existing inlet channel for tidal exchange to fully restore the natural biological functions of the wetlands.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	800,000	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	8,000	LF	$ 50.00	$ 400,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 65,000.00	$ 65,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 175,000.00	$ 175,000.00
Environmental Consulting Services	1	LS	$ 50,000.00	$ 50,000.00
Mobilization and Demobilization	1	LS	$ 350,000.00	$ 350,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Maintenance Dredged Material	800,000	CY	$ 1.95	$ 1,560,000.00
Recycled Concrete	20,000	CY	$ 30.00	$ 600,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 180,000.00
Crane	1	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 180,000.00
Excavator	2	EA	$ 15,000.00	$ 180,000.00
Tug Boat	5	EA	$ 30,000.00	$ 900,000.00

Engineering and Design (E&D)	$ 225,000.00
Construction Cost and Management	$ 4,160,000.00
Mobilization and Demobilization	$ 350,000.00
Subtotal	$ 4,735,000.00
Project Contingency	$ 473,500.00
Total Project Cost	$ 5,208,500.00
Annual Operations and Maintenance (O&M)	$ 125,500.00
Total O&M	$ 1,255,200.00

Project Data Template

Project Details	
Project ID	145
Project Name	City of South Padre Island Gulf Shoreline Restoration
Region	4
Sub region	1
Start Year	2018
Construction Duration (months)	8
Longevity and Useful Life (years)	10
Project Outputs	Beach Nourishment; Dune Restoration
Brief Description of Work	The project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline

Project Cost		
Total Project Cost	$ 74,090,000.00	$ USD
Engineering and Design	$ 150,000.00	$ USD
Construction and Management Cost	$ 63,474,000.00	$ USD
Mobilization/Demobilization	$ 800,000.00	$ USD
Subtotal	$ 64,424,000.00	$ USD
Contingency	$ 9,663,600.00	% of subtotal 15%
Annualized Operations and Maintenance	$ 852,000.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	2,400,833	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☑	346,389	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Beneficially use dredge material for beach nourishment

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	x	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓
Emergency Management	
Environmental	X
Flood Risk	
Hydropower	
Navigation	
Recreation	
Regulatory	
Water Storage	

Monitoring, Operations & Maintenance	
Monitoring Freq. (yrs)	1
Cost (% of total project cost)	0.25%
Maintenance Freq. (yrs)	5
Cost (% of total project cost)	2%
Operation Duration (yrs)	10
Cost (% of total project cost)	0.5%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	3	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	0	Operator	6
Excavator	3	Laborer	5
Front-End Loader	0	TOTAL	25
Tug Boat	2		
TOTAL	13		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☑	14,333	LF
Sand or Soil Fill	☑	346,389	CY
Seeding	☐		SY
Soft Clay Fill	☑	2,400,833	CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	145	Project Feasibility	
Project Name	City of South Padre Island Gulf Shoreline Restoration	Feasibility Index (max. 75)	38
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	4		
Subregion	1	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	8		
Longevity and Useful Life (years)	10		
Project Outputs	Beach Nourishment; Dune		
Crew Size	25		
Brief Description of Work	The project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	2,400,833	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 10,000.00	$ 10,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Mobilization and Demobilization	1	LS	$ 800,000.00	$ 800,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand Fence	14,333	LF	$ 61.50	$ 881,479.50
Soft Clay Fill	2,400,833	CY	$ 15.00	$ 36,012,495.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 240,000.00
Bulldozer	3	EA	$ 15,000.00	$ 225,000.00
Crane	1	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 240,000.00
Excavator	3	EA	$ 15,000.00	$ 225,000.00
Tug Boat	2	EA	$ 30,000.00	$ 480,000.00

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 63,474,000.00
Mobilization and Demobilization	$ 800,000.00
Subtotal	$ 64,424,000.00
Project Contingency	$ 9,663,600.00
Total Project Cost	$ 74,090,000.00
Annual Operations and Maintenance (O&M)	$ 852,000.00
Total O&M	$ 8,520,000.00

Project Data Template

Project Details	
Project ID	252
Project Name	Bolivar Peninsula Beach & Dune Restoration
Region	1
Subregion	1
Start Year	2018
Construction Duration (months)	11
Longevity and Useful Life (years)	15
Project Outputs	
Brief Description of Work	The project would reconstruct severely eroded beaches and dunes along an approximately 10-mile stretch of beach between the communities of High Island on the east to Caplen on the west.

Project Cost			
Total Project Cost	$ 81,178,000.00	$ USD	
Engineering and Design	$ 180,000.00	$ USD	
Construction and Management Cost	$ 71,086,100.00	$ USD	
Mobilization/Demobilization	$ 2,531,800.00	$ USD	
Subtotal	$ 73,798,000.00	$ USD	
Contingency	$ 7,380,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 1,275,400.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	425,333	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	2,948,000	CY
Dune Construction and Restoration	☑	52,800	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Material to be beneficially used for dune and beach construction/restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	X
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	2%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	5	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	2	Operator	10
Excavator	6	Laborer	8
Front-End Loader	0	TOTAL	34
Tug Boat	2		
TOTAL	20		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☑	17,600	LF
Sand or Soil Fill	☑	2,948,000	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Sand Fill - Dunes	☑	425,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	252	Project Feasibility	
Project Name	Bolivar Peninsula Beach & Dune Restoration	Feasibility Index (max. 75)	49
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	1	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	11		
Longevity and Useful Life (years)	15		
Project Outputs	0		
Crew Size	34		
Brief Description of Work	The project would reconstruct severely eroded beaches and dunes along an approximately 10-mile stretch of beach between the communities of High Island on the east to Caplen on the west.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	425,333	CY	$ -	$ -
Dredging	2,948,000	CY	$ -	$ -
Dune Construction and Restoration	52,800	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ -	$ -
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ -	$ -
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 180,000.00	$ 180,000.00
Mobilization and Demobilization	1	LS	$ 2,531,750.00	$ 2,531,750.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand Fence	17,600	LF	$ 3.00	$ 52,800.00
Sand or Soil Fill	2,948,000	CY	$ 20.00	$ 58,960,000.00
Sand Fill - Dunes	425,333	CY	$ 25.00	$ 10,633,325.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3.00	EA	$ 10,000.00	$ 240,000.00
Bulldozer	5	EA	$ 15,000.00	$ 150,000.00
Crane	1	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 240,000.00
Dump Truck	2	EA	$ 15,000.00	$ 30,000.00
Excavator	6	EA	$ 15,000.00	$ 180,000.00
Tug Boat	2	EA	$ 30,000.00	$ 480,000.00

Engineering and Design (E&D)	$ 180,000.00
Construction Cost and Management	$ 71,086,100.00
Mobilization and Demobilization	$ 2,531,800.00
Subtotal	$ 73,798,000.00
Project Contingency	$ 7,380,000.00
Total Project Cost	$ 81,178,000.00
Annual Operations and Maintenance (O&M)	$ 1,275,400.00
Total O&M	$ 19,130,900.00

Project Data Template

Project Details	
Project ID	255
Project Name	Candy Abshier Wildlife Management Area Shoreline Protection and Marsh Restoration
Region	1
Sub region	11
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	25
Project Outputs	2,660 LF of breakwaters, 20 acres of marsh
Brief Description of Work	This project would construct 2,660 feet of shoreline to create up to 20 acres of coastal salt-marsh habitat. Additionally, the investment would protect and preserve the adjacent coastal prairie within the 212-acre Candy Abshier Wildlife Management Area.

Project Cost				
Total Project Cost	$	1,623,000.00	$ USD	
Engineering and Design	$	90,000.00	$ USD	
Construction and Management Cost	$	1,349,000.00	$ USD	
Mobilization/Demobilization	$	107,000.00	$ USD	
Subtotal	$	1,546,000.00	$ USD	
Contingency	$	77,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$	18,900.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	2,660	LF
Marsh / Wetland Construction and Restoration	☑	20	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers	X	Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	2%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	20
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	255	Project Feasibility	
Project Name	Candy Abshier Wildlife Management Area Shoreline	Feasibility Index (max. 4)	3.26
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	11	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	4		
Longevity and Useful Life (years)	25		
Project Outputs	2,660 LF of breakwaters, 20		
Crew Size	29		
Brief Description of Work	This project would construct 2,660 feet of shoreline to create up to 20 acres of coastal salt-marsh habitat. Additionally, the investment would protect and preserve the adjacent coastal prairie within the 212-acre Candy Abshier Wildlife Management Area.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	2,660	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	20	acres	$ 200.00	$ 4,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 107,000.00	$ 107,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 160,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	4	EA	$ 15,000.00	$ 240,000.00
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	3	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 90,000.00
Construction Cost and Management	$ 1,349,000.00
Mobilization and Demobilization	$ 107,000.00
Subtotal	$ 1,546,000.00
Project Contingency	$ 77,000.00
Total Project Cost	$ 1,623,000.00
Annual Operations and Maintenance (O&M)	$ 18,900.00
Total O&M	$ 472,000.00

Project Data Template

Project Details

Project ID	315
Project Name	Follets Island Nourishment and Erosion Control
Region	1
Subregion	1
Start Year	2018
Construction Duration (months)	11
Longevity and Useful Life (years)	15
Project Outputs	2 EA Groins; 74,000 LF Gulf
Brief Description of Work	The project involves gulf shoreline protection and restoration using stone to create groins or other erosion control structures and one initial placement of beach nourishment. In conjunction with the beach nourishment, a sand fence would be added on shore along the vegetation line to keep the sand within the beach zone. It is anticipated that these measures would stabilize the shoreline and prevent erosion.

Project Cost

Total Project Cost	$ 106,338,000.00	$ USD
Engineering and Design	$ 115,000.00	$ USD
Construction and Management Cost	$ 89,194,600.00	$ USD
Mobilization/Demobilization	$ 3,158,500.00	$ USD
Subtotal	$ 92,468,100.00	$ USD
Contingency	$ 13,870,000.00	% of subtotal 15%
Annualized Operations and Maintenance	$ 1,115,400.00	$ USD

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	4,131,667	CY
Dune Construction and Restoration	☑	52,800	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	74,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF

Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS

Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)

Aransas		Kenedy	
Brazoria	X	Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	1%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors

Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	2	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	4
Front-End Loader	0	TOTAL	28
Tug Boat	4		
TOTAL	20		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☑	7,040	tons
250-lb Class Stone	☑	3,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	3,667	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	4,131,667	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY

Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Groins	☑	2	each
	☐		
	☐		

Detailed Project Cost

Project ID	315	Project Feasibility	
Project Name	Follets Island Nourishment and Erosion Control	Feasibility Index (max. 75)	34
Region	1	Descriptor (low, med-low, med-high, high)	Medium-Low
Subregion	1	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	38		
Longevity and Useful Life (years)	15		
Project Outputs	2 EA Groins; 74,000 LF Gulf		
Crew Size	28		
Brief Description of Work	The project involves gulf shoreline protection and restoration using stone to create groins or other erosion control structures and one initial placement of beach nourishment. In conjunction with the beach nourishment, a sand fence would be added on shore along the vegetation line to keep the sand within the beach zone. It is anticipated that these measures would stabilize the shoreline and prevent erosion.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	4,131,667	CY	$ -	$ -
Dune Construction and Restoration	52,800	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	74,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ -	$ -
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ -	$ -
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 115,000.00	$ 115,000.00
Mobilization and Demobilization	1	LS	$ 3,158,540.00	$ 3,158,540.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
2000-lb Class Stone	7,040	tons	$ 65.00	$ 457,600.00
250-lb Class Stone	3,400	tons	$ 45.00	$ 153,000.00
Geotextile	3,667	SY	$ 2.90	$ 10,634.30
Sand or Soil Fill	4,131,667	CY	$ 20.00	$ 82,633,340.00
Groins	2	each	$ -	$ -

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 480,000.00
Bulldozer	2	EA	$ 15,000.00	$ 1,140,000.00
Crane	1	EA	$ 15,000.00	$ 180,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 360,000.00
Dump Truck	4	EA	$ 15,000.00	$ 60,000.00
Excavator	4	EA	$ 15,000.00	$ 2,280,000.00
Tug Boat	4	EA	$ 30,000.00	$ 1,440,000.00

Engineering and Design (E&D)	$ 115,000.00
Construction Cost and Management	$ 89,194,600.00
Mobilization and Demobilization	$ 3,158,500.00
Subtotal	$ 92,468,000.00
Project Contingency	$ 13,870,000.00
Total Project Cost	$ 106,338,000.00
Annual Operations and Maintenance (O&M)	$ 1,115,400.00
Total O&M	$ 16,730,500.00

Project Data Template

Project Details	
Project ID	320
Project Name	Old River Cove Dredge Placement Island Restoration
Region	1
Sub region	2
Start Year	2020
Construction Duration (months)	9
Longevity and Useful Life (years)	25
Project Outputs	131 acres of barrier islands; 10,000 LF revetment
Brief Description of Work	This measure would restore islands that once protected the GIWW at the northern end of Sabine Lake in front of Old River Cove and Hickory Cove.

Project Cost				
Total Project Cost	$	15,130,000.00	$ USD	
Engineering and Design	$	350,000.00	$ USD	
Construction and Management Cost	$	12,206,500.00	$ USD	
Mobilization/Demobilization	$	600,000.00	$ USD	
Subtotal	$	13,156,500.00	$ USD	
Contingency	$	1,973,475.00	% of subtotal	15%
Annualized Operations and Maintenance	$	276,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	9,555	LF
Dredging	☑	1,088,868	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	131	acres
Marine Construction (e.g., groins, breakwaters)	☑	10,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☑	131	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The length of the dike/levee construction is assuming that the marsh is square, the number will change depending on the actual shape of the marsh.
Number of plants is an estimated quantity to plant a 10 wide section around the perimeter of the island at 3 ft spacing. To plant the entire island would require over 630,000 plants.
Material would be beneficially used in the island restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	2
Environmental	X	Cost (% of total project cost)	0.05%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	4%
Recreation	X		
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	90%
Non-Local	% of visitors	10%
Boaters	% of visitors	90%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	4	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	6	Operator	12
Excavator	6	Laborer	14
Front-End Loader	0	TOTAL	43
Tug Boat	3		
TOTAL	26		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	33,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	27,778	SY
Maintenance Dredged Material	☑	845,387	CY
Pipeline	☐		LF
Plants	☑	10,616	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	243,481	CY
Other:	✓	Quantity	Units
	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	320	Project Feasibility	
Project Name	Old River Cove Dredge Placement Island Restoration	Feasibility Index (max. 75)	36
Region	1	Descriptor (low, med-low, med-high, high)	Medium-Low
Subregion	2	Construction Contingency	
Start Year	2020	Contingency (%)	15%
Construction Duration (months)	9		
Longevity and Useful Life (years)	25		
Project Outputs	131 acres of barrier islands; 10,000 LF revetment		
Crew Size	43		
Brief Description of Work	This measure would restore islands that once protected the GIWW at the northern end of Sabine Lake in front of Old River Cove and Hickory Cove.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	9,555	LF	$ -	$ -
Dredging	1,088,868	CY	$ -	$ -
Island Creation	131	acres	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	10,000	LF	$ -	$ -
Planting	131	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ 25,000.00	$ 25,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 250,000.00	$ 250,000.00
Environmental Consulting Services	1	LS	$ 100,000.00	$ 100,000.00
Mobilization and Demobilization	1	LS	$ 600,000.00	$ 600,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	33,333	tons	$ 45.00	$ 1,499,985.00
Geotextile	27,778	SY	$ 2.90	$ 80,556.20
Maintenance Dredged Material	845,387	CY	$ 1.95	$ 1,648,504.65
Plants	10,616	each	$ 25.00	$ 265,400.00
Stiff Clay Fill	243,481	CY	$ 25.00	$ 6,087,025.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 360,000.00
Bulldozer	4	EA	$ 15,000.00	$ 240,000.00
Crane	2	EA	$ 15,000.00	$ 270,000.00
Dredge - Hydraulic	1	EA	$ 15,000.00	$ 135,000.00
Dump Truck	6	EA	$ 15,000.00	$ 360,000.00
Excavator	6	EA	$ 15,000.00	$ 360,000.00
Tug Boat	3	EA	$ 30,000.00	$ 810,000.00

Engineering and Design (E&D)	$ 350,000.00
Construction Cost and Management	$ 12,206,500.00
Mobilization and Demobilization	$ 600,000.00
Subtotal	$ 13,156,500.00
Project Contingency	$ 1,973,500.00
Total Project Cost	$ 15,130,000.00
Annual Operations and Maintenance (O&M)	$ 276,100.00
Total O&M	$ 6,902,500.00

Project Data Template

Project Details	
Project ID	322
Project Name	North Pleasure Island Barrier Island Restoration
Region	1
Subregion	2
Start Year	2018
Construction Duration (months)	12
Longevity and Useful Life (years)	15
Project Outputs	2000 LF misc. wave break; 15 acre island
Brief Description of Work	This project will restore remnants of a 15 acre island that once protected the navigation channel at the northern end of Sabine Lake at Pleasure Island by using dredged material to build up the island and construct up to 2,000 feet of breakwater.

Project Cost			
Total Project Cost	$ 10,789,500.00	$ USD	
Engineering and Design	$ 150,000.00	$ USD	
Construction and Management Cost	$ 8,732,200.00	$ USD	
Mobilization/Demobilization	$ 500,000.00	$ USD	
Subtotal	$ 9,382,200.00	$ USD	
Contingency	$ 1,407,330.00	% of subtotal	15%
Annualized Operations and Maintenance	$ 264,900.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	4,312	LF
Dredging	☑	179,190	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	2,000	LF
Marsh / Wetland Construction and Restoration	☑	15	acres
Oyster Reef Creation	☐		acres
Planting	☑	15	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The LF of containment dike has been drastically reduced from version 1 of this template. The barrier island typical cross section was used as opposed to the marsh containment dike cross section.
Dredged material will be beneficially used to construct the marsh

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	0.5%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	7	Captain	1
Bulldozer	4	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	4
Dredge - Mechanical	0	Supervisor	6
Dump Truck	5	Operator	13
Excavator	7	Laborer	12
Front-End Loader	0	TOTAL	44
Tug Boat	6		
TOTAL	31		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	6,667	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	5,556	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	59,500	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	96,800	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	82,390	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	322	Project Feasibility	
Project Name	North Pleasure Island Barrier Island Restoration	Feasibility Index (max. 75)	35
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	1		
Subregion	2	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	6		
Longevity and Useful Life (years)	15		
Project Outputs	2000 LF misc. wave break; 15		
Crew Size	44		
Brief Description of Work	This project will restore remnants of a 15 acre island that once protected the navigation channel at the northern end of Sabine Lake at Pleasure Island by using dredged material to build up the island and construct up to 2,000 feet of breakwater.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	4,312	LF	$ 30.00	$ 129,360.00
Dredging	179,190	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	2,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	15	acres	$ 200.00	$ 3,000.00
Planting	15	acres	$ 100.00	$ 1,500.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Mobilization and Demobilization	1	LS	$ 500,000.00	$ 500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	6,667	tons	$ 45.00	$ 300,015.00
Geotextile	5,556	SY	$ 2.90	$ 16,112.40
Plants	59,500	each	$ 25.00	$ 1,487,500.00
Sand or Soil Fill	96,800	CY	$ 25.00	$ 2,420,000.00
Stiff Clay Fill	82,390	CY	$ 25.00	$ 2,059,750.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	7	EA	$ 10,000.00	$ 420,000.00
Bulldozer	4	EA	$ 15,000.00	$ 120,000.00
Crane	1	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 180,000.00
Dump Truck	5	EA	$ 15,000.00	$ 150,000.00
Excavator	7	EA	$ 15,000.00	$ 210,000.00
Tug Boat	6	EA	$ 30,000.00	$ 1,080,000.00

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 8,732,200.00
Mobilization and Demobilization	$ 500,000.00
Subtotal	$ 9,382,200.00
Project Contingency	$ 1,407,300.00
Total Project Cost	$ 10,789,500.00
Annual Operations and Maintenance (O&M)	$ 264,900.00
Total O&M	$ 3,973,500.00

Project Data Template

Project Details	
Project ID	337
Project Name	Old River Cove Marsh Restoration
Region	1
Sub region	2
Start Year	2018
Construction Duration (months)	47
Longevity and Useful Life (years)	15
Project Outputs	1,210 acres of wetlands
Brief Description of Work	This measure would restore 639 acres of brackish marsh, 139 acres of shallow-water habitat, and nourish 432 acres of existing marsh. The total influence area is 1,210 acres.

Project Cost		
Total Project Cost	$ 26,399,000.00	$ USD
Engineering and Design	$ 100,000.00	$ USD
Construction and Management Cost	$ 21,246,900.00	$ USD
Mobilization/Demobilization	$ 651,900.00	$ USD
Subtotal	$ 21,999,000.00	$ USD
Contingency	$ 4,400,000.00	% of subtotal 20%
Annualized Operations and Maintenance	$ 587,800.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	2,046,782	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	1,210	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material will be beneficially used for marsh restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	5	Captain	2
Bulldozer	1	Deckhand	10
Crane	2	Mate	6
Dredge - Hydraulic	2	Engineer	4
Dredge - Mechanical	0	Supervisor	4
Dump Truck	1	Operator	4
Excavator	2	Laborer	8
Front-End Loader	0	TOTAL	38
Tug Boat	4		
TOTAL	17		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	94,649	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	1,952,133	CY
	☐		
	☐		

Detailed Project Cost

Project ID	337	Project Feasibility		
Project Name	Old River Cove Marsh Restoration	Feasibility Index (max. 75)	31	
		Descriptor (low, med-low, med-high, high)	Low	
Region	1			
Subregion	2	Construction Contingency		
Start Year	2018	Contingency (%)	20%	
Construction Duration (months)	47			
Longevity and Useful Life (years)	15			
Project Outputs	1,210 acres of wetlands			
Crew Size	38			
Brief Description of Work	This measure would restore 639 acres of brackish marsh, 139 acres of shallow-water habitat, and nourish 432 acres of existing marsh. The total influence area is 1,210 acres.			

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	2,046,782	CY	$ -	$ -
Marsh / Wetland Construction and Restoration	1,210	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ -	$ -
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ -	$ -
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Mobilization and Demobilization	1	LS	$ 651,894.00	$ 651,894.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Stiff Clay Fill	94,649	CY	$ 25.00	$ 2,366,225.00
Marsh Fill	1,952,133	CY	$ 5.00	$ 9,760,665.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	5	EA	$ 10,000.00	$ 300,000.00
Bulldozer	1	EA	$ 15,000.00	$ 615,000.00
Crane	2	EA	$ 15,000.00	$ 180,000.00
Dredge - Hydraulic	2	EA	$ 30,000.00	$ 360,000.00
Dump Truck	1	EA	$ 15,000.00	$ 615,000.00
Excavator	2	EA	$ 15,000.00	$ 1,410,000.00
Tug Boat	4	EA	$ 30,000.00	$ 5,640,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 21,246,900.00
Mobilization and Demobilization	$ 651,900.00
Subtotal	$ 21,999,000.00
Project Contingency	$ 4,400,000.00
Total Project Cost	$ 26,399,000.00
Annual Operations and Maintenance (O&M)	$ 587,800.00
Total O&M	$ 8,817,300.00

Project Data Template

Project Details	
Project ID	344
Project Name	Pierce Marsh Living Shoreline
Region	1
Sub region	17
Start Year	
Construction Duration (months)	12
Longevity and Useful Life (years)	15
Project Outputs	2,080 acre marsh, 8,500 LF Misc. wave break
Brief Description of Work	The project will restore 2,076 acres of marsh. This will involve installation of a 7.2 mile containment dike and bay shoreline protection of 1.6 miles.

Project Cost		
Total Project Cost	$ 18,307,300.00	$ USD
Engineering and Design	$ 150,000.00	$ USD
Construction and Management Cost	$ 14,756,100.00	$ USD
Mobilization/Demobilization	$ 350,000.00	$ USD
Subtotal	$ 15,256,100.00	$ USD
Contingency	$ 3,051,220.00	% of subtotal 20%
Annualized Operations and Maintenance	$ 228,800.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	38,038	LF
Dredging	☑	3,497,012	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	8,500	LF
Marsh / Wetland Construction and Restoration	☑	2,076	acres
Oyster Reef Creation	☐		acres
Planting	☑	2,076	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The 17,184 cy of maintenance dredge material will be used to fill the Geotubes.
The length of the dike/levee construction is assuming that the marsh is square, the number will change depending on the actual shape of the marsh.
Number of plants is an estimated quantity to plant a 10 wide section around the perimeter of the marsh at 3 ft spacing. To plant the entire marsh would require over 9,000,000 plants.
Material to be beneficially used to fill the marshes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	0.25%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	2%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	90%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	4	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	4
Dredge - Mechanical	0	Supervisor	7
Dump Truck	6	Operator	12
Excavator	6	Laborer	14
Front-End Loader	0	TOTAL	46
Tug Boat	3		
TOTAL	25		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	34,907	SY
Maintenance Dredged Material	☑	3,372,917	CY
Pipeline	☐		LF
Plants	☑	42,264	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	124,095	CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Geotubes	☑	8500	LF
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	344	Project Feasibility	
Project Name	Pierce Marsh Living Shoreline	Feasibility Index (max. 75)	29
		Descriptor (low, med-low, med-high, high)	Low
Region	1		
Subregion	17	Construction Contingency	
Start Year	0	Contingency (%)	20%
Construction Duration (months)	103		
Longevity and Useful Life (years)	15		
Project Outputs	2,080 acre marsh, 8,500 LF Misc.		
Crew Size	46		
Brief Description of Work	The project will restore 2,076 acres of marsh. This will involve installation of a 7.2 mile containment dike and bay shoreline protection of 1.6 miles.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	38,038	LF	$ -	$ -
Dredging	3,497,012	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	8,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	2,076	acres	$ -	$ -
Planting	2,076	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ 30,000.00	$ 30,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 125,000.00	$ 125,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 350,000.00	$ 350,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	34,907	SY	$ 2.90	$ 101,230.30
Maintenance Dredged Material	3,372,917	CY	$ 1.95	$ 6,577,188.15
Plants	42,264	each	$ 25.00	$ 1,056,600.00
Soft Clay Fill	124,095	CY	$ 15.00	$ 1,861,425.00
Geotubes	8,500	LF	$ 2.90	$ 24,650.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ -	$ -
Bulldozer	4	EA	$ 15,000.00	$ 780,000.00
Crane	2	EA	$ 15,000.00	$ 3,090,000.00
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	6	EA	$ -	$ -
Excavator	6	EA	$ 15,000.00	$ 1,170,000.00
Tug Boat	3	EA	$ -	$ -

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 14,756,100.00
Mobilization and Demobilization	$ 350,000.00
Subtotal	$ 15,256,100.00
Project Contingency	$ 3,051,200.00
Total Project Cost	$ 18,307,300.00
Annual Operations and Maintenance (O&M)	$ 228,800.00
Total O&M	$ 3,432,000.00

Project Data Template

Project Details

Project ID	346
Project Name	IH-45 Causway Marsh Restoration
Region	1
Subregion	17
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	25
Project Outputs	8,500 LF breakwater, 25 acres marsh restoration
Brief Description of Work	This project, located south of causeway and east of Bayou Vista, includes restoration of 633 acres of marsh, a containment dike of 4.8 miles, and bay shoreline protection of 1.6 miles.

Project Cost

Total Project Cost	$ 4,251,000.00	$ USD	
Engineering and Design	$ 120,000.00	$ USD	
Construction and Management Cost	$ 3,444,500.00	$ USD	
Mobilization/Demobilization	$ 300,000.00	$ USD	
Subtotal	$ 3,864,500.00	$ USD	
Contingency	$ 386,450.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 93,500.00	$ USD	

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	8,500	LF
Marsh / Wetland Construction and Restoration	☑	25	acres
Oyster Reef Creation	☐		acres
Planting	☑	25	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations

	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area

Approximate populated area the completed project will impact.

	✓
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector

Sector	✓
Emergency Management	
Environmental	X
Flood Risk	
Hydropower	
Navigation	
Recreation	X
Regulatory	
Water Storage	

Monitoring, Operations & Maintenance

Monitoring Freq. (yrs)	1
Cost (% of total project cost)	1%
Maintenance Freq. (yrs)	5
Cost (% of total project cost)	1%
Operation Duration (yrs)	25
Cost (% of total project cost)	1%

Site Visitors

Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	80%
Multi-Day / Overnight	% of visitors	0%

Equipment

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	4	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	4	Operator	5
Excavator	3	Laborer	5
Front-End Loader	0	TOTAL	23
Tug Boat	3		
TOTAL	19		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	28,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	24,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	10,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	3,400	CY
Other:	✓	**Quantity**	**Units**
Marsh Fill	☑	40,300	CY
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	346	Project Feasibility	
Project Name	IH-45 Causway Marsh Restoration	Feasibility Index (max. 75)	42
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	17	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	6		
Longevity and Useful Life (years)	25		
Project Outputs	8,500 LF breakwater, 25 acres		
Crew Size	23		
Brief Description of Work	This project, located south of causeway and east of Bayou Vista, includes restoration of 633 acres of marsh, a containment dike of 4.8 miles, and bay shoreline protection of 1.6 miles.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	8,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	25	acres	$ -	$ -
Planting	25	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 300,000.00	$ 300,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	28,400	tons	$ 45.00	$ 1,278,000.00
Geotextile	24,000	SY	$ 2.90	$ 69,600.00
Plants	10,000	each	$ 25.00	$ 250,000.00
Stiff Clay Fill	3,400	CY	$ 25.00	$ 85,000.00
Marsh Fill	40,300	CY	$ 2.90	$ 116,870.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 180,000.00
Bulldozer	4	EA	$ 15,000.00	$ 360,000.00
Crane	1	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 15,000.00	$ 90,000.00
Dump Truck	4	EA	$ 10,000.00	$ 240,000.00
Excavator	3	EA	$ 15,000.00	$ 270,000.00
Tug Boat	3	EA	$ 20,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 3,444,500.00
Mobilization and Demobilization	$ 300,000.00
Subtotal	$ 3,864,500.00
Project Contingency	$ 386,500.00
Total Project Cost	$ 4,251,000.00
Annualized Operations and Maintenance (O&M)	$ 93,500.00
Total O&M	$ 2,337,500.00

Project Data Template

Project Details	
Project ID	380
Project Name	Gordy Marsh Restoration & Shoreline Protection
Region	1
Sub region	10
Start Year	2018
Construction Duration (months)	60
Longevity and Useful Life (years)	15
Project Outputs	3000 LF misc. wave break; 1700 acres marsh
Brief Description of Work	The project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1700-acre coastal wetland and prairie habitat that borders Trinity Bay. Gordy Marsh is located within an area rated as a high conservation priority by Chambers County and the Galveston Bay Foundation.

Project Cost			
Total Project Cost	$ 28,205,000.00	$ USD	
Engineering and Design	$ 180,000.00	$ USD	
Construction and Management Cost	$ 22,451,900.00	$ USD	
Mobilization/Demobilization	$ 871,600.00	$ USD	
Subtotal	$ 23,504,000.00	$ USD	
Contingency	$ 4,701,000.00	% of subtotal	20%
Annualized Operations and Maintenance	$ 897,500.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	2,776,779	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	3,000	LF
Marsh / Wetland Construction and Restoration	☑	1,700	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for marsh restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers	X	Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	4
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	12,320	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	28,047	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Geotube Fill - Sludge	☑	6,065	CY
Marsh Fill	☑	2,742,667	CY
Geotubes	☑	3,000	LF

Detailed Project Cost

Project ID	380	Project Feasibility	
Project Name	Gordy Marsh Restoration & Shoreline Protection	Feasibility Index (max. 75)	28
		Descriptor (low, med-low, med-high, high)	Low
Region	1		
Subregion	10	Construction Contingency	
Start Year	2018	Contingency (%)	20%
Construction Duration (months)	60		
Longevity and Useful Life (years)	15		
Project Outputs	3000 LF misc. wave break; 1700		
Crew Size	31		
Brief Description of Work	The project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1700-acre coastal wetland and prairie habitat that borders Trinity Bay. Gordy Marsh is located within an area rated as a high conservation priority by Chambers County and the Galveston Bay Foundation.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	2,776,779	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	3,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	1,700	acres	$ 200.00	$ 340,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 25,000.00	$ 25,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 180,000.00	$ 180,000.00
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	12,320	SY	$ 2.90	$ 35,728.00
Stiff Clay Fill	28,047	CY	$ 25.00	$ 701,175.00
Geotube Fill - Sludge	6,065	CY	$ 2.90	$ 17,588.50
Marsh Fill	2,742,667	CY	$ 2.90	$ 7,953,734.30
Geotubes	3,000	LF	$ 2.90	$ 8,700.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ 10,000.00	$ 320,000.00
Bulldozer	1	EA	$ 15,000.00	$ 120,000.00
Crane	2	EA	$ 15,000.00	$ 240,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 240,000.00
Dump Truck	4	EA	$ 15,000.00	$ 3,420,000.00
Excavator	4	EA	$ 15,000.00	$ 3,600,000.00
Tug Boat	3	EA	$ 30,000.00	$ 5,130,000.00

Engineering and Design (E&D)	$ 180,000.00
Construction Cost and Management	$ 22,451,900.00
Mobilization and Demobilization	$ 871,600.00
Subtotal	$ 23,504,000.00
Project Contingency	$ 4,701,000.00
Total Project Cost	$ 28,205,000.00
Annual Operations and Maintenance (O&M)	$ 897,500.00
Total O&M	$ 13,463,200.00

Project Data Template

Project Details	
Project ID	418
Project Name	Sargent Beach Dune/Beach Restoration
Region	2
Subregion	1
Start Year	2018
Construction Duration (months)	20
Longevity and Useful Life (years)	10
Project Outputs	45,000 LF Gulf; 45,000 LF Dune
Brief Description of Work	The project will nourish and restore approximately 8 miles of beach shoreline and dunes on Sargent Beach. This solution could include constructing groins or detached breakwaters to retain sediment on the beach to slow the natural processes of offshore transport. The nourishment efforts would primarily rely on sand sources that developed nearshore along the Brazos and San Bernard River deltas, with the additional possibility of a source offshore in the Colorado River Delta. A recommendationof phased 2-mile stretches of shoreline, focused on critical needs, is proposed to account for sediment and budget limitations, as opposed to address the full project length in a single phase of work.

Project Cost		
Total Project Cost	$ 66,230,000.00	$ USD
Engineering and Design	$ 400,000.00	$ USD
Construction and Management Cost	$ 54,466,300.00	$ USD
Mobilization/Demobilization	$ 2,723,315.00	$ USD
Subtotal	$ 57,589,615.00	$ USD
Contingency	$ 8,638,442.25	% of subtotal 15%
Annualized Operations and Maintenance	$ 1,688,800.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	2,512,500	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☑	362,500	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☑	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material would beneficially used to build beach shoreline and dunes.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	0.05%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	5
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	4	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	2	Operator	9
Excavator	3	Laborer	7
Front-End Loader	0	TOTAL	30
Tug Boat	2		
TOTAL	16		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☑	45,000	LF
Sand or Soil Fill	☑	2,512,500	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	418	Project Feasibility	
Project Name	Sargent Beach Dune/Beach Restoration	Feasibility Index (max. 75)	35
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	2		
Subregion	1	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	14		
Longevity and Useful Life (years)	10		
Project Outputs	45,000 LF Gulf; 45,000 LF Dune		
Crew Size	30		
Brief Description of Work	The project will nourish and restore approximately 8 miles of beach shoreline and dunes on Sargent Beach. This solution could include constructing groins or detached breakwaters to retain sediment on the beach to slow the natural processes of offshore transport. The nourishment efforts would primarily rely on sand sources that developed nearshore along the Brazos and San Bernard River deltas, with the additional possibility of a source offshore in the Colorado River Delta. A recommendationof phased 2-mile		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	2,512,500	CY	$ -	$ -
Dune Construction and Restoration	362,500	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 10,000.00	$ 10,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 400,000.00	$ 400,000.00
Environmental Consulting Services	1	LS	$ -	$ -
Fuel	1	LS	$ -	$ -
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand Fence	45,000	LF	$ 51.50	$ 2,317,500.00
Sand or Soil Fill	2,512,500	CY	$ 19.50	$ 48,993,750.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 420,000.00
Bulldozer	4	EA	$ 15,000.00	$ 540,000.00
Crane	1	EA	$ 15,000.00	$ 210,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 420,000.00
Dump Truck	2	EA	$ 15,000.00	$ 270,000.00
Excavator	3	EA	$ 15,000.00	$ 405,000.00
Tug Boat	2	EA	$ 30,000.00	$ 840,000.00

Engineering and Design (E&D)	$ 400,000.00
Construction Cost and Management	$ 54,466,300.00
Mobilization and Demobilization	$ 2,723,315.00
Subtotal	$ 57,589,600.00
Project Contingency	$ 8,638,400.00
Total Project Cost	$ 66,230,000.00
Annualized Operations and Maintenance (O&M)	$ 1,688,800.00
Total O&M	$ 11,593,600.00

Project Data Template

Project Details	
Project ID	430
Project Name	Redfish Lake Living Shoreline
Region	2
Subregion	7
Start Year	2018
Construction Duration (months)	14
Longevity and Useful Life (years)	15
Project Outputs	15,900 LF breakwater; 100 acres marsh
Brief Description of Work	This project will rebuild and reconnect the breached bayside hook back to the peninsula with approximately 3 miles of living shore line. There are depleted oyster reefs in this area, which may be able to be restored as part of the living shoreline. Healthy oyster reefs can create natural wave breaks due to the added elevation and structure of the reef, and can be incorporated into the living shoreline design for additional benefits.

Project Cost			
Total Project Cost	$ 4,683,300.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 3,997,700.00	$ USD	
Mobilization/Demobilization	$ 199,885.00	$ USD	
Subtotal	$ 4,257,585.00	$ USD	
Contingency	$ 425,758.50	% of subtotal	10%
Annualized Operations and Maintenance	$ 70,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	168,135	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	15,900	LF
Marsh / Wetland Construction and Restoration	☑	100	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☑	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓
Emergency Management	
Environmental	X
Flood Risk	
Hydropower	
Navigation	
Recreation	
Regulatory	
Water Storage	

Monitoring, Operations & Maintenance	
Monitoring Freq. (yrs)	3
Cost (% of total project cost)	1%
Maintenance Freq. (yrs)	15
Cost (% of total project cost)	10%
Operation Duration (yrs)	15
Cost (% of total project cost)	0.5%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	53,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	44,167	SY
Maintenance Dredged Material	☑	161,333	CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	6,802	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	430	Project Feasibility	
Project Name	Redfish Lake Living Shoreline	Feasibility Index (max. 75)	42
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	2		
Subregion	7	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	11		
Longevity and Useful Life (years)	15		
Project Outputs	15,900 LF breakwater; 100 acres		
Crew Size	29		
Brief Description of Work	This project will rebuild and reconnect the breached bayside hook back to the peninsula with approximately 3 miles of living shore line. There are depleted oyster reefs in this area, which may be able to be restored as part of the living shoreline. Healthy oyster reefs can create natural wave breaks due to the added elevation and structure of the reef, and can be incorporated into the living shoreline design for additional benefits.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	168,135	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	15,900	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	100	acres	$ 200.00	$ 20,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Environmental Consulting Services	1	LS	$ -	$ -
Fuel	1	LS	$ -	$ -
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	53,000	tons	$ 45.00	$ 2,385,000.00
Geotextile	44,167	SY	$ 2.90	$ 128,084.30
Maintenance Dredged Material	161,333	CY	$ 1.95	$ 314,599.35
Stiff Clay Fill	6,802	CY	$ 25.00	$ 170,050.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ -	$ -
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 330,000.00
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	4	EA	$ -	$ -
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	3	EA	$ -	$ -

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 3,997,700.00
Mobilization and Demobilization	$ 199,885.00
Subtotal	$ 4,257,600.00
Project Contingency	$ 425,800.00
Total Project Cost	$ 4,683,400.00
Annual Operations and Maintenance (O&M)	$ 70,300.00
Total O&M	$ 1,054,500.00

Project Data Template

Project Details

Project ID	437
Project Name	Fulton Beach Road Protection
Region	3
Subregion	5
Start Year	
Construction Duration (months)	
Longevity and Useful Life (years)	15
Project Outputs	1,040 LF Breakwater
Brief Description of Work	The project involves 3 to 4 miles of breakwaters along Fulton Beach in Aransas County. The project includes regrading and filling along the shoreline, along with marsh planting, to establish a living shoreline system.

Project Cost

Total Project Cost	$	6,548,500.00	$ USD	
Engineering and Design	$	-	$ USD	
Construction and Management Cost	$	5,953,200.00	$ USD	
Mobilization/Demobilization	$	-	$ USD	
Subtotal	$	5,953,200.00	$ USD	
Contingency	$	595,320.00	% of subtotal	10%
Annualized Operations and Maintenance	$	126,600.00	$ USD	

Project Activities

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	85,477	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	18,500	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☐		LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☐		LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Material to be beneficially used to fill the marsh.

County (check all that apply)

County	✓	County	✓
Aransas	✓	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	✓
Rural (<10,000 people)	

Sector / Monitoring, Operations & Maintenance

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management	✓	Monitoring Freq. (yrs)	3
Environmental	✓	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	6%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors

Approx. number of visitors per day		
Local (within 30 mi.)	% of visitors	
Non-Local	% of visitors	
Boaters	% of visitors	
Multi-Day / Overnight	% of visitors	

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	3	Operator	7
Excavator	4	Laborer	8
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	18		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	61,667	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	51,389	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Marsh Fill	☑	80,667	CY
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	437	Project Feasibility	
Project Name	Fulton Beach Road Protection	Feasibility Index (max. 75)	42
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	5	Construction Contingency	
Start Year	0	Contingency (%)	10%
Construction Duration (months)	10		
Longevity and Useful Life (years)	15		
Project Outputs	1,040 LF Breakwater		
Crew Size	31		
Brief Description of Work	The project involves 3 to 4 miles of breakwaters along Fulton Beach in Aransas County. The project includes regrading and filling along the shoreline, along with marsh planting, to establish a living shoreline system.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	85,477	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	18,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	61,667	tons	$ 45.00	$ 2,775,015.00
Geotextile	51,389	SY	$ 2.90	$ 149,028.10
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00
Marsh Fill	80,667	CY	$ 2.90	$ 233,934.30

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 400,000.00
Bulldozer	1	EA	$ 15,000.00	$ 150,000.00
Crane	2	EA	$ 15,000.00	$ 300,000.00
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	3	EA	$ 15,000.00	$ 450,000.00
Excavator	4	EA	$ 15,000.00	$ 420,000.00
Tug Boat	3	EA	$ 30,000.00	$ 900,000.00

Engineering and Design (E&D)	$ -
Construction Cost and Management	$ 5,953,200.00
Mobilization and Demobilization	$ -
Subtotal	$ 5,953,200.00
Project Contingency	$ 595,300.00
Total Project Cost	$ 6,548,500.00
Annualized Operations and Maintenance (O&M)	$ 126,600.00
Total O&M	$ 1,899,000.00

Project Data Template

Project Details

Project ID	452
Project Name	Bird Island & Heron Island Restoration
Region	4
Subregion	8
Start Year	2018
Construction Duration (months)	5
Longevity and Useful Life (years)	15
Project Outputs	5,280 LF breakwaters; 2 rookery islands
Brief Description of Work	The project will constructed approximately 1 mile of breakwaters to control erosion and reduce the loss of critical bird habitat on Bird Island and Heron Island - two rookery islands located in the Bahia Grande.

Project Cost

Total Project Cost	$ 7,014,900.00	$ USD	
Engineering and Design	$ 120,000.00	$ USD	
Construction and Management Cost	$ 5,757,200.00	$ USD	
Mobilization/Demobilization	$ 500,000.00	$ USD	
Subtotal	$ 6,377,200.00	$ USD	
Contingency	$ 637,720.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 119,300.00	$ USD	

Project Activities

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	4,250	LF
Dredging	☑	141,597	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	4,250	LF
Marsh / Wetland Construction and Restoration	☑	15	acres
Oyster Reef Creation	☑	15	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☑	15	miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)

County		County	
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	X	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector / Monitoring, Operations & Maintenance

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors

Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	8	Captain	1
Bulldozer	4	Deckhand	5
Crane	3	Mate	3
Dredge - Hydraulic	1	Engineer	6
Dredge - Mechanical	0	Supervisor	10
Dump Truck	8	Operator	18
Excavator	10	Laborer	16
Front-End Loader	1	TOTAL	59
Tug Boat	7		
TOTAL	42		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	14,167	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	11,806	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	121,000	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	20,597	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	452	Project Feasibility	
Project Name	Bird Island & Heron Island Restoration	Feasibility Index (max. 75)	48
Region	4	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	8	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	5		
Longevity and Useful Life (years)	15		
Project Outputs	5,280 LF breakwaters; 2 rookery islands		
Crew Size	59		
Brief Description of Work	The project will constructed approximately 1 mile of breakwaters to control erosion and reduce the loss of critical bird habitat on Bird Island and Heron Island - two rookery islands located in the Bahia Grande.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	4,250	LF	$ 30.00	$ 127,500.00
Dredging	141,597	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	4,250	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	15	acres	$ 200.00	$ 3,000.00
Oyster Reef Creation	15	acres	$ -	$ -
Roadway or Bridge Construction and Maintenance	15	miles	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 120,000.00	$ 120,000.00
Mobilization and Demobilization	1	LS	$ 500,000.00	$ 500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	14,167	tons	$ 45.00	$ 637,515.00
Geotextile	11,806	SY	$ 2.90	$ 34,237.40
Sand or Soil Fill	121,000	CY	$ 15.00	$ 1,815,000.00
Stiff Clay Fill	20,597	CY	$ 25.00	$ 514,925.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	8	EA	$ 10,000.00	$ 400,000.00
Bulldozer	4	EA	$ 15,000.00	$ 120,000.00
Crane	3	EA	$ 15,000.00	$ 225,000.00
Dump Truck	8	EA	$ 15,000.00	$ 240,000.00
Excavator	10	EA	$ 15,000.00	$ 300,000.00
Front-End Loader	1	EA	$ 15,000.00	$ 75,000.00
Tug Boat	7	EA	$ 30,000.00	$ 1,050,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 5,757,200.00
Mobilization and Demobilization	$ 500,000.00
Subtotal	$ 6,377,200.00
Project Contingency	$ 637,700.00
Total Project Cost	$ 7,014,900.00
Annual Operations and Maintenance (O&M)	$ 119,300.00
Total O&M	$ 1,789,500.00

Project Data Template

Project Details	
Project ID	457
Project Name	Sabine-Neches Waterway Barrier Island Habitat Restoration
Region	1
Subregion	2
Start Year	2018
Construction Duration (months)	6
Longevity and Useful Life (years)	15
Project Outputs	40 acres marsh
Brief Description of Work	The project will restore up to 40 acres of island habitat along the Sabine-Neches Waterway in Jefferson County, along the southern boundary of the navigation channel, separating the channel from Sabine Lake. The restored habitat will contain wetlands and vegetated shallows.

Project Cost			
Total Project Cost	$ 3,607,400.00	$ USD	
Engineering and Design	$ 80,000.00	$ USD	
Construction and Management Cost	$ 2,856,900.00	$ USD	
Mobilization/Demobilization	$ 200,000.00	$ USD	
Subtotal	$ 3,136,900.00	$ USD	
Contingency	$ 470,535.00	% of subtotal	15%
Annualized Operations and Maintenance	$ 57,700.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	900	LF
Dredging	☑	64,533	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	40	acres
Oyster Reef Creation	☐		acres
Planting	☑	15	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Material to be beneficially used to build island habitat.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	0.5%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	3	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	12
Excavator	4	Laborer	10
Front-End Loader	0	TOTAL	38
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	20,625	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	64,533	CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	457	Project Feasibility	
Project Name	Sabine-Neches Waterway Barrier Island Habitat Restoration	Feasibility Index (max. 75)	33
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	1		
Subregion	2	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	6		
Longevity and Useful Life (years)	15		
Project Outputs	40 acres marsh		
Crew Size	38		
Brief Description of Work	The project will restore up to 40 acres of island habitat along the Sabine-Neches Waterway in Jefferson County, along the southern boundary of the navigation channel, separating the channel from Sabine Lake. The restored habitat will contain wetlands and vegetated shallows.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marsh / Wetland Construction and Restoration	40	acres	$ 200.00	$ 8,000.00
Planting	15	acres	$ 100.00	$ 1,500.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 3,000.00	$ 3,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Plants	20,625	each	$ 15.00	$ 309,375.00
Soft Clay Fill	64,533	CY	$ 15.00	$ 967,995.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 180,000.00
Dump Truck	4	EA	$ 15,000.00	$ 120,000.00
Excavator	4	EA	$ 15,000.00	$ 120,000.00
Tug Boat	3	EA	$ 30,000.00	$ 540,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 2,856,900.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 3,136,900.00
Project Contingency	$ 470,500.00
Total Project Cost	$ 3,607,400.00
Annual Operations and Maintenance (O&M)	$ 57,700.00
Total O&M	$ 865,500.00

Project Data Template

Project Details

Project ID	600
Project Name	Half Moon Reef Restoration in Matagorda Bay - Phase III
Region	2
Sub region	7
Start Year	2018
Construction Duration (months)	6
Longevity and Useful Life (years)	10
Project Outputs	30 acre Oyster Reef Creation & Restoration
Brief Description of Work	The project will restore 30 acres of reef habitat at Half Moon Oyster Reed in Matagorda Bay. The project is shovel-ready (designed, permitted, and leased) and will support a high economic value, popular recreational fishing area.

Project Cost

Total Project Cost	$	2,231,900.00	$ USD	
Engineering and Design	$	60,000.00	$ USD	
Construction and Management Cost	$	1,097,500.00	$ USD	
Mobilization/Demobilization	$	871,500.00	$ USD	
Subtotal	$	2,029,000.00	$ USD	
Contingency	$	202,900.00	% of subtotal	10%
Annualized Operations and Maintenance	$	178,600.00	$ USD	

Project Activities

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	30	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations

	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area

Approximate populated area the completed project will impact.	✓
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector / Monitoring, Operations & Maintenance

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	4
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors

Approx. number of visitors per day		100
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	8
Tug Boat	2		
TOTAL	6		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	11,749	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	600	Project Feasibility	
Project Name	Half Moon Reef Restoration in Matagorda Bay - Phase III	Feasibility Index (max. 75)	43
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	2		
Subregion	7	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	10		
Project Outputs	30 acre Oyster Reef Creation &		
Crew Size	8		
Brief Description of Work	The project will restore 30 acres of reef habitat at Half Moon Oyster Reed in Matagorda Bay. The project is shovel-ready (designed, permitted, and leased) and will support a high economic value, popular recreational fishing area.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	30	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 871,500.00	$ 871,500.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	11,749	CY	$ 30.00	$ 352,470.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 80,000.00
Crane	1	EA	$ 15,000.00	$ 60,000.00
Excavator	1	EA	$ 15,000.00	$ 60,000.00
Tug Boat	2	EA	$ 30,000.00	$ 240,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 1,097,500.00
Mobilization and Demobilization	$ 871,500.00
Subtotal	$ 2,029,000.00
Project Contingency	$ 202,900.00
Total Project Cost	$ 2,231,900.00
Annualized Operations and Maintenance (O&M)	$ 178,600.00
Total O&M	$ 1,786,000.00

Project Data Template

Project Details	
Project ID	605
Project Name	Guadalupe River Delta Estuary Restoration
Region	3
Sub region	2
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	8,800 LF of Breakwater
Brief Description of Work	This project involves restoration of river flows to the terminal end of the delta in addition to creating a living shoreline to guard against wind and wave erosion. Diversion of Traylor Cut to reconnect river flows will help mitigate erosion and maintain the functionality of the estuary.

Project Cost			
Total Project Cost	$ 3,842,000.00	$ USD	
Engineering and Design	$ 100,000.00	$ USD	
Construction and Management Cost	$ 3,090,900.00	$ USD	
Mobilization/Demobilization	$ 150,300.00	$ USD	
Subtotal	$ 3,341,000.00	$ USD	
Contingency	$ 501,000.00	% of subtotal	15%
Annualized Operations and Maintenance	$ 132,500.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	250,000	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	8,800	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes
Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	X
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	5	Captain	1
Bulldozer	0	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	3	Operator	6
Excavator	2	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	5		
TOTAL	18		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	29,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	24,444	SY
Maintenance Dredged Material	☑	250,000	CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	605	Project Feasibility	
Project Name	Guadalupe River Delta Estuary Restoration	Feasibility Index (max. 75)	38
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	3		
Subregion	2	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	4		
Longevity and Useful Life (years)	15		
Project Outputs	8,800 LF of Breakwater		
Crew Size	29		
Brief Description of Work	This project involves restoration of river flows to the terminal end of the delta in addition to creating a living shoreline to guard against wind and wave erosion. Diversion of Traylor Cut to reconnect river flows will help mitigate erosion and maintain the functionality of the estuary.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	250,000	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	8,800	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 10,000.00	$ 10,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Mobilization and Demobilization	1	LS	$ 150,333.00	$ 150,333.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	29,333	tons	$ 45.00	$ 1,319,985.00
Geotextile	24,444	SY	$ 2.90	$ 70,887.60
Maintenance Dredged Material	250,000	CY	$ 1.00	$ 250,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	5.00	EA	$ 10,000.00	$ 200,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	3	EA	$ 15,000.00	$ 180,000.00
Excavator	2	EA	$ 15,000.00	$ 120,000.00
Tug Boat	5	EA	$ 30,000.00	$ 600,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 3,090,900.00
Mobilization and Demobilization	$ 150,300.00
Subtotal	$ 3,341,000.00
Project Contingency	$ 501,000.00
Total Project Cost	$ 3,842,000.00

Annual Operations and Maintenance (O&M)	$ 132,500.00
Total O&M	$ 1,987,600.00

Project Data Template

Project Details	
Project ID	644
Project Name	Mad Island Shoreline Protection and Ecosystem Restoration
Region	2
Sub region	28
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	2.3 miles of breakwaters; 50 acres of marsh
Brief Description of Work	This alternatives analysis, engineering design, and permitting project is ongoing in an effort to protect over 6,000 acres of critically important coastal prairie and marsh ecosystem. The ultimate goal of the project is to install a 2.3-mile nearshore breakwater to stem the erosion.

Project Cost			
Total Project Cost	$ 7,355,000.00	$ USD	
Engineering and Design	$ 140,000.00	$ USD	
Construction and Management Cost	$ 6,264,700.00	$ USD	
Mobilization/Demobilization	$ 600,000.00	$ USD	
Subtotal	$ 7,005,000.00	$ USD	
Contingency	$ 350,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 48,900.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	12,144	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	20
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	40,480	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	33,733	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	25,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	80,667	CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	644	Project Feasibility	
Project Name	Mad Island Shoreline Protection and Ecosystem Restoration	Feasibility Index (max. 4)	3.58
		Descriptor (low, med-low, med-high, high)	High
Region	2		
Subregion	28	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	7		
Longevity and Useful Life (years)	25		
Project Outputs	2.3 miles of breakwaters; 50 acres		
Crew Size	29		
Brief Description of Work	This alternatives analysis, engineering design, and permitting project is ongoing in an effort to protect over 6,000 acres of critically important coastal prairie and marsh ecosystem. The ultimate goal of the project is to install a 2.3-mile nearshore breakwater to stem the erosion.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	12,144	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ 200.00	$ 10,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 120,000.00	$ 120,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 600,000.00	$ 600,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	40,480	tons	$ 45.00	$ 1,821,600.00
Geotextile	33,733	SY	$ 2.90	$ 97,825.70
Plants	25,000	each	$ 25.00	$ 625,000.00
Soft Clay Fill	80,667	CY	$ 15.00	$ 1,210,005.00
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 280,000.00
Bulldozer	1	EA	$ 15,000.00	$ 105,000.00
Crane	2	EA	$ 15,000.00	$ 210,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 210,000.00
Dump Truck	4	EA	$ 15,000.00	$ 420,000.00
Excavator	4	EA	$ 15,000.00	$ 420,000.00
Tug Boat	3	EA	$ 30,000.00	$ 630,000.00

Engineering and Design (E&D)	$ 140,000.00
Construction Cost and Management	$ 6,264,700.00
Mobilization and Demobilization	$ 600,000.00
Subtotal	$ 7,005,000.00
Project Contingency	$ 350,000.00
Total Project Cost	$ 7,355,000.00
Annual Operations and Maintenance (O&M)	$ 48,900.00
Total O&M	$ 1,222,400.00

Project Data Template

Project Details	
Project ID	678
Project Name	Indian Point Shoreline Protection
Region	3
Sub region	10
Start Year	
Construction Duration (months)	12
Longevity and Useful Life (years)	15
Project Outputs	1,760 LF Breakwater
Brief Description of Work	This project will protect over 50 acres of seagrass, wetlands and related habitat from shoreline erosion and retreat at Indian Point in Corpus Christi Bay by constructing an additional 1,760 linear feet of breakwaters for shoreline protection.

Project Cost			
Total Project Cost	$ 1,800,600.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 1,326,900.00	$ USD	
Mobilization/Demobilization	$ 250,000.00	$ USD	
Subtotal	$ 1,636,900.00	$ USD	
Contingency	$ 163,690.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 16,800.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	85,477	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	1,760	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☐	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes
The 4,810 cys of stiff clay fill will be beneficially used.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	✓
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	✓
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	2
Environmental	✓	Cost (% of total project cost)	5%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	10%
Recreation	✓		
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		
Local (within 30 mi.)	% of visitors	
Non-Local	% of visitors	
Boaters	% of visitors	
Multi-Day / Overnight	% of visitors	

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	3	Operator	6
Excavator	3	Laborer	7
Front-End Loader	0	TOTAL	27
Tug Boat	3		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	3,467	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	2,889	SY
Maintenance Dredged Material	☑	80,667	CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	678	Project Feasibility	
Project Name	Indian Point Shoreline Protection	Feasibility Index (max. 75)	50
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	10	Construction Contingency	
Start Year	0	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	15		
Project Outputs	1,760 LF Breakwater		
Crew Size	27		
Brief Description of Work	This project will protect over 50 acres of seagrass, wetlands and related habitat from shoreline erosion and retreat at Indian Point in Corpus Christi Bay by constructing an additional 1,760 linear feet of breakwaters for shoreline protection.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	85,477	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	1,760	LF		$ -
Marsh / Wetland Construction and Restoration	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	3,467	tons	$ 45.00	$ 156,015.00
Geotextile	2,889	SY	$ 2.90	$ 8,378.10
Maintenance Dredged Material	80,667	CY	$ 1.95	$ 157,300.65
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 80,000.00
Bulldozer	1	EA	$ 15,000.00	$ 30,000.00
Crane	1	EA	$ 15,000.00	$ 60,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	3	EA	$ 15,000.00	$ 90,000.00
Excavator	3	EA	$ 15,000.00	$ 90,000.00
Tug Boat	3	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 1,326,900.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 1,636,900.00
Project Contingency	$ 163,700.00
Total Project Cost	$ 1,800,600.00
Annual Operations and Maintenance (O&M)	$ 16,800.00
Total O&M	$ 252,100.00

Project Data Template

Project Details	
Project ID	696
Project Name	Shamrock Island Restoration
Region	3
Sub region	11
Start Year	
Construction Duration (months)	
Longevity and Useful Life (years)	15
Project Outputs	900 LF Breakwater; 150 acre Rookery Island
Brief Description of Work	This project involves the installation of 900 feet of breakwaters, filling of a breach into one of the interior wetlands and lagoon, and installation of a feeder mound, which will help restore the breach fill. Repairing the breach and adding saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat of up to 21

Project Cost			
Total Project Cost	$ 7,217,300.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 5,629,600.00	$ USD	
Mobilization/Demobilization	$ 871,600.00	$ USD	
Subtotal	$ 6,561,200.00	$ USD	
Contingency	$ 656,120.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 125,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	1,275,135	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	900	LF
Marsh / Wetland Construction and Restoration	☑	150	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☐	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☐	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	✓
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	✓
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	✓	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	15
Navigation		Cost (% of total project cost)	8%
Recreation	✓		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		
Local (within 30 mi.)	% of visitors	
Non-Local	% of visitors	
Boaters	% of visitors	
Multi-Day / Overnight	% of visitors	

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	3,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	2,500	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	65,135	CY
Other:	✓	Quantity	Units
Marsh Fill	☑	1,210,000	CY
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	696	Project Feasibility	
Project Name	Shamrock Island Restoration	Feasibility Index (max. 75)	44
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	11	Construction Contingency	
Start Year	0	Contingency (%)	10%
Construction Duration (months)	10		
Longevity and Useful Life (years)	15		
Project Outputs	900 LF Breakwater; 150 acre		
Crew Size	29		
Brief Description of Work	This project involves the installation of 900 feet of breakwaters, filling of a breach into one of the interior wetlands and lagoon, and installation of a feeder mound, which will help restore the breach fill. Repairing the breach and adding saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, and the American Oystercatcher.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	1,275,135	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	900	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	150	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 50,000.00	$ 50,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 300,000.00	$ 300,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	3,000	tons	$ 45.00	$ 135,000.00
Geotextile	2,500	SY	$ 2.90	$ 7,250.00
Stiff Clay Fill	65,135	CY	$ 25.00	$ 1,628,375.00
Marsh Fill	1,210,000	CY	$ 2.90	$ 3,509,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4.00	EA	$ -	$ -
Bulldozer	1	EA	$ -	$ -
Crane	2	EA	$ -	$ -
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	4	EA	$ -	$ -
Excavator	4	EA	$ -	$ -
Tug Boat	3	EA	$ -	$ -

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 5,629,600.00
Mobilization and Demobilization	$ 871,600.00
Subtotal	$ 6,561,200.00
Project Contingency	$ 656,100.00
Total Project Cost	$ 7,217,300.00

Annualized Operations and Maintenance (O&M)	$ 125,100.00
Total O&M	$ 1,876,500.00

Project Data Template

Project Details	
Project ID	797
Project Name	Dickenson Bay Rookery Island Restoration
Region	1
Sub region	17
Start Year	
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	2 acre Oyster Reef; 5 acre Rookery Island
Brief Description of Work	This project is to restore two 5 to 7 acre colonial water bird rookery islands in Dickenson Bay, which will be Phases II and III of the original Dickenson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approx. 5 acres of nesting space for colonial water birds and 2 acres of oyster reef. Approx.

Project Cost				
Total Project Cost	$	3,191,300.00	$ USD	
Engineering and Design	$	85,000.00	$ USD	
Construction and Management Cost	$	2,566,200.00	$ USD	
Mobilization/Demobilization	$	250,000.00	$ USD	
Subtotal	$	2,901,200.00	$ USD	
Contingency	$	290,120.00	% of subtotal	10%
Annualized Operations and Maintenance	$	64,500.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	1,870	LF
Dredging	☑	52,225	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	5	acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	2	acres
Planting	☑	5	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The length of the dike/levee construction is assuming that the Rookery Island is square, the number will change depending on the actual shape of the island. Material will be beneficially used to construct the dikes around the rookery islands.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	15
Navigation		Cost (% of total project cost)	15%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	2	Deckhand	6
Crane	2	Mate	4
Dredge - Hydraulic	1	Engineer	4
Dredge - Mechanical	0	Supervisor	6
Dump Truck	2	Operator	10
Excavator	6	Laborer	16
Front-End Loader	0	TOTAL	47
Tug Boat	4		
TOTAL	21		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	3,319	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	24,200	each
Recycled Concrete	☑	650	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	40,333	CY
Stiff Clay Fill	☑	11,892	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	797	Project Feasibility		
Project Name	Dickenson Bay Rookery Island Restoration	Feasibility Index (max. 75)	45	
		Descriptor (low, med-low, med-high, high)	Medium-High	
Region	1			
Subregion	17	Construction Contingency		
Start Year	0	Contingency (%)	10%	
Construction Duration (months)	3			
Longevity and Useful Life (years)	15			
Project Outputs	2 acre Oyster Reef; 5 acre			
Crew Size	47			
Brief Description of Work	This project is to restore two 5 to 7 acre colonial water bird rookery islands in Dickenson Bay, which will be Phases II and III of the original Dickenson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approx. 5 acres of nesting space for colonial water birds and 2 acres of oyster reef. Approx. 4,000 cubic yards of suitable oyster cultch will be provided to expand the oyster reef constructed in this phase, which will ultimately help improve water quality in			

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	1,870	LF	$ -	$ -
Dredging	52,225	CY	$ -	$ -
Island Creation	5.00	acres	$ -	$ -
Oyster Reef Creation	2	acres	$ -	$ -
Planting	5	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ 25,000.00	$ 25,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Environmental Consulting Services	1	LS	$ 15,000.00	$ 15,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	3,319	tons	$ 45.00	$ 149,355.00
Plants	24,200	each	$ 25.00	$ 605,000.00
Recycled Concrete	650	CY	$ 30.00	$ 19,500.00
Soft Clay Fill	40,333	CY	$ 15.00	$ 604,995.00
Stiff Clay Fill	11,892	CY	$ 25.00	$ 297,300.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	2	EA	$ 15,000.00	$ 30,000.00
Dump Truck	2	EA	$ 15,000.00	$ 30,000.00
Excavator	6	EA	$ 15,000.00	$ 90,000.00
Tug Boat	4	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 85,000.00
Construction Cost and Management	$ 2,566,200.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 2,901,200.00
Project Contingency	$ 290,100.00
Total Project Cost	$ 3,191,300.00
Annual Operations and Maintenance (O&M)	$ 64,500.00
Total O&M	$ 968,000.00

Project Data Template

Project Details

Project ID	822
Project Name	Paso Corvinas Wetlands and Hydrologic Restorations
Region	4
Subregion	8
Start Year	2018
Construction Duration (months)	2
Longevity and Useful Life (years)	15
Project Outputs	Hydrologic restoration
Brief Description of Work	The project will restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar thereby restoring the connectivity between the Bahia Grande and the Vadia Ancha, through the Paso Corvinas. A hydrological study will need to be performed, followed by design and construction of the preferred restoration alternative.

Project Cost

Total Project Cost	$ 2,656,500.00	$ USD
Engineering and Design	$ 60,000.00	$ USD
Construction and Management Cost	$ 2,255,000.00	$ USD
Mobilization/Demobilization	$ 100,000.00	$ USD
Subtotal	$ 2,415,000.00	$ USD
Contingency	$ 241,500.00	% of subtotal 10%
Annualized Operations and Maintenance	$ 59,200.00	$ USD

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	100,000	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF

Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS

Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	

Assumptions & Notes

Place notes here.

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	X	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector ✓

Emergency Management	
Environmental	X
Flood Risk	
Hydropower	
Navigation	
Recreation	X
Regulatory	
Water Storage	

Monitoring, Operations & Maintenance

Monitoring Freq. (yrs)	1
Cost (% of total project cost)	1%
Maintenance Freq. (yrs)	10
Cost (% of total project cost)	5%
Operation Duration (yrs)	15
Cost (% of total project cost)	2%

Site Visitors

Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	0	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	0	Laborer	4
Front-End Loader	0	TOTAL	19
Tug Boat	3		
TOTAL	8		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	100,000	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY

Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	822	Project Feasibility	
Project Name	Paso Corvinas Wetlands and Hydrologic Restorations	Feasibility Index (max. 75)	44
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	4		
Subregion	8	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	2		
Longevity and Useful Life (years)	15		
Project Outputs	Hydrologic restoration		
Crew Size	19		
Brief Description of Work	The project will restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar thereby restoring the connectivity between the Bahia Grande and the Vadia Ancha, through the Paso Corvinas. A hydrological study will need to be performed, followed by design and construction of the preferred restoration alternative.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	100,000	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 80,000.00	$ 80,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Environmental Consulting Services	1	LS	$ -	$ -
Mobilization and Demobilization	1	LS	$ 100,000.00	$ 100,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand or Soil Fill	100,000	CY	$ 20.00	$ 2,000,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	1	EA	$ 10,000.00	$ 20,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 60,000.00
Tug Boat	1	EA	$ 30,000.00	$ 60,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 2,255,000.00
Mobilization and Demobilization	$ 100,000.00
Subtotal	$ 2,415,000.00
Project Contingency	$ 241,500.00
Total Project Cost	$ 2,656,500.00
Annual Operations and Maintenance (O&M)	$ 59,200.00
Total O&M	$ 887,300.00

Project Data Template

Project Details	
Project ID	829
Project Name	Corpus Christi & Nueces Bays Oyster Reef Restoration
Region	3
Sub region	10
Start Year	2018
Construction Duration (months)	2
Longevity and Useful Life (years)	10
Project Outputs	5 acre Oyster Reef
Brief Description of Work	This project will focus on restoring approximately 1 acre of oyster reef at five sites where there is evidence of previously existing reef (hard bottom, calcified bottom, or shell remnants). Because the effects of dredging and tonging in Texas bays have eliminated much of the vertical structure of the reefs, this project will build vertical structure into the

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	X
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	X
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Project Cost				
Total Project Cost	$	604,000.00	$ USD	
Engineering and Design	$	70,000.00	$ USD	
Construction and Management Cost	$	418,800.00	$ USD	
Mobilization/Demobilization	$	60,500.00	$ USD	
Subtotal	$	549,000.00	$ USD	
Contingency	$	55,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$	33,300.00	$ USD	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	2%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	5	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	8
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	1,625	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	

Assumptions & Notes

Place notes here.

Detailed Project Cost

Project ID	829	Project Feasibility	
Project Name	Corpus Christi & Nueces Bays Oyster Reef Restoration	Feasibility Index (max. 75)	46
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	10	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	2		
Longevity and Useful Life (years)	10		
Project Outputs	5 acre Oyster Reef		
Crew Size	8		
Brief Description of Work	This project will focus on restoring approximately 1 acre of oyster reef at five sites where there is evidence of previously existing reef (hard bottom, calcified bottom, or shell remnants). Because the effects of dredging and tonging in Texas bays have eliminated much of the vertical structure of the reefs, this project will build vertical structure into the restoration of oyster reefs.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	5	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Soil Borings	1	LS	$ 50,000.00	$ 50,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Mobilization and Demobilization	1	LS	$ 60,500.00	$ 60,500.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	1,625	CY	$ 30.00	$ 48,750.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 40,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Excavator	1	EA	$ 15,000.00	$ 30,000.00
Tug Boat	2	EA	$ 30,000.00	$ 120,000.00

Engineering and Design (E&D)	$ 70,000.00
Construction Cost and Management	$ 418,800.00
Mobilization and Demobilization	$ 60,500.00
Subtotal	$ 549,000.00
Project Contingency	$ 55,000.00
Total Project Cost	$ 604,000.00
Annual Operations and Maintenance (O&M)	$ 33,300.00
Total O&M	$ 333,400.00

Project Data Template

Project Details	
Project ID	834
Project Name	Salt Bayou Siphons
Region	1
Sub region	6
Start Year	2018
Construction Duration (months)	6
Longevity and Useful Life (years)	15
Project Outputs	1 EA Hydrological Restoration
Brief Description of Work	The project involves the placement of siphons at multiple locations in the Salt Bayou system to restore a hydrologic connection between the freshwater wetland systems north of the GIWW, and the degraded wetlands south of the GIWW.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Project Cost				
Total Project Cost	$	7,330,700.00	$ USD	
Engineering and Design	$	110,000.00	$ USD	
Construction and Management Cost	$	5,564,500.00	$ USD	
Mobilization/Demobilization	$	700,000.00	$ USD	
Subtotal	$	6,374,500.00	$ USD	
Contingency	$	956,200.00	% of subtotal	15%
Annualized Operations and Maintenance	$	252,800.00	$ USD	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☑	2	each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☑	3,000	CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☑	1	acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	0	Captain	0
Bulldozer	3	Deckhand	0
Crane	0	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	2	Operator	3
Excavator	2	Laborer	10
Front-End Loader	0	TOTAL	18
Tug Boat	0		
TOTAL	7		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	20,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☑	6,500	LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☑	6,500	SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Siphon	☑	2	each
	☐		
	☐		

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	

Assumptions & Notes
Place notes here.

Detailed Project Cost

Project ID	834	Project Feasibility	
Project Name	Salt Bayou Siphons	Feasibility Index (max. 75)	34
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	1		
Subregion	6	Construction Contingency	
Start Year	2018	Contingency (%)	15%
Construction Duration (months)	6		
Longevity and Useful Life (years)	15		
Project Outputs	1 EA Hydrological Restoration		
Crew Size	18		
Brief Description of Work	The project involves the placement of siphons at multiple locations in the Salt Bayou system to restore a hydrologic connection between the freshwater wetland systems north of the GIWW, and the degraded wetlands south of the GIWW.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Construction of New Non-Residential Structures	2	each	$ 200,000.00	$ 400,000.00
Earthwork / Grading	3,000	CY	$ 300.00	$ 900,000.00
Seeding or Hydromulching	1	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 15,000.00	$ 15,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 150,000.00	$ 150,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 110,000.00	$ 110,000.00
Mobilization and Demobilization	1	LS	$ 700,000.00	$ 700,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	20,000	SY	$ 2.90	$ 58,000.00
Pipeline	6,500	LF	$ 415.00	$ 2,697,500.00
Seeding	6,500	SY	$ 2.16	$ 14,040.00
Siphon	2	each	$ 350,000.00	$ 700,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Bulldozer	3	EA	$ 15,000.00	$ 270,000.00
Dump Truck	2	EA	$ 15,000.00	$ 180,000.00
Excavator	2	EA	$ 15,000.00	$ 180,000.00

Engineering and Design (E&D)	$ 110,000.00
Construction Cost and Management	$ 5,564,500.00
Mobilization and Demobilization	$ 700,000.00
Subtotal	$ 6,374,500.00
Project Contingency	$ 956,200.00
Total Project Cost	$ 7,330,700.00
Annual Operations and Maintenance (O&M)	$ 252,800.00
Total O&M	$ 3,792,400.00

Project Data Template

Project Details	
Project ID	922
Project Name	Oliver Point Oyster Reef Restoration
Region	2
Subregion	7
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	10
Project Outputs	10 acre oyster reef
Brief Description of Work	The project will restore the approximately 10 acres of the legacy Oliver Point Oyster Reef in Matagorda Bay.

Project Cost				
Total Project Cost	$	1,319,700.00	$ USD	
Engineering and Design	$	60,000.00	$ USD	
Construction and Management Cost	$	268,100.00	$ USD	
Mobilization/Demobilization	$	871,600.00	$ USD	
Subtotal	$	1,199,700.00	$ USD	
Contingency	$	119,970.00	% of subtotal	10%
Annualized Operations and Maintenance	$	57,200.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	10	acres
Planting	☐	-	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	3
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	9
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	438	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	922	Project Feasibility	
Project Name	Oliver Point Oyster Reef Restoration	Feasibility Index (max. 75)	40
Region	2	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	7	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	2		
Longevity and Useful Life (years)	10		
Project Outputs	10 acre oyster reef		
Crew Size	9		
Brief Description of Work	The project will restore the approximately 10 acres of the legacy Oliver Point Oyster Reef in Matagorda Bay.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	10	acres		$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 30,000.00	$ 30,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	438	CY	$ 30.00	$ 13,140.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 40,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Excavator	1	EA	$ 15,000.00	$ 30,000.00
Tug Boat	2	EA	$ 30,000.00	$ 120,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 268,100.00
Mobilization and Demobilization	$ 871,600.00
Subtotal	$ 1,199,700.00
Project Contingency	$ 120,000.00
Total Project Cost	$ 1,319,700.00

Annualized Operations and Maintenance (O&M)	$ 57,200.00
Total O&M	$ 572,000.00

Project Data Template

Project Details	
Project ID	922
Project Name	Chinquapin Oyster Reef Restoration
Region	2
Subregion	7
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	10
Project Outputs	10 acre oyster reef
Brief Description of Work	The project will restore the approximately 10 acres of the legacy Chinquapin Oyster Reef in Matagorda Bay.

Project Cost			
Total Project Cost	$ 1,319,700.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 268,100.00	$ USD	
Mobilization/Demobilization	$ 871,600.00	$ USD	
Subtotal	$ 1,199,700.00	$ USD	
Contingency	$ 119,970.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 57,200.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	10	acres
Planting	☐	-	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	3
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	9
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	438	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	922	Project Feasibility	
Project Name	Chinquapin Oyster Reef Restoration	Feasibility Index (max. 75)	40
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	2	Construction Contingency	
Subregion	7	Contingency (%)	10%
Start Year	2018		
Construction Duration (months)	2		
Longevity and Useful Life (years)	10		
Project Outputs	10 acre oyster reef		
Crew Size	9		
Brief Description of Work	The project will restore the approximately 10 acres of the legacy Chinquapin Oyster Reef in Matagorda Bay.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	10	acres		$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 30,000.00	$ 30,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 871,574.00	$ 871,574.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	438	CY	$ 30.00	$ 13,140.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 40,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Excavator	1	EA	$ 15,000.00	$ 30,000.00
Tug Boat	2	EA	$ 30,000.00	$ 120,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 268,100.00
Mobilization and Demobilization	$ 871,600.00
Subtotal	$ 1,199,700.00
Project Contingency	$ 120,000.00
Total Project Cost	$ 1,319,700.00
Annualized Operations and Maintenance (O&M)	$ 57,200.00
Total O&M	$ 572,000.00

Project Data Template

Project Details	
Project ID	1171
Project Name	Sabine Pass Jetty Repair
Region	1
Sub region	1
Start Year	2019
Construction Duration (months)	12
Longevity and Useful Life (years)	50
Project Outputs	1,000 feet of jetty repair
Brief Description of Work	The Sabine Pass jetties need to be repaired. The jetties have subsided over time and pose a navigation hazard during high tide. This project proposes a study to conduct an alternatives analysis for the best methodology to repair the jetties and improve the navigational safety of this infrastructure.

Project Cost			
Total Project Cost	$ 105,000,000.00	$ USD	
Engineering and Design	$ 600,000.00	$ USD	
Construction and Management Cost	$ 96,854,000.00	$ USD	
Mobilization/Demobilization	$ 2,500,000.00	$ USD	
Subtotal	$ 99,954,000.00	$ USD	
Contingency	$ 4,998,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 527,400.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☑	30,000	CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	1,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	15
Environmental	X	Cost (% of total project cost)	0.05%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation	X	Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	50
Water Storage		Cost (% of total project cost)	0.5%

Site Visitors		
Approx. number of visitors per day		30
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	2	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	4	Operator	8
Excavator	4	Laborer	5
Front-End Loader	0	TOTAL	18
Tug Boat	2		
TOTAL	15		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☑	565,000	tons
250-lb Class Stone	☑	1,175,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	610,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	1171	Project Feasibility	
Project Name	Sabine Pass Jetty Repair	Feasibility Index (max. 75)	3.16
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	1	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	12		
Longevity and Useful Life (years)	50		
Project Outputs	1,000 feet of jetty repair		
Crew Size	18		
Brief Description of Work	The Sabine Pass jetties need to be repaired. The jetties have subsided over time and pose a navigation hazard during high tide. This project proposes a study to conduct an alternatives analysis for the best methodology to repair the jetties and improve the navigational safety of this infrastructure.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Earthwork / Grading	30,000	CY	$ 75.00	$ 2,250,000.00
Marine Construction (e.g., groins, breakwaters)	1,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 15,000.00	$ 15,000.00
Soil Borings	1	LS	$ 80,000.00	$ 80,000.00
Pre and Post Construction Surveying	1	LS	$ 200,000.00	$ 200,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 500,000.00	$ 500,000.00
Environmental Consulting Services	1	LS	$ 100,000.00	$ 100,000.00
Mobilization and Demobilization	1	LS	$ 2,500,000.00	$ 2,500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
2000-lb Class Stone	565,000	tons	$ 65.00	$ 36,725,000.00
250-lb Class Stone	1,175,000	tons	$ 45.00	$ 52,875,000.00
Geotextile	610,000	SY	$ 2.90	$ 1,769,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 240,000.00
Bulldozer	2	EA	$ 15,000.00	$ 360,000.00
Crane	1	EA	$ 15,000.00	$ 180,000.00
Dump Truck	4	EA	$ 15,000.00	$ 720,000.00
Excavator	4	EA	$ 15,000.00	$ 720,000.00
Tug Boat	2	EA	$ 30,000.00	$ 720,000.00

Engineering and Design (E&D)	$ 600,000.00
Construction Cost and Management	$ 96,854,000.00
Mobilization and Demobilization	$ 2,500,000.00
Subtotal	$ 100,000,000.00
Project Contingency	$ 5,000,000.00
Total Project Cost	$ 105,000,000.00
Annual Operations and Maintenance (O&M)	$ 527,400.00
Total O&M	$ 26,370,800.00

Project Data Template

Project Details	
Project ID	1194
Project Name	Galveston Island State Park Wetland Restoration & Shoreline Protection - Phase 3
Region	1
Sub region	18
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	1.5 miles of breakwaters; 50 acres of marsh
Brief Description of Work	This project would construct an additional 7,600 linear feet of rock breakwater to protect approximately 87 acres of existing estuarine emergent wetlands, 12 acres of existing sand and mud flats, and 311 acres of shallow open water.

Project Cost				
Total Project Cost	$ 5,693,000.00	$ USD		
Engineering and Design	$ 100,000.00	$ USD		
Construction and Management Cost	$ 4,821,500.00	$ USD		
Mobilization/Demobilization	$ 500,000.00	$ USD		
Subtotal	$ 5,422,000.00	$ USD		
Contingency	$ 271,000.00	% of subtotal	5%	
Annualized Operations and Maintenance	$ 63,900.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	7,600	LF
Marsh / Wetland Construction and Restoration	☑	150	acres
Oyster Reef Creation	☐		acres
Planting	☑	50	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	15
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		20
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	4	Operator	6
Excavator	4	Laborer	12
Front-End Loader	0	TOTAL	35
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	25,333	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	21,111	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	25,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	80,667	CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	1194	Project Feasibility	
Project Name	Galveston Island State Park Wetland Restoration & Shoreline	Feasibility Index (max. 4)	3.56
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	18	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	5		
Longevity and Useful Life (years)	25		
Project Outputs	1.5 miles of breakwaters; 50 acres		
Crew Size	35		
Brief Description of Work	This project would construct an additional 7,600 linear feet of rock breakwater to protect approximately 87 acres of existing estuarine emergent wetlands, 12 acres of existing sand and mud flats, and 311 acres of shallow open water.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	7,600	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	150	acres	$ -	$ -
Planting	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 35,000.00	$ 35,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 85,000.00	$ 85,000.00
Environmental Consulting Services	1	LS	$ 15,000.00	$ 15,000.00
Mobilization and Demobilization	1	LS	$ 500,000.00	$ 500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	25,333	tons	$ 45.00	$ 1,139,985.00
Geotextile	21,111	SY	$ 2.90	$ 61,221.90
Plants	25,000	each	$ 25.00	$ 625,000.00
Soft Clay Fill	80,667	CY	$ 15.00	$ 1,210,005.00
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 200,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 150,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 150,000.00
Dump Truck	4	EA	$ 15,000.00	$ 300,000.00
Excavator	4	EA	$ 15,000.00	$ 300,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 4,821,500.00
Mobilization and Demobilization	$ 500,000.00
Subtotal	$ 5,422,000.00
Project Contingency	$ 271,000.00
Total Project Cost	$ 5,693,000.00
Annual Operations and Maintenance (O&M)	$ 63,900.00
Total O&M	$ 1,596,300.00

Project Data Template

Project Details	
Project ID	1196
Project Name	Aransas National Wildlife Refuge Dagger Point Shoreline Preservation
Region	3
Sub region	41
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	7,920 LF of breakwaters
Brief Description of Work	Coastal Bend Bays and Estuary Program is working with U.S. Fish and Wildlife Service to conduct an alternatives analysis for shoreline protection at Dagger Point in the Aransas National Wildlife Refuge, which is eroding heavily. Possible solutions include a living shoreline using rock breakwaters.

Project Cost				
Total Project Cost	$	2,554,000.00	$ USD	
Engineering and Design	$	85,000.00	$ USD	
Construction and Management Cost	$	2,146,800.00	$ USD	
Mobilization/Demobilization	$	200,000.00	$ USD	
Subtotal	$	2,432,000.00	$ USD	
Contingency	$	122,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$	53,200.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	7,920	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	4
Excavator	2	Laborer	3
Front-End Loader	0	TOTAL	10
Tug Boat	2		
TOTAL	10		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	26,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	22,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	1196	Project Feasibility	
Project Name	Aransas National Wildlife Refuge Dagger Point Shoreline	Feasibility Index (max. 4)	3.14
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	41	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	5		
Longevity and Useful Life (years)	25		
Project Outputs	7,920 LF of breakwaters		
Crew Size	10		
Brief Description of Work	Coastal Bend Bays and Estuary Program is working with U.S. Fish and Wildlife Service to conduct an alternatives analysis for shoreline protection at Dagger Point in the Aransas National Wildlife Refuge, which is eroding heavily. Possible solutions include a living shoreline using rock breakwaters.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	7,920	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 85,000.00	$ 85,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	26,400	tons	$ 45.00	$ 1,188,000.00
Geotextile	22,000	SY	$ 2.90	$ 63,800.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 100,000.00
Crane	1	EA	$ 15,000.00	$ 75,000.00
Dump Truck	3	EA	$ 15,000.00	$ 225,000.00
Excavator	2	EA	$ 15,000.00	$ 150,000.00
Tug Boat	2	EA	$ 30,000.00	$ 300,000.00

Engineering and Design (E&D)	$ 85,000.00
Construction Cost and Management	$ 2,146,800.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 2,432,000.00
Project Contingency	$ 122,000.00
Total Project Cost	$ 2,554,000.00
Annual Operations and Maintenance (O&M)	$ 53,200.00
Total O&M	$ 1,329,100.00

Project Data Template

Project Details	
Project ID	1202
Project Name	Tern Island and Triangle Tree Island Rookery Habitat Protection
Region	3
Sub region	53
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	20
Project Outputs	1,000 LF breakwater; 10 acres island restoration
Brief Description of Work	The objective is to protect two rookery islands in the upper Laguna Madre from erosion by constructing 500 linear feet of breakwater at each island. Tern Island provides nesting habitat for herons, egrets, gulls, terns and skimmers. Triangle Tree Island has large pine trees and supports large numbers of herons and great egrets.

Project Cost				
Total Project Cost	$	3,507,000.00	$ USD	
Engineering and Design	$	80,000.00	$ USD	
Construction and Management Cost	$	3,009,700.00	$ USD	
Mobilization/Demobilization	$	250,000.00	$ USD	
Subtotal	$	3,340,000.00	$ USD	
Contingency	$	167,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$	39,500.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	10	acres
Marine Construction (e.g., groins, breakwaters)	☑	1,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	X
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	20
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		1
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	8,026	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	2,778	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	80,667	CY
Stiff Clay Fill	☑	16,818	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	1202	Project Feasibility	
Project Name	Tern Island and Triangle Tree Island Rookery Habitat	Feasibility Index (max. 4)	3.14
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	53	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	20		
Project Outputs	1,000 LF breakwater; 10 acres		
Crew Size	29		
Brief Description of Work	The objective is to protect two rookery islands in the upper Laguna Madre from erosion by constructing 500 linear feet of breakwater at each island. Tern Island provides nesting habitat for herons, egrets, gulls, terns and skimmers. Triangle Tree Island has large pine trees and supports large numbers of herons and great egrets.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Island Creation	10.00	acres	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	1,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 30,000.00	$ 30,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	8,026	tons	$ 45.00	$ 361,170.00
Geotextile	2,778	SY	$ 2.90	$ 8,056.20
Soft Clay Fill	80,667	CY	$ 15.00	$ 1,210,005.00
Stiff Clay Fill	16,818	CY	$ 25.00	$ 420,450.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 3,009,700.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 3,340,000.00
Project Contingency	$ 167,000.00
Total Project Cost	$ 3,507,000.00

Annual Operations and Maintenance (O&M)	$ 39,500.00
Total O&M	$ 790,800.00

Project Data Template

Project Details	
Project ID	3025
Project Name	Green's Lake Shoreline Protection & Wetland Restoration - Phase 2
Region	1
Sub region	17
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	1.5 mile breakwaters; 10 acres marsh restoration
Brief Description of Work	This project would protect and restore 5,100 acres of fragile coastal wetland habitat, seagrass, tidal channels and oyster beds in West Galveston Bay. It is likely to include shoreline protection breakwaters, a weir or reduced inlet structure at the mouth of Greens Lake to reduce tidal exchange and wave energy, and beneficial use of dredge material from

Project Cost				
Total Project Cost	$	4,101,000.00	$ USD	
Engineering and Design	$	180,000.00	$ USD	
Construction and Management Cost	$	3,147,600.00	$ USD	
Mobilization/Demobilization	$	400,000.00	$ USD	
Subtotal	$	3,728,000.00	$ USD	
Contingency	$	373,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$	43,700.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	7,920	LF
Marsh / Wetland Construction and Restoration	☑	10	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	GIWW maintenance

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	4%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	0%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	26,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	22,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	2,150	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh fill	☑	16,000	CY
	☐		
	☐		

Detailed Project Cost

Project ID	3025	Project Feasibility	
Project Name	Green's Lake Shoreline Protection & Wetland	Feasibility Index (max. 75)	2.91
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	17	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	5		
Longevity and Useful Life (years)	25		
Project Outputs	1.5 mile breakwaters; 10 acres		
Crew Size	29		
Brief Description of Work	This project would protect and restore 5,100 acres of fragile coastal wetland habitat, seagrass, tidal channels and oyster beds in West Galveston Bay. It is likely to include shoreline protection breakwaters, a weir or reduced inlet structure at the mouth of Greens Lake to reduce tidal exchange and wave energy, and beneficial use of dredge material from the Gulf Intracoastal Waterway and/or other sources to restore wetland elevations sufficient to promote and sustain wetland vegetation.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	7,920	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	10	acres	$ 200.00	$ 2,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Environmental Consulting Services	1	LS	$ 30,000.00	$ 30,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	26,400	tons	$ 45.00	$ 1,188,000.00
Geotextile	22,000	SY	$ 2.90	$ 63,800.00
Stiff Clay Fill	2,150	CY	$ 25.00	$ 53,750.00
Marsh fill	16,000	CY	$ 10.00	$ 160,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 200,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 150,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 150,000.00
Dump Truck	4	EA	$ 15,000.00	$ 300,000.00
Excavator	4	EA	$ 15,000.00	$ 300,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 180,000.00
Construction Cost and Management	$ 3,147,600.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 3,728,000.00
Project Contingency	$ 373,000.00
Total Project Cost	$ 4,101,000.00
Annual Operations and Maintenance (O&M)	$ 43,700.00
Total O&M	$ 1,092,500.00

Project Data Template

Project Details	
Project ID	4564
Project Name	Lower Neches Wildlife Management Area Wetland Restoration
Region	1
Sub region	5
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	10
Project Outputs	450 acres of wetlands
Brief Description of Work	This project proposes restoration of approximately 450 acres of wetlands in the Nelda Stark unit of the Lower Neches Wildlife Management Area. The restoration methodology would use beneficial use of dredged material to create marsh mounds stabilized by containment berms.

Project Cost				
Total Project Cost	$ 7,873,000.00	$ USD		
Engineering and Design	$ 80,000.00	$ USD		
Construction and Management Cost	$ 6,676,500.00	$ USD		
Mobilization/Demobilization	$ 400,000.00	$ USD		
Subtotal	$ 7,157,000.00	$ USD		
Contingency	$ 716,000.00	% of subtotal	10%	
Annualized Operations and Maintenance	$ 118,900.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	450	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		4
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	2
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	19
Tug Boat	1		
TOTAL	9		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	363,000	CY
Stiff Clay Fill	☑	28,860	CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	4564	Project Feasibility	
Project Name	Lower Neches Wildlife Management Area Wetland	Feasibility Index (max. 4)	3.03
Region	1	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	5	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	3		
Longevity and Useful Life (years)	10		
Project Outputs	450 acres of wetlands		
Crew Size	19		
Brief Description of Work	This project proposes restoration of approximately 450 acres of wetlands in the Nelda Stark unit of the Lower Neches Wildlife Management Area. The restoration methodology would use beneficial use of dredged material to create marsh mounds stabilized by containment berms.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marsh / Wetland Construction and Restoration	450	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Soft Clay Fill	363,000	CY	$ 15.00	$ 5,445,000.00
Stiff Clay Fill	28,860	CY	$ 25.00	$ 721,500.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 60,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	1	EA	$ 15,000.00	$ 45,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	1	EA	$ 15,000.00	$ 45,000.00
Excavator	2	EA	$ 15,000.00	$ 90,000.00
Tug Boat	1	EA	$ 30,000.00	$ 90,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 6,676,500.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 7,157,000.00
Project Contingency	$ 716,000.00
Total Project Cost	$ 7,873,000.00
Annual Operations and Maintenance (O&M)	$ 118,900.00
Total O&M	$ 1,188,800.00

Project Data Template

Project Details	
Project ID	9001
Project Name	Portland Living Shoreline
Region	3
Sub region	10
Start Year	2018
Construction Duration (months)	5
Longevity and Useful Life (years)	10
Project Outputs	6,000 LF Misc. Wave Break; 50 acre Marsh
Brief Description of Work	The project proposes the creation of a living shoreline in southwest Portland that would act as a buffer to mitigate impacts on water quality in Nueces Bay. The enhanced marsh would also help mitigate the impacts of storm surge on the city's coastal infrastructure.

Project Cost			
Total Project Cost	$ 2,995,000.00	$ USD	
Engineering and Design	$ 60,000.00	$ USD	
Construction and Management Cost	$ 2,577,000.00	$ USD	
Mobilization/Demobilization	$ 85,800.00	$ USD	
Subtotal	$ 2,723,000.00	$ USD	
Contingency	$ 272,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 105,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	97,607	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	6,000	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	N/A

Assumptions & Notes

Dredge material to be beneficially used to create the marsh and fill the geotubes.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	X
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	8
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	31
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	24,640	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Geotube Fill - Sludge	☑	12,130	CY
Marsh Fill	☑	80,667	CY
Geotubes	☑	6,000	LF

Detailed Project Cost

Project ID	9001	Project Feasibility	
Project Name	Portland Living Shoreline	Feasibility Index (max. 75)	46
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	10	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	5		
Longevity and Useful Life (years)	10		
Project Outputs	6,000 LF Misc. Wave Break; 50		
Crew Size	31		
Brief Description of Work	The project proposes the creation of a living shoreline in southwest Portland that would act as a buffer to mitigate impacts on water quality in Nueces Bay. The enhanced marsh would also help mitigate the impacts of storm surge on the city's coastal infrastructure.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	97,607	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	6,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ 200.00	$ 10,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 85,848.00	$ 85,848.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	24,640	SY	$ 2.90	$ 71,456.00
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00
Geotube Fill - Sludge	12,130	CY	$ 5.00	$ 60,650.00
Marsh Fill	80,667	CY	$ 10.00	$ 806,670.00
Geotubes	6,000	LF	$ 3.00	$ 18,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 200,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 30,000.00
Dump Truck	4	EA	$ 15,000.00	$ 300,000.00
Excavator	4	EA	$ 15,000.00	$ 300,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 2,577,000.00
Mobilization and Demobilization	$ 85,800.00
Subtotal	$ 2,723,000.00
Project Contingency	$ 272,000.00
Total Project Cost	$ 2,995,000.00
Annual Operations and Maintenance (O&M)	$ 105,100.00
Total O&M	$ 1,051,200.00

Project Data Template

Project Details	
Project ID	9004
Project Name	Lamar Beach Road Protection
Region	3
Sub region	42
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	10
Project Outputs	5,280 LF of breakwaters; 10 acres of marsh
Brief Description of Work	This project proposes approximately 1 mile of breakwaters along Lamar Beach Road from Main Street to 12th Street in Aransas County. The project also includes regrading and filling along the shoreline, and marsh planting to establish a living shoreline system.

Project Cost			
Total Project Cost	$ 3,470,000.00	$ USD	
Engineering and Design	$ 135,000.00	$ USD	
Construction and Management Cost	$ 2,820,300.00	$ USD	
Mobilization/Demobilization	$ 350,000.00	$ USD	
Subtotal	$ 3,305,000.00	$ USD	
Contingency	$ 165,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 87,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,280	LF
Marsh / Wetland Construction and Restoration	☑	10	acres
Oyster Reef Creation	☐		acres
Planting	☑	10	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		25
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	4	Operator	6
Excavator	4	Laborer	12
Front-End Loader	0	TOTAL	35
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	17,600	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	14,667	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	5,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	16,133	CY
Stiff Clay Fill	☑	2,151	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9004	Project Feasibility	
Project Name	Lamar Beach Road Protection	Feasibility Index (max. 4)	3.31
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	42	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	4		
Longevity and Useful Life (years)	10		
Project Outputs	5,280 LF of breakwaters; 10 acres		
Crew Size	35		
Brief Description of Work	This project proposes approximately 1 mile of breakwaters along Lamar Beach Road from Main Street to 12th Street in Aransas County. The project also includes regrading and filling along the shoreline, and marsh planting to establish a living shoreline system.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	5,280	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	10	acres	$ 20,000.00	$ 200,000.00
Planting	10	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 110,000.00	$ 110,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 350,000.00	$ 350,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	17,600	tons	$ 45.00	$ 792,000.00
Geotextile	14,667	SY	$ 2.90	$ 42,534.30
Plants	5,000	each	$ 25.00	$ 125,000.00
Soft Clay Fill	16,133	CY	$ 15.00	$ 241,995.00
Stiff Clay Fill	2,151	CY	$ 25.00	$ 53,775.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 160,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	4	EA	$ 15,000.00	$ 240,000.00
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	3	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 135,000.00
Construction Cost and Management	$ 2,820,300.00
Mobilization and Demobilization	$ 350,000.00
Subtotal	$ 3,305,000.00
Project Contingency	$ 165,000.00
Total Project Cost	$ 3,470,000.00
Annual Operations and Maintenance (O&M)	$ 87,100.00
Total O&M	$ 871,000.00

Project Data Template

Project Details	
Project ID	9006
Project Name	Dagger Island Shoreline Protection
Region	3
Subregion	5
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	15
Project Outputs	3,700 LF Misc. Wave Break; 50 acre Marsh
Brief Description of Work	The project proposes to eliminate or drastically reduce the rate of shoreline erosion and island migration by protecting the shoreline of Dagger Island, which is due west of Ingleside, on the southern edge of Redfish Bay just north of Corpus Christi Bay. The shoreline is eroding due to natural and human causes, and the project will address both the

Project Cost			
Total Project Cost	$ 1,938,300.00	$ USD	
Engineering and Design	$ 125,000.00	$ USD	
Construction and Management Cost	$ 1,387,100.00	$ USD	
Mobilization/Demobilization	$ 250,000.00	$ USD	
Subtotal	$ 1,762,100.00	$ USD	
Contingency	$ 176,210.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 54,900.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	92,957	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	3,700	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	✓
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	✓
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	✓	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation	✓		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		
Local (within 30 mi.)	% of visitors	
Non-Local	% of visitors	
Boaters	% of visitors	
Multi-Day / Overnight	% of visitors	

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	1	Deckhand	3
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	2	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	25
Tug Boat	3		
TOTAL	15		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	15,195	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Marsh Fill	☑	80,667	CY
Geotube Fill	☑	7480	CY
Geotubes	☑	5,900	LF
	☐		

Detailed Project Cost

Project ID	9006	Project Feasibility	
Project Name	Dagger Island Shoreline Protection	Feasibility Index (max. 75)	39
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	5	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	5		
Longevity and Useful Life (years)	15		
Project Outputs	3,700 LF Misc. Wave Break; 50		
Crew Size	25		
Brief Description of Work	The project proposes to eliminate or drastically reduce the rate of shoreline erosion and island migration by protecting the shoreline of Dagger Island, which is due west of Ingleside, on the southern edge of Redfish Bay just north of Corpus Christi Bay. The shoreline is eroding due to natural and human causes, and the project will address both the current and future need for shoreline stabilization. The project focuses on protecting shallow aquatic habitat, submerged aquatic vegetation, intertidal habitat, oyster		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	92,957	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	3,700	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	15,195	SY	$ 2.90	$ 44,065.50
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00
Marsh Fill	80,667	CY	$ 2.90	$ 233,934.30
Geotube Fill	7,480	CY	$ 2.90	$ 21,692.00
Geotubes	5,900	LF	$ 2.90	$ 17,110.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 150,000.00
Bulldozer	1	EA	$ 15,000.00	$ 30,000.00
Crane	1	EA	$ 15,000.00	$ 75,000.00
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	2	EA	$ 15,000.00	$ 60,000.00
Excavator	4	EA	$ 15,000.00	$ 120,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 125,000.00
Construction Cost and Management	$ 1,387,100.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 1,762,100.00
Project Contingency	$ 176,200.00
Total Project Cost	$ 1,938,300.00
Annual Operations and Maintenance (O&M)	$ 54,900.00
Total O&M	$ 823,500.00

Project Data Template

Project Details	
Project ID	9008
Project Name	Flour Bluff Living Shoreline
Region	3
Subregion	14
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	20
Project Outputs	7,920 LF misc. wave break; 50 acre marsh
Brief Description of Work	The project proposes the creation of approximately 1.5 miles of living shoreline to act as a buffer between Laguna Shores Road and the erosional shoreline of Laguna Madre, along the eastern shoreline of Flour Bluff. Doing so would improve water quality and the viability of existing transportation infrastructure.

Project Cost				
Total Project Cost	$ 3,368,100.00	$ USD		
Engineering and Design	$ 250,000.00	$ USD		
Construction and Management Cost	$ 2,178,800.00	$ USD		
Mobilization/Demobilization	$ 500,000.00	$ USD		
Subtotal	$ 2,928,800.00	$ USD		
Contingency	$ 439,320.00	% of subtotal	15%	
Annualized Operations and Maintenance	$ 24,000.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	101,489	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	7,920	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	

Assumptions & Notes

Material will be beneficially used to create the living shoreline.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	✓
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	✓
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	✓	Cost (% of total project cost)	1%
Flood Risk	✓		
Hydropower		Maintenance Freq. (yrs)	20
Navigation		Cost (% of total project cost)	10%
Recreation	✓		
Regulatory		Operation Duration (yrs)	5
Water Storage		Cost (% of total project cost)	0.05%

Site Visitors		
Approx. number of visitors per day		
Local (within 30 mi.)	% of visitors	
Non-Local	% of visitors	
Boaters	% of visitors	
Multi-Day / Overnight	% of visitors	

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	6
Excavator	4	Laborer	5
Front-End Loader	0	TOTAL	24
Tug Boat	4		
TOTAL	18		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	35,525	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	4,810	CY
Other:	✓	Quantity	Units
Marsh Fill	☑	80,667	CY
Geotube Fill	☑	16,012	CY
Geotubes	☑	5,900	LF
	☐		

Detailed Project Cost

Project ID	9008	Project Feasibility	
Project Name	Flour Bluff Living Shoreline	Feasibility Index (max. 75)	33
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	3		
Subregion	14	Construction Contingency	
Start Year	2019	Contingency (%)	15%
Construction Duration (months)	6		
Longevity and Useful Life (years)	20		
Project Outputs	7,920 LF misc. wave break; 50 acre marsh		
Crew Size	24		
Brief Description of Work	The project proposes the creation of approximately 1.5 miles of living shoreline to act as a buffer between Laguna Shores Road and the erosional shoreline of Laguna Madre, along the eastern shoreline of Flour Bluff. Doing so would improve water quality and the viability of existing transportation infrastructure.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	7,920	LF	$ 25.00	$ 198,000.00
Marsh / Wetland Construction and Restoration	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Environmental Consulting Services	1	LS	$ 50,000.00	$ 50,000.00
Mobilization and Demobilization	1	LS	$ 500,000.00	$ 500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	35,525	SY	$ 2.90	$ 103,022.50
Stiff Clay Fill	4,810	CY	$ 25.00	$ 120,250.00
Marsh Fill	80,667	CY	$ 2.90	$ 233,934.30
Geotube Fill	16,012	CY	$ 2.90	$ 46,434.80

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 240,000.00
Bulldozer	1	EA	$ 15,000.00	$ 90,000.00
Crane	1	EA	$ 15,000.00	$ 45,000.00
Dredge - Hydraulic	1	EA	$ 15,000.00	$ 90,000.00
Dump Truck	3	EA	$ 15,000.00	$ 90,000.00
Excavator	4	EA	$ 15,000.00	$ 120,000.00
Tug Boat	4	EA	$ 30,000.00	$ 720,000.00

Engineering and Design (E&D)	$ 250,000.00
Construction Cost and Management	$ 2,178,800.00
Mobilization and Demobilization	$ 500,000.00
Subtotal	$ 2,928,800.00
Project Contingency	$ 439,300.00
Total Project Cost	$ 3,368,100.00

Annualized Operations and Maintenance (O&M)	$ 24,000.00
Total O&M	$ 480,000.00

Project Data Template

Project Details	
Project ID	9014
Project Name	Causeway Island Rookery Habitat Protection
Region	3
Subregion	10
Start Year	2018
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	Replace Failing Geotubes
Brief Description of Work	The project will replace failing geotubes with a 300-foot long hardened breakwater structure to retain sediment placed during recurring dredging events, which will protect the island from wind and wave erosion.

Project Cost			
Total Project Cost	$ 2,529,300.00	$ USD	
Engineering and Design	$ 70,000.00	$ USD	
Construction and Management Cost	$ 2,079,400.00	$ USD	
Mobilization/Demobilization	$ 150,000.00	$ USD	
Subtotal	$ 2,299,400.00	$ USD	
Contingency	$ 229,940.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 164,400.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☑	600	LF
Dredging	☑	98,698	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	600	LF
Marsh / Wetland Construction and Restoration	☑	10	acres
Oyster Reef Creation	☐		acres
Planting	☑	10	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☑	10	acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes
Soft clay fill

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	x
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	4
Navigation	x	Cost (% of total project cost)	10%
Recreation	x		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	2
Bulldozer	3	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	6	Operator	13
Excavator	5	Laborer	19
Front-End Loader	0	TOTAL	50
Tug Boat	3		
TOTAL	24		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	2,464	SY
Maintenance Dredged Material	☑	80,667	CY
Pipeline	☐		LF
Plants	☑	29,750	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	18,031	CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9014	Project Feasibility	
Project Name	Causeway Island Rookery Habitat Protection	Feasibility Index (max. 75)	46
Region	3	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	10	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	Replace Failing Geotubes		
Crew Size	50		
Brief Description of Work	The project will replace failing geotubes with a 300-foot long hardened breakwater structure to retain sediment placed during recurring dredging events, which will protect the island from wind and wave erosion.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dike / Levee Construction	600	LF	$ 30.00	$ 18,000.00
Marine Construction (e.g., groins, breakwaters)	600	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	10	acres	$ 200.00	$ 2,000.00
Planting	10	acres	$ 100.00	$ 1,000.00
Seeding or Hydromulching	10	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 2,500.00	$ 2,500.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Mobilization and Demobilization	1	LS	$ 150,000.00	$ 150,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	2,464	SY	$ 2.90	$ 7,145.60
Maintenance Dredged Material	80,667	CY	$ 1.95	$ 157,300.65
Plants	29,750	each	$ 16.00	$ 476,000.00
Soft Clay Fill	18,031	CY	$ 15.00	$ 270,465.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	3	EA	$ 15,000.00	$ 135,000.00
Crane	2	EA	$ 15,000.00	$ 30,000.00
Dump Truck	6	EA	$ 15,000.00	$ 270,000.00
Excavator	5	EA	$ 15,000.00	$ 225,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 70,000.00
Construction Cost and Management	$ 2,079,400.00
Mobilization and Demobilization	$ 150,000.00
Subtotal	$ 2,299,400.00
Project Contingency	$ 229,900.00
Total Project Cost	$ 2,529,300.00
Annual Operations and Maintenance (O&M)	$ 164,400.00
Total O&M	$ 2,466,000.00

Project Data Template

Project Details

Project ID	9025
Project Name	Bessie Heights Marsh Restoration
Region	1
Sub region	5
Start Year	2018
Construction Duration (months)	39
Longevity and Useful Life (years)	15
Project Outputs	1,000 Acre Marsh
Brief Description of Work	This project would restore up to 1,000 acres of a historical marsh complex at Bessie Heights Marsh in the Lower Neches Wildlife Management Area that has been lost due to subsidence. The wetland restoration methodology will be beneficial use of dredged material cells with sacrificial containment berms.

Project Cost

Total Project Cost	$ 13,479,000.00	$ USD
Engineering and Design	$ 100,000.00	$ USD
Construction and Management Cost	$ 11,609,800.00	$ USD
Mobilization/Demobilization	$ 544,200.00	$ USD
Subtotal	$ 12,254,000.00	$ USD
Contingency	$ 1,225,000.00	% of subtotal 10%
Annualized Operations and Maintenance	$ 464,900.00	$ USD

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	1,699,377	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	1,000	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF

Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS

Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for the marsh/wetland construction and restoration.

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors

Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	3
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	20
Tug Boat	1		
TOTAL	9		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	86,044	CY

Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	1,613,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9025	Project Feasibility	
Project Name	Bessie Heights Marsh Restoration	Feasibility Index (max. 75)	40
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	5	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	39		
Longevity and Useful Life (years)	15		
Project Outputs	1,000 Acre Marsh		
Crew Size	20		
Brief Description of Work	This project would restore up to 1,000 acres of a historical marsh complex at Bessie Heights Marsh in the Lower Neches Wildlife Management Area that has been lost due to subsidence. The wetland restoration methodology will be beneficial use of dredged material cells with sacrificial containment berms.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	1,699,377	CY	$ -	$ -
Marsh / Wetland Construction and Restoration	1,000	acres	$ 200.00	$ 200,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 15,000.00	$ 15,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 200,000.00	$ 200,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Mobilization and Demobilization	1	LS	$ 544,231.00	$ 544,231.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Stiff Clay Fill	86,044	CY	$ 25.00	$ 2,151,100.00
Marsh Fill	1,613,333	CY	$ 2.90	$ 4,678,665.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 780,000.00
Bulldozer	1	EA	$ 15,000.00	$ 510,000.00
Crane	1	EA	$ 15,000.00	$ 75,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 150,000.00
Dump Truck	1	EA	$ 15,000.00	$ 510,000.00
Excavator	2	EA	$ 15,000.00	$ 1,170,000.00
Tug Boat	1	EA	$ 30,000.00	$ 1,170,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 11,609,800.00
Mobilization and Demobilization	$ 544,200.00
Subtotal	$ 12,254,000.00
Project Contingency	$ 1,225,000.00
Total Project Cost	$ 13,479,000.00
Annual Operations and Maintenance (O&M)	$ 464,900.00
Total O&M	$ 6,973,100.00

Project Data Template

Project Details	
Project ID	9026
Project Name	Galveston Island West of Seawall to 8 Mile Road Beach Nourishment
Region	1
Sub region	1
Start Year	2018
Construction Duration (months)	5
Longevity and Useful Life (years)	10
Project Outputs	5,000 LF Misc. Wave Break; 5,000 LF Gulf
Brief Description of Work	The project will provide 1 mile of shoreline stabilization along the Gulf beach of Galveston's West End and create a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road though natural transport.

Project Cost				
Total Project Cost	$	10,463,300.00	$ USD	
Engineering and Design	$	120,000.00	$ USD	
Construction and Management Cost	$	8,299,400.00	$ USD	
Mobilization/Demobilization	$	300,000.00	$ USD	
Subtotal	$	8,719,400.00	$ USD	
Contingency	$	1,743,880.00	% of subtotal	20%
Annualized Operations and Maintenance	$	313,900.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	279,167	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	296,376	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,000	LF
Marsh / Wetland Construction and Restoration	☑		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

The sludge will be used to fill the geotubes.
Material will be beneficially used to create feeder beach.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	0.5%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		500
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	5	Captain	1
Bulldozer	4	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	4
Dredge - Mechanical	0	Supervisor	5
Dump Truck	3	Operator	13
Excavator	6	Laborer	13
Front-End Loader	0	TOTAL	44
Tug Boat	4		
TOTAL	25		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	20,533	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	279,167	CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	17,209	CY
Other:	✓	Quantity	Units
Geotube	☑	5,000	LF
Sludge	☑	10,108	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9026	Project Feasibility	
Project Name	Galveston Island West of Seawall to 8 Mile Road Beach	Feasibility Index (max. 75)	31
Region	1	Descriptor (low, med-low, med-high, high)	Low
Subregion	1	Construction Contingency	
Start Year	2018	Contingency (%)	20%
Construction Duration (months)	5		
Longevity and Useful Life (years)	10		
Project Outputs	5,000 LF Misc. Wave Break; 5,000		
Crew Size	44		
Brief Description of Work	The project will provide 1 mile of shoreline stabilization along the Gulf beach of Galveston's West End and create a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road though natural transport.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	279,167	CY	$ -	$ -
Dredging	296,376	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	5,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	-	acres	$ 200.00	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 120,000.00	$ 120,000.00
Mobilization and Demobilization	1	LS	$ 300,000.00	$ 300,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	20,533	SY	$ 2.90	$ 59,545.70
Sand or Soil Fill	279,167	CY	$ 20.00	$ 5,583,340.00
Stiff Clay Fill	17,209	CY	$ 25.00	$ 430,225.00
Geotube	5,000	LF	$ 2.90	$ 14,500.00
Sludge	10,108	CY	$ 2.16	$ 21,833.28

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	5	EA	$ 10,000.00	$ 250,000.00
Bulldozer	4	EA	$ 15,000.00	$ 300,000.00
Crane	2	EA	$ 15,000.00	$ 150,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 150,000.00
Dump Truck	3	EA	$ 15,000.00	$ 225,000.00
Excavator	6	EA	$ 15,000.00	$ 450,000.00
Tug Boat	4	EA	$ 30,000.00	$ 600,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 8,299,400.00
Mobilization and Demobilization	$ 300,000.00
Subtotal	$ 8,719,400.00
Project Contingency	$ 1,743,900.00
Total Project Cost	$ 10,463,300.00

Annual Operations and Maintenance (O&M)	$ 313,900.00
Total O&M	$ 3,139,000.00

Project Data Template

Project Details	
Project ID	9027
Project Name	San Antonio Bay Rookery Island Restoration
Region	2
Sub region	17
Start Year	2018
Construction Duration (months)	4
Longevity and Useful Life (years)	15
Project Outputs	50 acre rookery island
Brief Description of Work	An initial site assessment of San Antonio Bay identified five locations of previously functioning rookery islands that are suitable for reconstruction. This project will restore an historical rookery island utilizing one or more of these locations.

Project Cost		
Total Project Cost	$ 9,580,100.00	$ USD
Engineering and Design	$ 80,000.00	$ USD
Construction and Management Cost	$ 7,814,300.00	$ USD
Mobilization/Demobilization	$ 436,200.00	$ USD
Subtotal	$ 8,330,500.00	$ USD
Contingency	$ 1,249,575.00	% of subtotal 15%
Annualized Operations and Maintenance	$ 330,400.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	553,756	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Dredge material to be beneficially used for marsh creation/restoration.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	10%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	3%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	4
Excavator	4	Laborer	4
Front-End Loader	0	TOTAL	21
Tug Boat	4		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	41,978	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	150,423	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	403,333	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9027	Project Feasibility		
Project Name	San Antonio Bay Rookery Island Restoration	Feasibility Index (max. 75)	35	
		Descriptor (low, med-low, med-high, high)	Medium-Low	
Region	2			
Subregion	17	Construction Contingency		
Start Year	2018	Contingency (%)	15%	
Construction Duration (months)	4			
Longevity and Useful Life (years)	15			
Project Outputs	50 acre rookery island			
Crew Size	21			
Brief Description of Work	An initial site assessment of San Antonio Bay identified five locations of previously functioning rookery islands that are suitable for reconstruction. This project will restore an historical rookery island utilizing one or more of these locations.			

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	553,756	CY	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ 200.00	$ 10,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 150,000.00	$ 150,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Mobilization and Demobilization	1	LS	$ 436,188.00	$ 436,188.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	41,978	tons	$ 45.00	$ 1,889,010.00
Stiff Clay Fill	150,423	CY	$ 25.00	$ 3,760,575.00
Marsh Fill	403,333	CY	$ 2.90	$ 1,169,665.70

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2.00	EA	$ 10,000.00	$ 80,000.00
Bulldozer	1	EA	$ 15,000.00	$ 30,000.00
Crane	1	EA	$ 15,000.00	$ 30,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 60,000.00
Dump Truck	1	EA	$ 15,000.00	$ 30,000.00
Excavator	4	EA	$ 15,000.00	$ 120,000.00
Tug Boat	4	EA	$ 30,000.00	$ 480,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 7,814,300.00
Mobilization and Demobilization	$ 436,200.00
Subtotal	$ 8,330,500.00
Project Contingency	$ 1,249,600.00
Total Project Cost	$ 9,580,100.00
Annual Operations and Maintenance (O&M)	$ 330,400.00
Total O&M	$ 4,956,100.00

Project Data Template

Project Details	
Project ID	9042
Project Name	Bahia Grande Living Shoreline
Region	4
Subregion	8
Start Year	2018
Construction Duration (months)	5
Longevity and Useful Life (years)	15
Project Outputs	Living Shoreline
Brief Description of Work	The project will create a living shoreline near the intlet to the Bahia Grande using naturally-based, native material.

Project Cost			
Total Project Cost	$ 5,370,500.00	$ USD	
Engineering and Design	$ 125,000.00	$ USD	
Construction and Management Cost	$ 4,507,300.00	$ USD	
Mobilization/Demobilization	$ 250,000.00	$ USD	
Subtotal	$ 4,882,300.00	$ USD	
Contingency	$ 488,230.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 91,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☑	171,441	CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,000	LF
Marsh / Wetland Construction and Restoration	☑	100	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydromulching	☑	100	acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐	1	LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐	1	LS
Fuel	☐	1	LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

Place notes here.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	X	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	0.50%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	3%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	4	Operator	10
Excavator	4	Laborer	12
Front-End Loader	0	TOTAL	39
Tug Boat	3		
TOTAL	18		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	20,533	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☑	10,108	CY
Seeding	☐		SY
Soft Clay Fill	☑	161,333	CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9042	Project Feasibility	
Project Name	Bahia Grande Living Shoreline	Feasibility Index (max. 75)	43
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	4		
Subregion	8	Construction Contingency	
Start Year	2018	Contingency (%)	10%
Construction Duration (months)	5		
Longevity and Useful Life (years)	15		
Project Outputs	Living Shoreline		
Crew Size	39		
Brief Description of Work	The project will create a living shoreline near the intlet to the Bahia Grande using naturally-based, native material.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Dredging	171,441	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	5,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	100	acres	$ 200.00	$ 20,000.00
Seeding or Hydromulching	100	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Soil Borings	1	LS	$ -	$ -
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Geotextile	20,533	SY	$ 2.90	$ 59,545.70
Plants	-	each	$ 25.00	$ -
Sand or Soil Fill	10,108	CY	$ 72.00	$ 727,776.00
Soft Clay Fill	161,333	CY	$ 15.00	$ 2,419,995.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 150,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 60,000.00
Dredge - Hydraulic	1	EA	$ -	$ -
Dump Truck	4	EA	$ 15,000.00	$ 240,000.00
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 125,000.00
Construction Cost and Management	$ 4,507,300.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 4,882,300.00
Project Contingency	$ 488,200.00
Total Project Cost	$ 5,370,500.00
Annual Operations and Maintenance (O&M)	$ 91,300.00
Total O&M	$ 1,369,500.00

Project Data Template

Project Details	
Project ID	9045
Project Name	Packery Channel Nature Park Habitat Restoration - Phase 2
Region	3
Sub region	50
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	10
Project Outputs	3,000 LF of wave break; 2 acres of marsh; walkove
Brief Description of Work	Phase 2 of this project entails 2 acres of habitat restoration, additional elevated boardwalk for public access, and a living shoreline stabilization along the parks boundary on Packery Channel. An extended no-wake zone would help reduce the erosion in this area and provide better protection to public access routes.

Project Cost		
Total Project Cost	$ 2,412,000.00	$ USD
Engineering and Design	$ 120,000.00	$ USD
Construction and Management Cost	$ 1,926,600.00	$ USD
Mobilization/Demobilization	$ 250,000.00	$ USD
Subtotal	$ 2,297,000.00	$ USD
Contingency	$ 115,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$ 48,500.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☑	2	each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	3,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☑	2	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation	X		
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		25
Local (within 30 mi.)	% of visitors	90%
Non-Local	% of visitors	10%
Boaters	% of visitors	20%
Multi-Day / Overnight	% of visitors	5%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	1	Deckhand	0
Crane	2	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	3	Laborer	12
Front-End Loader	0	TOTAL	24
Tug Boat	2		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	10,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	8,333	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	1,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	3,227	CY
Stiff Clay Fill	☑	962	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Walkovers	☑	2	each
	☐		
	☐		

Detailed Project Cost

Project ID	9045	Project Feasibility	
Project Name	Packery Channel Nature Park Habitat Restoration - Phase 2	Feasibility Index (max. 4)	3.53
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	50	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	5		
Longevity and Useful Life (years)	10		
Project Outputs	3,000 LF of wave break; 2 acres of		
Crew Size	24		
Brief Description of Work	Phase 2 of this project entails 2 acres of habitat restoration, additional elevated boardwalk for public access, and a living shoreline stabilization along the parks boundary on Packery Channel. An extended no-wake zone would help reduce the erosion in this area and provide better protection to public access routes.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Construction of New Non-Residential Structures	2	each	$ 15,000.00	$ 30,000.00
Marine Construction (e.g., groins, breakwaters)	3,000	LF	$ -	$ -
Planting	2	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	10,000	tons	$ 45.00	$ 450,000.00
Geotextile	8,333	SY	$ 2.90	$ 24,165.70
Plants	1,000	each	$ 25.00	$ 25,000.00
Soft Clay Fill	3,227	CY	$ 15.00	$ 48,405.00
Stiff Clay Fill	962	CY	$ 25.00	$ 24,050.00
Walkovers	2	each	$ 60,000.00	$ 120,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 100,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 150,000.00
Dump Truck	4	EA	$ 15,000.00	$ 300,000.00
Excavator	3	EA	$ 15,000.00	$ 225,000.00
Tug Boat	2	EA	$ 30,000.00	$ 300,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 1,926,600.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 2,297,000.00
Project Contingency	$ 115,000.00
Total Project Cost	$ 2,412,000.00
Annual Operations and Maintenance (O&M)	$ 48,500.00
Total O&M	$ 484,800.00

Project Data Template

Project Details	
Project ID	9062
Project Name	Restore Upper and Lower Laguna Madre Dredge Placement and Rookery Islands
Region	4
Sub region	63
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	15
Project Outputs	40 acres of rookery islands
Brief Description of Work	Restore approximately 8 dredge placement and rookery islands just south of the Arroyo Colorado and Mansfield Channel. The islands range from "medium" to "extremely high" risk of erosion within the next 10 years based on an Audubon report. Also restore 1 to 2 additional islands in the upper Laguna Madre, with similar erosion potential.

Project Cost			
Total Project Cost	$ 12,004,000.00	$ USD	
Engineering and Design	$ 100,000.00	$ USD	
Construction and Management Cost	$ 10,213,200.00	$ USD	
Mobilization/Demobilization	$ 600,000.00	$ USD	
Subtotal	$ 10,913,000.00	$ USD	
Contingency	$ 1,091,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 128,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	40	acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	X
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	X

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	X
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	15
Navigation		Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	2
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	19
Tug Boat	1		
TOTAL	9		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	37,547	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	322,667	CY
Stiff Clay Fill	☑	134,542	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9062	Project Feasibility	
Project Name	Restore Upper and Lower Laguna Madre Dredge Placement and	Feasibility Index (max. 4)	3.1
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	4		
Subregion	63	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	1		
Longevity and Useful Life (years)	15		
Project Outputs	40 acres of rookery islands		
Crew Size	19		
Brief Description of Work	Restore approximately 8 dredge placement and rookery islands just south of the Arroyo Colorado and Mansfield Channel. The islands range from "medium" to "extremely high" risk of erosion within the next 10 years based on an Audubon report. Also restore 1 to 2 additional islands in the upper Laguna Madre, with similar erosion potential.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Island Creation	40.00	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 160,000.00	$ 160,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 600,000.00	$ 600,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	37,547	tons	$ 45.00	$ 1,689,615.00
Soft Clay Fill	322,667	CY	$ 15.00	$ 4,840,005.00
Stiff Clay Fill	134,542	CY	$ 25.00	$ 3,363,550.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 20,000.00
Bulldozer	1	EA	$ 15,000.00	$ 15,000.00
Crane	1	EA	$ 15,000.00	$ 15,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 30,000.00
Dump Truck	1	EA	$ 15,000.00	$ 15,000.00
Excavator	2	EA	$ 15,000.00	$ 30,000.00
Tug Boat	1	EA	$ 30,000.00	$ 30,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 10,213,200.00
Mobilization and Demobilization	$ 600,000.00
Subtotal	$ 10,913,000.00
Project Contingency	$ 1,091,000.00
Total Project Cost	$ 12,004,000.00
Annual Operations and Maintenance (O&M)	$ 128,300.00
Total O&M	$ 1,924,600.00

Project Data Template

Project Details	
Project ID	9063
Project Name	Restore Barrier Island Backside Wetlands on South Padre Island
Region	4
Sub region	63
Start Year	2019
Construction Duration (months)	9
Longevity and Useful Life (years)	15
Project Outputs	100 acres of marsh
Brief Description of Work	Restore the wetlands on the back side of South Padre Island using sediment deposition of non-beach quality materials, planting or other restoration techniques. Restoring these wetlands will provide a buffer on the back side of the island for stormwater runoff as well as storm surge.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	X	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Project Cost			
Total Project Cost	$ 5,500,000.00	$ USD	
Engineering and Design	$ 100,000.00	$ USD	
Construction and Management Cost	$ 4,599,500.00	$ USD	
Mobilization/Demobilization	$ 300,000.00	$ USD	
Subtotal	$ 5,000,000.00	$ USD	
Contingency	$ 500,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 56,300.00	$ USD	

Sector ✓		Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☑	100	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Site Visitors		
Approx. number of visitors per day		16
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	2
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	19
Tug Boat	1		
TOTAL	9		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	161,300	CY
Stiff Clay Fill	☑	27,200	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Detailed Project Cost

Project ID	9063	Project Feasibility	
Project Name	Restore Barrier Island Backside Wetlands on South Padre Island	Feasibility Index (max. 4)	3.1
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	4		
Subregion	63	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	9		
Longevity and Useful Life (years)	15		
Project Outputs	100 acres of marsh		
Crew Size	19		
Brief Description of Work	Restore the wetlands on the back side of South Padre Island using sediment deposition of non-beach quality materials, planting or other restoration techniques. Restoring these wetlands will provide a buffer on the back side of the island for stormwater runoff as well as storm surge.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marsh / Wetland Construction and Restoration	100	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 300,000.00	$ 300,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Soft Clay Fill	161,300	CY	$ 15.00	$ 2,419,500.00
Stiff Clay Fill	27,200	CY	$ 25.00	$ 680,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 180,000.00
Bulldozer	1	EA	$ 15,000.00	$ 135,000.00
Crane	1	EA	$ 15,000.00	$ 135,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 270,000.00
Dump Truck	1	EA	$ 15,000.00	$ 135,000.00
Excavator	2	EA	$ 15,000.00	$ 270,000.00
Tug Boat	1	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 4,599,500.00
Mobilization and Demobilization	$ 300,000.00
Subtotal	$ 5,000,000.00
Project Contingency	$ 500,000.00
Total Project Cost	$ 5,500,000.00
Annual Operations and Maintenance (O&M)	$ 56,300.00
Total O&M	$ 845,200.00

Project Data Template

Project Details	
Project ID	9064
Project Name	Sabine-Neches Channel Shoreline Protection
Region	1
Sub region	6
Start Year	2019
Construction Duration (months)	7
Longevity and Useful Life (years)	50
Project Outputs	5 miles of revetment
Brief Description of Work	This project would place shoreline armoring along the Sabine Neches navigation channel to prevent erosion caused by ship wakes, and protect habitats and dredge placement island shorelines adjacent to the channel. The project would reduce shoaling and decrease dredging events required to maintain the channel.

Project Cost			
Total Project Cost	$ 10,161,000.00	$ USD	
Engineering and Design	$ 200,000.00	$ USD	
Construction and Management Cost	$ 8,237,300.00	$ USD	
Mobilization/Demobilization	$ 800,000.00	$ USD	
Subtotal	$ 9,237,000.00	$ USD	
Contingency	$ 924,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 103,700.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☑	15,250	CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	26,400	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	50
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		50
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	2	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	4	Operator	8
Excavator	4	Laborer	5
Front-End Loader	0	TOTAL	18
Tug Boat	2		
TOTAL	15		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	69,300	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	46,400	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9064	Project Feasibility	
Project Name	Sabine-Neches Channel Shoreline Protection	Feasibility Index (max. 4)	3.1
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	6	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	7		
Longevity and Useful Life (years)	50		
Project Outputs	5 miles of revetment		
Crew Size	18		
Brief Description of Work	This project would place shoreline armoring along the Sabine Neches navigation channel to prevent erosion caused by ship wakes, and protect habitats and dredge placement island shorelines adjacent to the channel. The project would reduce shoaling and decrease dredging events required to maintain the channel.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Earthwork / Grading	15,250	CY	$ 125.00	$ 1,906,250.00
Marine Construction (e.g., groins, breakwaters)	26,400	LF	$ 45.00	$ 1,188,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 25,000.00	$ 25,000.00
Pre and Post Construction Surveying	1	LS	$ 150,000.00	$ 150,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Mobilization and Demobilization	1	LS	$ 800,000.00	$ 800,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	69,300	tons	$ 45.00	$ 3,118,500.00
Geotextile	46,400	SY	$ 2.90	$ 134,560.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 140,000.00
Bulldozer	2	EA	$ 15,000.00	$ 210,000.00
Crane	1	EA	$ 15,000.00	$ 105,000.00
Dump Truck	4	EA	$ 15,000.00	$ 420,000.00
Excavator	4	EA	$ 15,000.00	$ 420,000.00
Tug Boat	2	EA	$ 30,000.00	$ 420,000.00

Engineering and Design (E&D)	$ 200,000.00
Construction Cost and Management	$ 8,237,300.00
Mobilization and Demobilization	$ 800,000.00
Subtotal	$ 9,237,000.00
Project Contingency	$ 924,000.00
Total Project Cost	$ 10,161,000.00
Annual Operations and Maintenance (O&M)	$ 103,700.00
Total O&M	$ 5,184,100.00

Project Data Template

Project Details	
Project ID	9066
Project Name	Dollar Bay Wetland Restoration and Creation
Region	1
Sub region	17
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	25
Project Outputs	1,500 LF breakwater; 30 acres marsh
Brief Description of Work	This project would fund the engineering and design to protect approximately 30 acres of coastal wetland habitat in Dollar Bay, and approximately 1,500 feet of shoreline and adjacent wetland habitat along the southwestern shoreline of Moses Lake.

Project Cost		
Total Project Cost	$ 1,961,000.00	$ USD
Engineering and Design	$ 70,000.00	$ USD
Construction and Management Cost	$ 1,698,200.00	$ USD
Mobilization/Demobilization	$ 100,000.00	$ USD
Subtotal	$ 1,868,000.00	$ USD
Contingency	$ 93,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$ 20,300.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	1,500	LF
Marsh / Wetland Construction and Restoration	☑	30	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	2
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	2%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	5,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	4,150	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	24,200	CY
Stiff Clay Fill	☑	3,725	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9066	Project Feasibility	
Project Name	Dollar Bay Wetland Restoration and Creation	Feasibility Index (max. 4)	3.34
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	17	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	25		
Project Outputs	1,500 LF breakwater; 30 acres		
Crew Size	29		
Brief Description of Work	This project would fund the engineering and design to protect approximately 30 acres of coastal wetland habitat in Dollar Bay, and approximately 1,500 feet of shoreline and adjacent wetland habitat along the southwestern shoreline of Moses Lake.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	1,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	30	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 25,000.00	$ 25,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 100,000.00	$ 100,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	5,000	tons	$ 45.00	$ 225,000.00
Geotextile	4,150	SY	$ 2.90	$ 12,035.00
Soft Clay Fill	24,200	CY	$ 15.00	$ 363,000.00
Stiff Clay Fill	3,725	CY	$ 25.00	$ 93,125.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 70,000.00
Construction Cost and Management	$ 1,698,200.00
Mobilization and Demobilization	$ 100,000.00
Subtotal	$ 1,868,000.00
Project Contingency	$ 93,000.00
Total Project Cost	$ 1,961,000.00
Annual Operations and Maintenance (O&M)	$ 20,300.00
Total O&M	$ 507,500.00

Project Data Template

Project Details	
Project ID	9073
Project Name	Interstate 10 Drainage Improvements at Cow Bayou
Region	1
Sub region	4
Start Year	2019
Construction Duration (months)	7
Longevity and Useful Life (years)	25
Project Outputs	2 miles roadway and utility improvements
Brief Description of Work	This area experienced severe flooding during Hurricane Harvey. This project would provide a drainage study of Interstate 10 from Vidor to Cow Bayou to determine appropriate flood control solutions, such as adding or improving culverts. Implementation of identified solutions would mitigate future flooding occurrence.

Project Cost			
Total Project Cost	$ 4,967,000.00	$ USD	
Engineering and Design	$ 350,000.00	$ USD	
Construction and Management Cost	$ 3,980,000.00	$ USD	
Mobilization/Demobilization	$ 400,000.00	$ USD	
Subtotal	$ 4,730,000.00	$ USD	
Contingency	$ 237,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 103,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☑	2	miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☑	2,000	LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Assume 2 miles of road work and 2,000 LF of 12'X12' box culvert for purpose of cost-estimating. Size and length to be determined during engineering and design phase.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	0
Environmental		Cost (% of total project cost)	0%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		100
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	0	Captain	0
Bulldozer	2	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	5	Operator	6
Excavator	4	Laborer	4
Front-End Loader	2	TOTAL	14
Tug Boat	0		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☑	10,000	CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
12'X12' Box Culvert	☑	2,000	LF
	☐		
	☐		

Detailed Project Cost

Project ID	9073	Project Feasibility	
Project Name	Interstate 10 Drainage Improvements at Cow Bayou	Feasibility Index (max. 75)	3.65
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	4	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	7		
Longevity and Useful Life (years)	25		
Project Outputs	2 miles roadway and utility		
Crew Size	14		
Brief Description of Work	This area experienced severe flooding during Hurricane Harvey. This project would provide a drainage study of Interstate 10 from Vidor to Cow Bayou to determine appropriate flood control solutions, such as adding or improving culverts. Implementation of identified solutions would mitigate future flooding occurrence.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Roadway or Bridge Construction and Maintenance	2	miles	$ 25,000.00	$ 50,000.00
Utility Construction and Repair	2,000	LF	$ 100.00	$ 200,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Soil Borings	1	LS	$ 60,000.00	$ 60,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 350,000.00	$ 350,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Concrete	10,000	CY	$ 30.00	$ 300,000.00
12'X12' Box Culvert	2,000	LF	$ 900.00	$ 1,800,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Bulldozer	2	EA	$ 15,000.00	$ 210,000.00
Crane	1	EA	$ 15,000.00	$ 105,000.00
Dump Truck	5	EA	$ 15,000.00	$ 525,000.00
Excavator	4	EA	$ 15,000.00	$ 420,000.00
Front-End Loader	2	EA	$ 15,000.00	$ 210,000.00

Engineering and Design (E&D)	$ 350,000.00
Construction Cost and Management	$ 3,980,000.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 4,730,000.00
Project Contingency	$ 237,000.00
Total Project Cost	$ 4,967,000.00
Annual Operations and Maintenance (O&M)	$ 103,300.00
Total O&M	$ 2,582,800.00

Project Data Template

Project Details	
Project ID	9078
Project Name	Improve State Highway 73 at Bridge City
Region	1
Sub region	4
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	25
Project Outputs	1.5 miles roadway and 800 LF utility reconstructio
Brief Description of Work	This project would protect SH 73 from Bridge City to north of the junction with SH 87. The highway, which is used as an evacuation route, is at risk of flooding during major rainfall events. Drainage of SH 87 north of the superfund site would be considered to ensure that no negative impacts are anticipated for flows draining from the site.

Project Cost			
Total Project Cost	$ 2,738,000.00	$ USD	
Engineering and Design	$ 200,000.00	$ USD	
Construction and Management Cost	$ 2,157,500.00	$ USD	
Mobilization/Demobilization	$ 250,000.00	$ USD	
Subtotal	$ 2,608,000.00	$ USD	
Contingency	$ 130,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 61,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☑	1.5	miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☑	800	LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Assume 1.5 miles of road work and 800 LF of 6'X6' box culvert for purpose of cost-estimating. Size and length to be determined during engineering and design phase.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	X
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management	X	Monitoring Freq. (yrs)	0
Environmental		Cost (% of total project cost)	0%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	15%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		3000
Local (within 30 mi.)	% of visitors	10000%
Non-Local	% of visitors	0%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	0	Captain	0
Bulldozer	2	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	5	Operator	6
Excavator	4	Laborer	4
Front-End Loader	2	TOTAL	14
Tug Boat	0		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☑	4,000	CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
6'X6' Box Culvert	☑	800	LF
	☐		
	☐		

Detailed Project Cost

Project ID	9078	Project Feasibility	
Project Name	Improve State Highway 73 at Bridge City	Feasibility Index (max. 75)	3.5
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	4	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	6		
Longevity and Useful Life (years)	25		
Project Outputs	1.5 miles roadway and 800 LF		
Crew Size	14		
Brief Description of Work	This project would protect SH 73 from Bridge City to north of the junction with SH 87. The highway, which is used as an evacuation route, is at risk of flooding during major rainfall events. Drainage of SH 87 north of the superfund site would be considered to ensure that no negative impacts are anticipated for flows draining from the site.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Roadway or Bridge Construction and Maintenance	2	miles	$ 25,000.00	$ 37,500.00
Utility Construction and Repair	800	LF	$ 100.00	$ 80,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Soil Borings	1	LS	$ 80,000.00	$ 80,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Mobilization and Demobilization	1	LS	$ 250,000.00	$ 250,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Concrete	4,000	CY	$ 30.00	$ 120,000.00
6'X6' Box Culvert	800	LF	$ 600.00	$ 480,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Bulldozer	2	EA	$ 15,000.00	$ 180,000.00
Crane	1	EA	$ 15,000.00	$ 90,000.00
Dump Truck	5	EA	$ 15,000.00	$ 450,000.00
Excavator	4	EA	$ 15,000.00	$ 360,000.00
Front-End Loader	2	EA	$ 15,000.00	$ 180,000.00

Engineering and Design (E&D)	$ 200,000.00
Construction Cost and Management	$ 2,157,500.00
Mobilization and Demobilization	$ 250,000.00
Subtotal	$ 2,608,000.00
Project Contingency	$ 130,000.00
Total Project Cost	$ 2,738,000.00

Annual Operations and Maintenance (O&M)	$ 61,300.00
Total O&M	$ 1,533,300.00

Project Data Template

Project Details	
Project ID	9081
Project Name	Texas Point Beach Nourishment Project
Region	1
Sub region	1
Start Year	2019
Construction Duration (months)	7
Longevity and Useful Life (years)	5
Project Outputs	5 miles of beach and dune nourishment
Brief Description of Work	This project would conduct beach restoration at Texas Point using BUDM or other methods. The design phase would consider how the beach ridge restoration ties into the USACE's Coastal Texas Study planning efforts. Most of this shoreline has experienced severe erosion based on short and long-term shoreline change monitoring.

Project Cost				
Total Project Cost	$ 36,091,000.00	$ USD		
Engineering and Design	$ 250,000.00	$ USD		
Construction and Management Cost	$ 33,322,200.00	$ USD		
Mobilization/Demobilization	$ 800,000.00	$ USD		
Subtotal	$ 34,372,000.00	$ USD		
Contingency	$ 1,719,000.00		% of subtotal	5%
Annualized Operations and Maintenance	$ 375,300.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☑	1,474,000	CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☑	213,000	CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	0%
Recreation			
Regulatory		Operation Duration (yrs)	5
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		20
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	3	Captain	1
Bulldozer	5	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	2	Operator	10
Excavator	6	Laborer	8
Front-End Loader	0	TOTAL	35
Tug Boat	2		
TOTAL	20		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☑	8,800	LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Beach Quality Sand	☑	1,687,000	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9081	Project Feasibility	
Project Name	Texas Point Beach Nourishment Project	Feasibility Index (max. 75)	3.85
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	1	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	7		
Longevity and Useful Life (years)	5		
Project Outputs	5 miles of beach and dune		
Crew Size	35		
Brief Description of Work	This project would conduct beach restoration at Texas Point using BUDM or other methods. The design phase would consider how the beach ridge restoration ties into the USACE's Coastal Texas Study planning efforts. Most of this shoreline has experienced severe erosion based on short and long-term shoreline change monitoring.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Beach Nourishment - Gulf	1,474,000	CY	$ -	$ -
Dune Construction and Restoration	213,000	CY	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Environmental Consulting Services	1	LS	$ 50,000.00	$ 50,000.00
Mobilization and Demobilization	1	LS	$ 800,000.00	$ 800,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Sand Fence	8,800	LF	$ 61.50	$ 541,200.00
Beach Quality Sand	1,687,000	CY	$ 18.00	$ 30,366,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	3	EA	$ 10,000.00	$ 210,000.00
Bulldozer	5	EA	$ 15,000.00	$ 525,000.00
Crane	1	EA	$ 15,000.00	$ 105,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 210,000.00
Dump Truck	2	EA	$ 15,000.00	$ 210,000.00
Excavator	6	EA	$ 15,000.00	$ 630,000.00
Tug Boat	2	EA	$ 30,000.00	$ 420,000.00

Engineering and Design (E&D)	$ 250,000.00
Construction Cost and Management	$ 33,322,200.00
Mobilization and Demobilization	$ 800,000.00
Subtotal	$ 34,372,000.00
Project Contingency	$ 1,719,000.00
Total Project Cost	$ 36,091,000.00
Annual Operations and Maintenance (O&M)	$ 375,300.00
Total O&M	$ 1,876,700.00

Project Data Template

Project Details	
Project ID	9084
Project Name	Elevate State Highway 87 and State Highway 124 to Improve Evacuation Capabilities
Region	1
Sub region	9
Start Year	2019
Construction Duration (months)	24
Longevity and Useful Life (years)	50
Project Outputs	8 miles roadway elevation
Brief Description of Work	SH 87 is frequently overwashed due to low elevation, proximity to the shoreline and lack of beach width protection. The project would elevate and widen SH 124, and also evaluate the prospect of elevating low portions of SH 124 north of the GIWW to improve evacuation of communities on the Bolivar Peninsula.

Project Cost			
Total Project Cost	$ 21,813,000.00	$ USD	
Engineering and Design	$ 650,000.00	$ USD	
Construction and Management Cost	$ 18,380,000.00	$ USD	
Mobilization/Demobilization	$ 800,000.00	$ USD	
Subtotal	$ 19,830,000.00	$ USD	
Contingency	$ 1,983,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 219,000.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☑	500,000	CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☑	10	miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management	X	Monitoring Freq. (yrs)	0
Environmental		Cost (% of total project cost)	0%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	2%
Recreation			
Regulatory		Operation Duration (yrs)	50
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		100
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	0	Captain	0
Bulldozer	3	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	4	Operator	7
Excavator	4	Laborer	4
Front-End Loader	1	TOTAL	15
Tug Boat	0		
TOTAL	13		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☑	30,000	CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9084	Project Feasibility	
Project Name	Elevate State Highway 87 and State Highway 124 to Improve	Feasibility Index (max. 75)	2.95
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	9	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	24		
Longevity and Useful Life (years)	50		
Project Outputs	8 miles roadway elevation		
Crew Size	15		
Brief Description of Work	SH 87 is frequently overwashed due to low elevation, proximity to the shoreline and lack of beach width protection. The project would elevate and widen SH 124, and also evaluate the prospect of elevating low portions of SH 124 north of the GIWW to improve evacuation of communities on the Bolivar Peninsula. Previous evacuations have shown that this highway in its current state is too narrow for efficient evacuation purposes.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Earthwork / Grading	500,000	CY	$ 10.00	$ 5,000,000.00
Roadway or Bridge Construction and Maintenance	10	miles	$ 750,000.00	$ 7,500,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Soil Borings	1	LS	$ 200,000.00	$ 200,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 650,000.00	$ 650,000.00
Mobilization and Demobilization	1	LS	$ 800,000.00	$ 800,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Concrete	30,000	CY	$ 30.00	$ 900,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Bulldozer	3	EA	$ 15,000.00	$ 1,080,000.00
Crane	1	EA	$ 15,000.00	$ 360,000.00
Dump Truck	4	EA	$ 15,000.00	$ 1,440,000.00
Excavator	4	EA	$ 15,000.00	$ 1,440,000.00
Front-End Loader	1	EA	$ 15,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 650,000.00
Construction Cost and Management	$ 18,380,000.00
Mobilization and Demobilization	$ 800,000.00
Subtotal	$ 19,830,000.00
Project Contingency	$ 1,983,000.00
Total Project Cost	$ 21,813,000.00

Annual Operations and Maintenance (O&M)	$ 219,000.00
Total O&M	$ 10,950,100.00

Project Data Template

Project Details	
Project ID	9085
Project Name	Replace Water Control Structure at Star Lake
Region	1
Sub region	6
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	20
Project Outputs	New water control structure
Brief Description of Work	This project would improve the Star Lake water control structure to help protect the Salt Bayou System. The water control structure helps to regulate the flow of freshwater into Star Lake. The structure is past the end of its life cycle and is in need of replacement or repair.

Project Cost				
Total Project Cost	$	2,023,000.00	$ USD	
Engineering and Design	$	175,000.00	$ USD	
Construction and Management Cost	$	1,551,600.00	$ USD	
Mobilization/Demobilization	$	200,000.00	$ USD	
Subtotal	$	1,927,000.00	$ USD	
Contingency	$	96,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$	103,700.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☑	1	each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	-	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☐		LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Project cost can range depending on final design. This assumes a conservative approach.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson	X	Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental		Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	20
Water Storage	X	Cost (% of total project cost)	5%

Site Visitors		
Approx. number of visitors per day		1
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	1	Deckhand	0
Crane	2	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	3
Dump Truck	4	Operator	6
Excavator	3	Laborer	7
Front-End Loader	0	TOTAL	18
Tug Boat	2		
TOTAL	14		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☑	20	CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Water Control Gate	☑	1	each
	☐		
	☐		

Detailed Project Cost

Project ID	9085	Project Feasibility	
Project Name	Replace Water Control Structure at Star Lake	Feasibility Index (max. 75)	3.3
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	6	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	6		
Longevity and Useful Life (years)	20		
Project Outputs	New water control structure		
Crew Size	18		
Brief Description of Work	This project would improve the Star Lake water control structure to help protect the Salt Bayou System. The water control structure helps to regulate the flow of freshwater into Star Lake. The structure is past the end of its life cycle and is in need of replacement or repair.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Construction of New Non-Residential Structures	1	each	$ 15,000.00	$ 15,000.00
Marine Construction (e.g., groins, breakwaters)	-	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 150,000.00	$ 150,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Concrete	20	CY	$ 30.00	$ 600.00
Water Control Gate	1	each	$ 56,000.00	$ 56,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 90,000.00
Crane	2	EA	$ 15,000.00	$ 180,000.00
Dump Truck	4	EA	$ 15,000.00	$ 360,000.00
Excavator	3	EA	$ 15,000.00	$ 270,000.00
Tug Boat	2	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 175,000.00
Construction Cost and Management	$ 1,551,600.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 1,927,000.00
Project Contingency	$ 96,000.00
Total Project Cost	$ 2,023,000.00
Annual Operations and Maintenance (O&M)	$ 103,700.00
Total O&M	$ 2,074,600.00

Project Data Template

Project Details	
Project ID	9099
Project Name	Oyster Lake - West Bay Breach Protection
Region	1
Sub region	20
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	25
Project Outputs	13,000 feet of breakwater
Brief Description of Work	Oyster Lake is breaching, and there is a need to provide additional protection or armoring between Oyster Lake and West Bay. Existing reef balls have been washed out and are intended to be replaced by Galveston Bay Foundation.

Project Cost		
Total Project Cost	$ 4,518,000.00	$ USD
Engineering and Design	$ 120,000.00	$ USD
Construction and Management Cost	$ 3,832,900.00	$ USD
Mobilization/Demobilization	$ 350,000.00	$ USD
Subtotal	$ 4,303,000.00	$ USD
Contingency	$ 215,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$ 49,800.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	13,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria	X	Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	12.5
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	80%
Multi-Day / Overnight	% of visitors	5%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	3	Operator	4
Excavator	2	Laborer	3
Front-End Loader	0	TOTAL	10
Tug Boat	2		
TOTAL	10		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	43,300	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	36,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9099	Project Feasibility	
Project Name	Oyster Lake - West Bay Breach Protection	Feasibility Index (max. 4)	3.43
		Descriptor (low, med-low, med-high, high)	High
Region	1		
Subregion	20	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	6		
Longevity and Useful Life (years)	25		
Project Outputs	13,000 feet of breakwater		
Crew Size	10		
Brief Description of Work	Oyster Lake is breaching, and there is a need to provide additional protection or armoring between Oyster Lake and West Bay. Existing reef balls have been washed out and are intended to be replaced by Galveston Bay Foundation.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	13,000	LF	$ 50.00	$ 650,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 10,000.00	$ 10,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 120,000.00	$ 120,000.00
Mobilization and Demobilization	1	LS	$ 350,000.00	$ 350,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	43,300	tons	$ 45.00	$ 1,948,500.00
Geotextile	36,000	SY	$ 2.90	$ 104,400.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 120,000.00
Crane	1	EA	$ 15,000.00	$ 90,000.00
Dump Truck	3	EA	$ 15,000.00	$ 270,000.00
Excavator	2	EA	$ 15,000.00	$ 180,000.00
Tug Boat	2	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 3,832,900.00
Mobilization and Demobilization	$ 350,000.00
Subtotal	$ 4,303,000.00
Project Contingency	$ 215,000.00
Total Project Cost	$ 4,518,000.00
Annual Operations and Maintenance (O&M)	$ 49,800.00
Total O&M	$ 1,244,300.00

Project Data Template

Project Details	
Project ID	9103
Project Name	Lavaca Bay Oyster Reef Restoration
Region	2
Sub region	29
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	20
Project Outputs	20 acres of oyster reef
Brief Description of Work	This project proposes oyster reef restoration/creation, as well as fish habitat restoration in Lavaca Bay. This would help with overall water quality and shoreline protection. This also could enhance the local economy through recreational fishing opportunities.

Project Cost			
Total Project Cost	$ 1,234,000.00	$ USD	
Engineering and Design	$ 90,000.00	$ USD	
Construction and Management Cost	$ 985,000.00	$ USD	
Mobilization/Demobilization	$ 100,000.00	$ USD	
Subtotal	$ 1,175,000.00	$ USD	
Contingency	$ 59,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 26,300.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	20	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☐		LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	20
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	8
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	6,500	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9103	Project Feasibility	
Project Name	Lavaca Bay Oyster Reef Restoration	Feasibility Index (max. 4)	3.29
Region	2	Descriptor (low, med-low, med-high, high)	High
Subregion	29	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	20		
Project Outputs	20 acres of oyster reef		
Crew Size	8		
Brief Description of Work	This project proposes oyster reef restoration/creation, as well as fish habitat restoration in Lavaca Bay. This would help with overall water quality and shoreline protection. This also could enhance the local economy through recreational fishing opportunities.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	20	acres	$ 20,000.00	$ 400,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 100,000.00	$ 100,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	6,500	CY	$ 30.00	$ 195,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 60,000.00
Crane	1	EA	$ 15,000.00	$ 45,000.00
Excavator	1	EA	$ 15,000.00	$ 45,000.00
Tug Boat	2	EA	$ 30,000.00	$ 180,000.00

Engineering and Design (E&D)	$ 90,000.00
Construction Cost and Management	$ 985,000.00
Mobilization and Demobilization	$ 100,000.00
Subtotal	$ 1,175,000.00
Project Contingency	$ 59,000.00
Total Project Cost	$ 1,234,000.00
Annual Operations and Maintenance (O&M)	$ 26,300.00
Total O&M	$ 525,100.00

Project Data Template

Project Details	
Project ID	9105
Project Name	Restore East Matagorda Bay Wetlands
Region	2
Sub region	24
Start Year	2019
Construction Duration (months)	2
Longevity and Useful Life (years)	10
Project Outputs	50 acres marsh restoration
Brief Description of Work	This project proposes to restore the wetlands in East Matagorda Bay, which were damaged during Hurricane Harvey. These wetlands are key birding, fishing and recreational areas.

Project Cost			
Total Project Cost	$ 642,000.00	$ USD	
Engineering and Design	$ 20,000.00	$ USD	
Construction and Management Cost	$ 515,000.00	$ USD	
Mobilization/Demobilization	$ -	$ USD	
Subtotal	$ 535,000.00	$ USD	
Contingency	$ 107,000.00	% of subtotal	20%
Annualized Operations and Maintenance	$ 16,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☑	50	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☐		LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☐		LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☐		LS
Supplies	☑	1	LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Assuming planting only, no marsh reconstruction or fill needed.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	10
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	0	Captain	0
Bulldozer	0	Deckhand	0
Crane	0	Mate	0
Dredge - Hydraulic	0	Engineer	0
Dredge - Mechanical	0	Supervisor	1
Dump Truck	0	Operator	0
Excavator	0	Laborer	5
Front-End Loader	0	TOTAL	6
Tug Boat	0		
TOTAL	0		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	25,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9105	Project Feasibility	
Project Name	Restore East Matagorda Bay Wetlands	Feasibility Index (max. 75)	2.48
		Descriptor (low, med-low, med-high, high)	Low
Region	2		
Subregion	24	Construction Contingency	
Start Year	2019	Contingency (%)	20%
Construction Duration (months)	2		
Longevity and Useful Life (years)	10		
Project Outputs	50 acres marsh restoration		
Crew Size	6		
Brief Description of Work	This project proposes to restore the wetlands in East Matagorda Bay, which were damaged during Hurricane Harvey. These wetlands are key birding, fishing and recreational areas.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Planting	50	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Supplies	1	LS	$ 10,000.00	$ 10,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Plants	25,000	each	$ 20.00	$ 500,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost

Engineering and Design (E&D)	$ 20,000.00
Construction Cost and Management	$ 515,000.00
Mobilization and Demobilization	$ -
Subtotal	$ 535,000.00
Project Contingency	$ 107,000.00
Total Project Cost	$ 642,000.00
Annual Operations and Maintenance (O&M)	$ 16,100.00
Total O&M	$ 161,100.00

Project Data Template

Project Details	
Project ID	9114
Project Name	Ocean Drive Living Shoreline
Region	2
Sub region	38
Start Year	2019
Construction Duration (months)	6
Longevity and Useful Life (years)	20
Project Outputs	7,920 LF of breakwater; 5 acres of marsh
Brief Description of Work	This project proposes to add a living shoreline or other stabilization / storm surge protection along Ocean Drive near Indianola, heading north. Protecting the shoreline would also help protect the roadway, which serves as an evacuation route for the community.

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Project Cost				
Total Project Cost	$ 4,491,000.00	$ USD		
Engineering and Design	$ 80,000.00	$ USD		
Construction and Management Cost	$ 3,424,900.00	$ USD		
Mobilization/Demobilization	$ 400,000.00	$ USD		
Subtotal	$ 3,905,000.00	$ USD		
Contingency	$ 586,000.00		% of subtotal	15%
Annualized Operations and Maintenance	$ 95,900.00	$ USD		

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management	X	Monitoring Freq. (yrs)	4
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	20
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		300
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	7,920	LF
Marsh / Wetland Construction and Restoration	☑	5	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	26,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	22,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	8,000	CY
Stiff Clay Fill	☑	1,525	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9114	Project Feasibility	
Project Name	Ocean Drive Living Shoreline	Feasibility Index (max. 4)	2.83
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	2		
Subregion	38	Construction Contingency	
Start Year	2019	Contingency (%)	15%
Construction Duration (months)	6		
Longevity and Useful Life (years)	20		
Project Outputs	7,920 LF of breakwater; 5 acres of		
Crew Size	29		
Brief Description of Work	This project proposes to add a living shoreline or other stabilization / storm surge protection along Ocean Drive near Indianola, heading north. Protecting the shoreline would also help protect the roadway, which serves as an evacuation route for the community.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	7,920	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	5	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	26,400	tons	$ 45.00	$ 1,188,000.00
Geotextile	22,000	SY	$ 2.90	$ 63,800.00
Soft Clay Fill	8,000	CY	$ 15.00	$ 120,000.00
Stiff Clay Fill	1,525	CY	$ 25.00	$ 38,125.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 240,000.00
Bulldozer	1	EA	$ 15,000.00	$ 90,000.00
Crane	2	EA	$ 15,000.00	$ 180,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 180,000.00
Dump Truck	4	EA	$ 15,000.00	$ 360,000.00
Excavator	4	EA	$ 15,000.00	$ 360,000.00
Tug Boat	3	EA	$ 30,000.00	$ 540,000.00

Engineering and Design (E&D)	$ 80,000.00
Construction Cost and Management	$ 3,424,900.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 3,905,000.00
Project Contingency	$ 586,000.00
Total Project Cost	$ 4,491,000.00
Annual Operations and Maintenance (O&M)	$ 95,900.00
Total O&M	$ 1,917,700.00

Project Data Template

Project Details	
Project ID	9115
Project Name	Port Lavaca Living Shoreline
Region	2
Sub region	35
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	10
Project Outputs	5,000 feet of breakwater; 2 acres of marsh
Brief Description of Work	The project proposes a living shoreline at Port Lavaca to enhance wetlands and improve the quality of runoff into Lavaca Bay. Wetlands in this area have experienced minor erosion and degradation. A living shoreline would be visible to the public and could help educate the public on the benefits of wetlands to stormwater treatment.

Project Cost		
Total Project Cost	$ 2,361,000.00	$ USD
Engineering and Design	$ 65,000.00	$ USD
Construction and Management Cost	$ 1,880,800.00	$ USD
Mobilization/Demobilization	$ 200,000.00	$ USD
Subtotal	$ 2,146,000.00	$ USD
Contingency	$ 215,000.00	% of subtotal 10%
Annualized Operations and Maintenance	$ 82,900.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,000	LF
Marsh / Wetland Construction and Restoration	☑	2	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun	X	Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		20
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	10%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	16,600	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	13,900	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	3,300	CY
Stiff Clay Fill	☑	960	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9115	Project Feasibility	
Project Name	Port Lavaca Living Shoreline	Feasibility Index (max. 4)	3.03
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	2		
Subregion	35	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	3		
Longevity and Useful Life (years)	10		
Project Outputs	5,000 feet of breakwater; 2 acres		
Crew Size	29		
Brief Description of Work	The project proposes a living shoreline at Port Lavaca to enhance wetlands and improve the quality of runoff into Lavaca Bay. Wetlands in this area have experienced minor erosion and degradation. A living shoreline would be visible to the public and could help educate the public on the benefits of wetlands to stormwater treatment.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	5,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	2	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 65,000.00	$ 65,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	16,600	tons	$ 45.00	$ 747,000.00
Geotextile	13,900	SY	$ 2.90	$ 40,310.00
Soft Clay Fill	3,300	CY	$ 15.00	$ 49,500.00
Stiff Clay Fill	960	CY	$ 25.00	$ 24,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 65,000.00
Construction Cost and Management	$ 1,880,800.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 2,146,000.00
Project Contingency	$ 215,000.00
Total Project Cost	$ 2,361,000.00
Annual Operations and Maintenance (O&M)	$ 82,900.00
Total O&M	$ 828,700.00

Project Data Template

Project Details	
Project ID	9117
Project Name	Palacios Shoreline Revitalization Project
Region	2
Sub region	29
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	20
Project Outputs	1 mile of bulkhead; 2 acres of marsh
Brief Description of Work	Several ongoing activities in Palacios may be combined for a multi-faceted project: 1) Repair of the seawall; 2) Enhancements to the existing educational pavilion; 3) Improvements to SH 35, inlcuding improved green infrastructure; 4) Marsh restoration along the shorefront to benefit stormwater runoff into Tres Palacios Bay.

Project Cost				
Total Project Cost	$ 4,400,000.00	$ USD		
Engineering and Design	$ 60,000.00	$ USD		
Construction and Management Cost	$ 3,854,500.00	$ USD		
Mobilization/Demobilization	$ 85,800.00	$ USD		
Subtotal	$ 4,000,000.00	$ USD		
Contingency	$ 400,000.00		% of subtotal	10%
Annualized Operations and Maintenance	$ 49,700.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,280	LF
Marsh / Wetland Construction and Restoration	☑	2	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	2
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	20
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		100
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	0%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	3,300	CY
Stiff Clay Fill	☑	960	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Bulkhead	☑	5,280	LF
	☐		
	☐		

Detailed Project Cost

Project ID	9117	Project Feasibility	
Project Name	Palacios Shoreline Revitalization Project	Feasibility Index (max. 4)	2.97
Region	2	Descriptor (low, med-low, med-high, high)	Medium-High
Subregion	29	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	20		
Project Outputs	1 mile of bulkhead; 2 acres of		
Crew Size	29		
Brief Description of Work	Several ongoing activities in Palacios may be combined for a multi-faceted project: 1) Repair of the seawall; 2) Enhancements to the existing educational pavilion; 3) Improvements to SH 35, inlcuding improved green infrastructure; 4) Marsh restoration along the shorefront to benefit stormwater runoff into Tres Palacios Bay.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	5,280	LF	$ 200.00	$ 1,056,000.00
Marsh / Wetland Construction and Restoration	2	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 60,000.00	$ 60,000.00
Mobilization and Demobilization	1	LS	$ 85,848.00	$ 85,848.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Soft Clay Fill	3,300	CY	$ 15.00	$ 49,500.00
Stiff Clay Fill	960	CY	$ 25.00	$ 24,000.00
Bulkhead	5,280	LF	$ 250.00	$ 1,320,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 160,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	4	EA	$ 15,000.00	$ 240,000.00
Excavator	4	EA	$ 15,000.00	$ 240,000.00
Tug Boat	3	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 60,000.00
Construction Cost and Management	$ 3,854,500.00
Mobilization and Demobilization	$ 85,800.00
Subtotal	$ 4,000,000.00
Project Contingency	$ 400,000.00
Total Project Cost	$ 4,400,000.00
Annual Operations and Maintenance (O&M)	$ 49,700.00
Total O&M	$ 994,400.00

Project Data Template

Project Details	
Project ID	9121
Project Name	Mansfield Rookery Island Shoreline Protection
Region	4
Sub region	61
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	5 acres of rookery islands; 2,000 feet of breakwate
Brief Description of Work	Add an additional breakwater or other shoreline stabilization to protect the southern and eastern sides of the island. This will protect the habitat and reduce siltation in the channel. It is anticipated that it will be possible to work with industrial users to easily nourish the island with BUDM from Mansfield Channel.

Project Cost			
Total Project Cost	$ 3,711,000.00	$ USD	
Engineering and Design	$ 85,000.00	$ USD	
Construction and Management Cost	$ 3,149,300.00	$ USD	
Mobilization/Demobilization	$ 300,000.00	$ USD	
Subtotal	$ 3,534,000.00	$ USD	
Contingency	$ 177,000.00	% of subtotal	5%
Annualized Operations and Maintenance	$ 50,000.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	5	acres
Marine Construction (e.g., groins, breakwaters)	☑	2,000	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	Mansfield Channel

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	X

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	3
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	15
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	19,975	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	5,500	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	40,300	CY
Stiff Clay Fill	☑	24,000	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9121	Project Feasibility	
Project Name	Mansfield Rookery Island Shoreline Protection	Feasibility Index (max. 4)	3.32
		Descriptor (low, med-low, med-high, high)	High
Region	4		
Subregion	61	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	5 acres of rookery islands; 2,000		
Crew Size	29		
Brief Description of Work	Add an additional breakwater or other shoreline stabilization to protect the southern and eastern sides of the island. This will protect the habitat and reduce siltation in the channel. It is anticipated that it will be possible to work with industrial users to easily nourish the island with BUDM from Mansfield Channel.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Island Creation	5.00	acres	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	2,000	LF	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 70,000.00	$ 70,000.00
Environmental Consulting Services	1	LS	$ 15,000.00	$ 15,000.00
Mobilization and Demobilization	1	LS	$ 300,000.00	$ 300,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	19,975	tons	$ 45.00	$ 898,875.00
Geotextile	5,500	SY	$ 2.90	$ 15,950.00
Soft Clay Fill	40,300	CY	$ 15.00	$ 604,500.00
Stiff Clay Fill	24,000	CY	$ 25.00	$ 600,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 85,000.00
Construction Cost and Management	$ 3,149,300.00
Mobilization and Demobilization	$ 300,000.00
Subtotal	$ 3,534,000.00
Project Contingency	$ 177,000.00
Total Project Cost	$ 3,711,000.00
Annual Operations and Maintenance (O&M)	$ 50,000.00
Total O&M	$ 749,600.00

Project Data Template

Project Details

Project ID	9123
Project Name	City of South Padre Island Living Shoreline
Region	4
Sub region	63
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	1 mile of breakwater; 5 acres of marsh
Brief Description of Work	Construct a living shoreline along the bay-side of the City of South Padre Island to restore the black mangroves, grasses and oyster habitats that have been declining in the region. Maintaining access routes to the Laguna Madre will be an important consideration during the project design phase.

Project Cost

Total Project Cost	$ 2,532,000.00	$ USD	
Engineering and Design	$ 90,000.00	$ USD	
Construction and Management Cost	$ 2,012,100.00	$ USD	
Mobilization/Demobilization	$ 200,000.00	$ USD	
Subtotal	$ 2,302,000.00	$ USD	
Contingency	$ 230,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 31,100.00	$ USD	

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,280	LF
Marsh / Wetland Construction and Restoration	☑	5	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF

Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS

Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)

Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron	X	Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector ✓ / Monitoring, Operations & Maintenance

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors

Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	17,600	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	14,700	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	8,000	CY
Stiff Clay Fill	☑	1,500	CY

Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9123	Project Feasibility	
Project Name	City of South Padre Island Living Shoreline	Feasibility Index (max. 4)	3.03
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	4		
Subregion	63	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	1 mile of breakwater; 5 acres of		
Crew Size	29		
Brief Description of Work	Construct a living shoreline along the bay-side of the City of South Padre Island to restore the black mangroves, grasses and oyster habitats that have been declining in the region. Maintaining access routes to the Laguna Madre will be an important consideration during the project design phase.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	5,280	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	5	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 40,000.00	$ 40,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	17,600	tons	$ 45.00	$ 792,000.00
Geotextile	14,700	SY	$ 2.90	$ 42,630.00
Soft Clay Fill	8,000	CY	$ 15.00	$ 120,000.00
Stiff Clay Fill	1,500	CY	$ 25.00	$ 37,500.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 90,000.00
Construction Cost and Management	$ 2,012,100.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 2,302,000.00
Project Contingency	$ 230,000.00
Total Project Cost	$ 2,532,000.00

Annual Operations and Maintenance (O&M)	$ 31,100.00
Total O&M	$ 465,900.00

Project Data Template

Project Details

Project ID	9126
Project Name	Coon Islands Restoration
Region	2
Sub region	29
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	10
Project Outputs	10 acres of rookery island restoration
Brief Description of Work	This project would restore the elevation and connectivity of Coon Islands, protect Coon Island Bay, and enhance freshwater input to support Oliver Point Reef. The project would also improve the shallow water habitat in bay, which will support nursery habitat for recreational and commercially-important species.

Project Cost

Total Project Cost	$ 5,402,000.00	$ USD	
Engineering and Design	$ 90,000.00	$ USD	
Construction and Management Cost	$ 4,420,500.00	$ USD	
Mobilization/Demobilization	$ 400,000.00	$ USD	
Subtotal	$ 4,911,000.00	$ USD	
Contingency	$ 491,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$ 189,600.00	$ USD	

Project Activities

Construction	✓	Quantity (If known)	Units
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☑	10	acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations ✓

Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)

County		County	
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	X
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area ✓

Approximate populated area the completed project will impact.

Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector ✓ / Monitoring, Operations & Maintenance

Sector		Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors

Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment / Crew Size

Equipment	No.	Crew Size	No.
Barge	2	Captain	1
Bulldozer	1	Deckhand	5
Crane	1	Mate	3
Dredge - Hydraulic	1	Engineer	2
Dredge - Mechanical	0	Supervisor	2
Dump Truck	1	Operator	2
Excavator	2	Laborer	4
Front-End Loader	0	TOTAL	19
Tug Boat	1		
TOTAL	9		

Primary Project Materials

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	18,750	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	80,700	CY
Stiff Clay Fill	☑	67,250	CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9126	Project Feasibility	
Project Name	Coon Islands Restoration	Feasibility Index (max. 4)	2.9
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	2		
Subregion	29	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	4		
Longevity and Useful Life (years)	10		
Project Outputs	10 acres of rookery island		
Crew Size	19		
Brief Description of Work	This project would restore the elevation and connectivity of Coon Islands, protect Coon Island Bay, and enhance freshwater input to support Oliver Point Reef. The project would also improve the shallow water habitat in bay, which will support nursery habitat for recreational and commercially-important species.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Island Creation	10.00	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 60,000.00	$ 60,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	18,750	tons	$ 45.00	$ 843,750.00
Soft Clay Fill	80,700	CY	$ 15.00	$ 1,210,500.00
Stiff Clay Fill	67,250	CY	$ 25.00	$ 1,681,250.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 80,000.00
Bulldozer	1	EA	$ 15,000.00	$ 60,000.00
Crane	1	EA	$ 15,000.00	$ 60,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	1	EA	$ 15,000.00	$ 60,000.00
Excavator	2	EA	$ 15,000.00	$ 120,000.00
Tug Boat	1	EA	$ 30,000.00	$ 120,000.00

Engineering and Design (E&D)	$ 90,000.00
Construction Cost and Management	$ 4,420,500.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 4,911,000.00
Project Contingency	$ 491,000.00
Total Project Cost	$ 5,402,000.00
Annual Operations and Maintenance (O&M)	$ 189,600.00
Total O&M	$ 1,896,100.00

Project Data Template

Project Details	
Project ID	9134
Project Name	Port Aransas Nature Preserve Stabilization and Restoration
Region	3
Sub region	50
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	15
Project Outputs	2,500 feet of revetment; 60 acres of marsh
Brief Description of Work	The 1500-acre Port Aransas Nature Preserve has seen saltwater intrusion due to wave action from ships and boats. Recommended improvements include: repairing breaches in the ship channel revetment on Mustang Island; constructing living shorelines along the backside of the channel; and rebuilding marsh and wetland habitat.

Project Cost		
Total Project Cost	$ 4,314,000.00	$ USD
Engineering and Design	$ 110,000.00	$ USD
Construction and Management Cost	$ 3,599,300.00	$ USD
Mobilization/Demobilization	$ 400,000.00	$ USD
Subtotal	$ 4,109,000.00	$ USD
Contingency	$ 205,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$ 96,100.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☑	1,500	CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	2,500	LF
Marsh / Wetland Construction and Restoration	☑	60	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		20
Local (within 30 mi.)	% of visitors	80%
Non-Local	% of visitors	20%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	3	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	4
Dredge - Mechanical	0	Supervisor	5
Dump Truck	5	Operator	10
Excavator	6	Laborer	9
Front-End Loader	0	TOTAL	37
Tug Boat	3		
TOTAL	24		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	6,600	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	4,400	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	96,800	CY
Stiff Clay Fill	☑	5,300	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9134	Project Feasibility	
Project Name	Port Aransas Nature Preserve Stabilization and Restoration	Feasibility Index (max. 4)	3.51
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	50	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	4		
Longevity and Useful Life (years)	15		
Project Outputs	2,500 feet of revetment; 60 acres		
Crew Size	37		
Brief Description of Work	The 1500-acre Port Aransas Nature Preserve has seen saltwater intrusion due to wave action from ships and boats. Recommended improvements include: repairing breaches in the ship channel revetment on Mustang Island; constructing living shorelines along the backside of the channel; and rebuilding marsh and wetland habitat.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Earthwork / Grading	1,500	CY	$ -	$ -
Marine Construction (e.g., groins, breakwaters)	2,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	60	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 100,000.00	$ 100,000.00
Environmental Consulting Services	1	LS	$ 10,000.00	$ 10,000.00
Mobilization and Demobilization	1	LS	$ 400,000.00	$ 400,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	6,600	tons	$ 45.00	$ 297,000.00
Geotextile	4,400	SY	$ 2.90	$ 12,760.00
Soft Clay Fill	96,800	CY	$ 15.00	$ 1,452,000.00
Stiff Clay Fill	5,300	CY	$ 25.00	$ 132,500.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 160,000.00
Bulldozer	3	EA	$ 15,000.00	$ 180,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 120,000.00
Dump Truck	5	EA	$ 15,000.00	$ 300,000.00
Excavator	6	EA	$ 15,000.00	$ 360,000.00
Tug Boat	3	EA	$ 30,000.00	$ 360,000.00

Engineering and Design (E&D)	$ 110,000.00
Construction Cost and Management	$ 3,599,300.00
Mobilization and Demobilization	$ 400,000.00
Subtotal	$ 4,109,000.00
Project Contingency	$ 205,000.00
Total Project Cost	$ 4,314,000.00
Annual Operations and Maintenance (O&M)	$ 96,100.00
Total O&M	$ 1,440,900.00

Project Data Template

Project Details	
Project ID	9139
Project Name	Newcomb's Point Shoreline Stabilization
Region	3
Sub region	43
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	5,000 feet of breakwater; 10 acres of marsh
Brief Description of Work	Erosion of the shoreline at Newcomb's Point is endangering the survival of marsh habitat. Potential solutions include creating a living shoreline that will protect the shoreline from erosion using a semi-submerged breakwater with vegetation behind it, allowing the shoreline to accrete and stabilize naturally.

Project Cost				
Total Project Cost	$	2,682,000.00	$ USD	
Engineering and Design	$	120,000.00	$ USD	
Construction and Management Cost	$	2,118,100.00	$ USD	
Mobilization/Demobilization	$	200,000.00	$ USD	
Subtotal	$	2,438,000.00	$ USD	
Contingency	$	244,000.00	% of subtotal	10%
Annualized Operations and Maintenance	$	56,000.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	5,000	LF
Marsh / Wetland Construction and Restoration	☑	10	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☐		LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	5
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	2%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	16,700	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	14,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	16,150	CY
Stiff Clay Fill	☑	2,150	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9139	Project Feasibility	
Project Name	Newcomb's Point Shoreline Stabilization	Feasibility Index (max. 4)	3.06
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	3		
Subregion	43	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	3		
Longevity and Useful Life (years)	25		
Project Outputs	5,000 feet of breakwater; 10		
Crew Size	29		
Brief Description of Work	Erosion of the shoreline at Newcomb's Point is endangering the survival of marsh habitat. Potential solutions include creating a living shoreline that will protect the shoreline from erosion using a semi-submerged breakwater with vegetation behind it, allowing the shoreline to accrete and stabilize naturally.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	5,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	10	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 120,000.00	$ 120,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	16,700	tons	$ 45.00	$ 751,500.00
Geotextile	14,000	SY	$ 2.90	$ 40,600.00
Soft Clay Fill	16,150	CY	$ 15.00	$ 242,250.00
Stiff Clay Fill	2,150	CY	$ 25.00	$ 53,750.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 120,000.00
Bulldozer	1	EA	$ 15,000.00	$ 45,000.00
Crane	2	EA	$ 15,000.00	$ 90,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 90,000.00
Dump Truck	4	EA	$ 15,000.00	$ 180,000.00
Excavator	4	EA	$ 15,000.00	$ 180,000.00
Tug Boat	3	EA	$ 30,000.00	$ 270,000.00

Engineering and Design (E&D)	$ 120,000.00
Construction Cost and Management	$ 2,118,100.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 2,438,000.00
Project Contingency	$ 244,000.00
Total Project Cost	$ 2,682,000.00
Annual Operations and Maintenance (O&M)	$ 56,000.00
Total O&M	$ 1,400,000.00

Project Data Template

Project Details	
Project ID	9145
Project Name	Copano Bay Oyster Reef Restoration
Region	3
Sub region	46
Start Year	2019
Construction Duration (months)	3
Longevity and Useful Life (years)	15
Project Outputs	45 acres of oyster reef
Brief Description of Work	The project involves a large-scale (45-acre) oyster reef restoration in Copano Bay. Notable benefits of oyster habitat creation are oyster harvests, water filtration, aquatic habitat diversity and shoreline protection by wave energy attenuation.

Project Cost		
Total Project Cost	$ 2,172,000.00	$ USD
Engineering and Design	$ 100,000.00	$ USD
Construction and Management Cost	$ 1,768,800.00	$ USD
Mobilization/Demobilization	$ 200,000.00	$ USD
Subtotal	$ 2,069,000.00	$ USD
Contingency	$ 103,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$ 22,800.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☐		LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	45	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☐		LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas	X	Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	X
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	2%
Recreation	X		
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	2	Captain	0
Bulldozer	0	Deckhand	0
Crane	1	Mate	0
Dredge - Hydraulic	0	Engineer	1
Dredge - Mechanical	0	Supervisor	2
Dump Truck	0	Operator	2
Excavator	1	Laborer	3
Front-End Loader	0	TOTAL	8
Tug Boat	2		
TOTAL	6		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☐		tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☐		SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☑	14,625	CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9145	Project Feasibility	
Project Name	Copano Bay Oyster Reef Restoration	Feasibility Index (max. 4)	3.51
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	46	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	3		
Longevity and Useful Life (years)	15		
Project Outputs	45 acres of oyster reef		
Crew Size	8		
Brief Description of Work	The project involves a large-scale (45-acre) oyster reef restoration in Copano Bay. Notable benefits of oyster habitat creation are oyster harvests, water filtration, aquatic habitat diversity and shoreline protection by wave energy attenuation.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Oyster Reef Creation	45	acres	$ 20,000.00	$ 900,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 80,000.00	$ 80,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 200,000.00	$ 200,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
Recycled Concrete	14,625	CY	$ 30.00	$ 438,750.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	2	EA	$ 10,000.00	$ 60,000.00
Crane	1	EA	$ 15,000.00	$ 45,000.00
Excavator	1	EA	$ 15,000.00	$ 45,000.00
Tug Boat	2	EA	$ 30,000.00	$ 180,000.00

Engineering and Design (E&D)	$ 100,000.00
Construction Cost and Management	$ 1,768,800.00
Mobilization and Demobilization	$ 200,000.00
Subtotal	$ 2,069,000.00
Project Contingency	$ 103,000.00
Total Project Cost	$ 2,172,000.00
Annual Operations and Maintenance (O&M)	$ 22,800.00
Total O&M	$ 341,700.00

Project Data Template

Project Details	
Project ID	9158
Project Name	Indian Point Marsh Area Living Shoreline
Region	3
Sub region	49
Start Year	2019
Construction Duration (months)	5
Longevity and Useful Life (years)	25
Project Outputs	1,500 feet of breakwater; 5 acres marsh
Brief Description of Work	The Indian Point Marsh Area is one of the last natural marsh areas on the inland shorelines of East Corpus Christi Bay, and functions as a buffer zone protecting the Nueces Bay Causeway from storm impacts. This project focuses on the design of living shorelines (using breakwaters) on the southwest side of the marsh area. This will include new

Project Cost			
Total Project Cost	$	2,787,000.00	$ USD
Engineering and Design	$	250,000.00	$ USD
Construction and Management Cost	$	2,128,700.00	$ USD
Mobilization/Demobilization	$	275,000.00	$ USD
Subtotal	$	2,654,000.00	$ USD
Contingency	$	133,000.00	% of subtotal 5%
Annualized Operations and Maintenance	$	30,100.00	$ USD

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	1,500	LF
Marsh / Wetland Construction and Restoration	☑	5	acres
Oyster Reef Creation	☐		acres
Planting	☑	5	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	X
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation	X	Cost (% of total project cost)	5%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	50%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	4	Operator	6
Excavator	4	Laborer	12
Front-End Loader	0	TOTAL	35
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	5,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	4,200	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	2,500	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	1,500	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Marsh Fill	☑	8,000	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9158	Project Feasibility	
Project Name	Indian Point Marsh Area Living Shoreline	Feasibility Index (max. 75)	3.16
		Descriptor (low, med-low, med-high, high)	High
Region	3		
Subregion	49	Construction Contingency	
Start Year	2019	Contingency (%)	5%
Construction Duration (months)	5		
Longevity and Useful Life (years)	25		
Project Outputs	1,500 feet of breakwater; 5 acres		
Crew Size	35		
Brief Description of Work	The Indian Point Marsh Area is one of the last natural marsh areas on the inland shorelines of East Corpus Christi Bay, and functions as a buffer zone protecting the Nueces Bay Causeway from storm impacts. This project focuses on the design of living shorelines (using breakwaters) on the southwest side of the marsh area. This will include new geotechnical surveys, topo-bathymetric surveys, permitting, specs and bid package.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	1,500	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	5	acres	$ 200.00	$ 1,000.00
Planting	5	acres	$ 100.00	$ 500.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 80,000.00	$ 80,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Environmental Consulting Services	1	LS	$ 50,000.00	$ 50,000.00
Mobilization and Demobilization	1	LS	$ 275,000.00	$ 275,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	5,000	tons	$ 45.00	$ 225,000.00
Geotextile	4,200	SY	$ 2.90	$ 12,180.00
Plants	2,500	each	$ 25.00	$ 62,500.00
Stiff Clay Fill	1,500	CY	$ 25.00	$ 37,500.00
Marsh Fill	8,000	CY	$ 10.00	$ 80,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 200,000.00
Bulldozer	1	EA	$ 15,000.00	$ 75,000.00
Crane	2	EA	$ 15,000.00	$ 150,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 150,000.00
Dump Truck	4	EA	$ 15,000.00	$ 300,000.00
Excavator	4	EA	$ 15,000.00	$ 300,000.00
Tug Boat	3	EA	$ 30,000.00	$ 450,000.00

Engineering and Design (E&D)	$ 250,000.00
Construction Cost and Management	$ 2,128,700.00
Mobilization and Demobilization	$ 275,000.00
Subtotal	$ 2,654,000.00
Project Contingency	$ 133,000.00
Total Project Cost	$ 2,787,000.00

Annual Operations and Maintenance (O&M)	$ 30,100.00
Total O&M	$ 753,600.00

Project Data Template

Project Details	
Project ID	9161
Project Name	Living Shorelines and Wetland Restoration Near Smith Point and Rollover Pass
Region	1
Sub region	11
Start Year	2019
Construction Duration (months)	9
Longevity and Useful Life (years)	25
Project Outputs	4 miles breakwaters, 20 acres marsh restoration
Brief Description of Work	The project proposes wetland restoration & maintenance and shoreline protection near Smith Point and Rollover Pass to stabilize shorelines that experienced losses of wetland habitat. Living shorelines designed to include creation or enhancement of wetlands and oyster reefs would provide feeding and nesting sites for coastal birds.

Project Cost				
Total Project Cost	$ 8,820,000.00	$ USD		
Engineering and Design	$ 350,000.00	$ USD		
Construction and Management Cost	$ 6,968,100.00	$ USD		
Mobilization/Demobilization	$ 700,000.00	$ USD		
Subtotal	$ 8,018,000.00	$ USD		
Contingency	$ 802,000.00		% of subtotal	10%
Annualized Operations and Maintenance	$ 94,000.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	21,120	LF
Marsh / Wetland Construction and Restoration	☑	20	acres
Oyster Reef Creation	☐		acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☑	1	LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	GIWW maintenance

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers	X	Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	X

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	10
Navigation		Cost (% of total project cost)	4%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		10
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	4
Dump Truck	4	Operator	6
Excavator	4	Laborer	7
Front-End Loader	0	TOTAL	29
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	70,400	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	59,000	SY
Maintenance Dredged Material	☑	33,000	CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☑	3,000	CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	9161	Project Feasibility	
Project Name	Living Shorelines and Wetland Restoration Near Smith Point	Feasibility Index (max. 75)	2.9
		Descriptor (low, med-low, med-high, high)	Medium-High
Region	1		
Subregion	11	Construction Contingency	
Start Year	2019	Contingency (%)	10%
Construction Duration (months)	9		
Longevity and Useful Life (years)	25		
Project Outputs	4 miles breakwaters, 20 acres		
Crew Size	29		
Brief Description of Work	The project proposes wetland restoration & maintenance and shoreline protection near Smith Point and Rollover Pass to stabilize shorelines that experienced losses of wetland habitat. Living shorelines designed to include creation or enhancement of wetlands and oyster reefs would provide feeding and nesting sites for coastal birds.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	21,120	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	20	acres	$ 200.00	$ 4,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 10,000.00	$ 10,000.00
Soil Borings	1	LS	$ 30,000.00	$ 30,000.00
Pre and Post Construction Surveying	1	LS	$ 90,000.00	$ 90,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 300,000.00	$ 300,000.00
Environmental Consulting Services	1	LS	$ 50,000.00	$ 50,000.00
Mobilization and Demobilization	1	LS	$ 700,000.00	$ 700,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	70,400	tons	$ 45.00	$ 3,168,000.00
Geotextile	59,000	SY	$ 2.90	$ 171,100.00
Maintenance Dredged Material	33,000	CY	$ 15.00	$ 495,000.00
Stiff Clay Fill	3,000	CY	$ 25.00	$ 75,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 360,000.00
Bulldozer	1	EA	$ 15,000.00	$ 135,000.00
Crane	2	EA	$ 15,000.00	$ 270,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 270,000.00
Dump Truck	4	EA	$ 15,000.00	$ 540,000.00
Excavator	4	EA	$ 15,000.00	$ 540,000.00
Tug Boat	3	EA	$ 30,000.00	$ 810,000.00

Engineering and Design (E&D)	$ 350,000.00
Construction Cost and Management	$ 6,968,100.00
Mobilization and Demobilization	$ 700,000.00
Subtotal	$ 8,018,000.00
Project Contingency	$ 802,000.00
Total Project Cost	$ 8,820,000.00
Annual Operations and Maintenance (O&M)	$ 94,000.00
Total O&M	$ 2,349,600.00

Project Data Template

Project Details	
Project ID	9173
Project Name	Texas City Levee Erosion Control and Marsh and Oyster Reef Restoration
Region	1
Sub region	17
Start Year	2019
Construction Duration (months)	4
Longevity and Useful Life (years)	25
Project Outputs	6,500 feet of breakwater; 1 acre oyster reef
Brief Description of Work	This project would construct a 6,500-foot riprap breakwater along the Dickinson Bay shoreline to prevent further erosion and create inner tidal marshland behind the breakwater. Additionally, reinforce the existing 5,000-foot shell spit, protecting 130 acres of critical nesting and foraging marsh area and restore oyster habitat.

Project Cost			
Total Project Cost	$ 2,783,000.00	$ USD	
Engineering and Design	$ 150,000.00	$ USD	
Construction and Management Cost	$ 2,045,200.00	$ USD	
Mobilization/Demobilization	$ 225,000.00	$ USD	
Subtotal	$ 2,420,000.00	$ USD	
Contingency	$ 363,000.00	% of subtotal	15%
Annualized Operations and Maintenance	$ 28,100.00	$ USD	

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	6,500	LF
Marsh / Wetland Construction and Restoration	☐		acres
Oyster Reef Creation	☑	1	acres
Planting	☐		acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		Quantity	Units
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		Quantity	Units
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	
BUDM Supplier	N/A

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	
Chambers		Orange	
Galveston	X	Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	2%
Flood Risk			
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	25
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		5
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	100%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	0
Bulldozer	0	Deckhand	0
Crane	2	Mate	0
Dredge - Hydraulic	0	Engineer	2
Dredge - Mechanical	0	Supervisor	4
Dump Truck	3	Operator	6
Excavator	3	Laborer	6
Front-End Loader	0	TOTAL	18
Tug Boat	4		
TOTAL	16		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	22,000	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	18,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☐		each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☐		CY
Stiff Clay Fill	☐		CY
Other:	✓	Quantity	Units
Fill in as appropriate	☐		
Oyster Cultch	☑	1,500	CY
	☐		
	☐		

Detailed Project Cost

Project ID	9173	Project Feasibility	
Project Name	Texas City Levee Erosion Control and Marsh and Oyster Reef	Feasibility Index (max. 75)	2.86
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	1		
Subregion	17	Construction Contingency	
Start Year	2019	Contingency (%)	15%
Construction Duration (months)	4		
Longevity and Useful Life (years)	25		
Project Outputs	6,500 feet of breakwater; 1 acre		
Crew Size	18		
Brief Description of Work	This project would construct a 6,500-foot riprap breakwater along the Dickinson Bay shoreline to prevent further erosion and create inner tidal marshland behind the breakwater. Additionally, reinforce the existing 5,000-foot shell spit, protecting 130 acres of critical nesting and foraging marsh area and restore oyster habitat.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	6,500	LF	$ -	$ -
Oyster Reef Creation	1	acres	$ -	$ -
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 125,000.00	$ 125,000.00
Environmental Consulting Services	1	LS	$ 25,000.00	$ 25,000.00
Mobilization and Demobilization	1	LS	$ 225,000.00	$ 225,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	22,000	tons	$ 35.00	$ 770,000.00
Geotextile	18,000	SY	$ 2.90	$ 52,200.00
Oyster Cultch	1,500	CY	$ 32.00	$ 48,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 160,000.00
Crane	2	EA	$ 15,000.00	$ 120,000.00
Dump Truck	3	EA	$ 15,000.00	$ 180,000.00
Excavator	3	EA	$ 15,000.00	$ 180,000.00
Tug Boat	4	EA	$ 30,000.00	$ 480,000.00

Engineering and Design (E&D)	$ 150,000.00
Construction Cost and Management	$ 2,045,200.00
Mobilization and Demobilization	$ 225,000.00
Subtotal	$ 2,420,000.00
Project Contingency	$ 363,000.00
Total Project Cost	$ 2,783,000.00
Annual Operations and Maintenance (O&M)	$ 28,100.00
Total O&M	$ 703,500.00

Project Data Template

Project Details		
Project ID	10005	
Project Name	Restore Barrier Island Backside Marshes on Mustang Island	
Region	3	
Sub region	50	
Start Year	2019	
Construction Duration (months)	8	
Longevity and Useful Life (years)	15	
Project Outputs	100 acres of marsh; 2 miles of breakwaters	
Brief Description of Work	Restore the estuarine wetlands on the back side of Mustang Island by depositing non-beach quality sediments, planting, constructing rock breakwaters or other restoration techniques. Restoring these wetlands will provide a buffer on the back side of the island for stormwater runoff and storm surge.	

Project Cost				
Total Project Cost	$ 8,375,000.00	$ USD		
Engineering and Design	$ 220,000.00	$ USD		
Construction and Management Cost	$ 6,562,900.00	$ USD		
Mobilization/Demobilization	$ 500,000.00	$ USD		
Subtotal	$ 7,283,000.00	$ USD		
Contingency	$ 1,092,000.00		% of subtotal	15%
Annualized Operations and Maintenance	$ 86,000.00	$ USD		

Project Activities	✓	Quantity	Units
Construction		If known	
Beach Nourishment - Bay	☐		CY
Beach Nourishment - Gulf	☐		CY
Construction of New Non-Residential Structures	☐		each
Construction of New Residential Structures	☐		each
Dike / Levee Construction	☐		LF
Dredging	☐		CY
Dune Construction and Restoration	☐		CY
Earthwork / Grading	☐		CY
Island Creation	☐		acres
Marine Construction (e.g., groins, breakwaters)	☑	10,000	LF
Marsh / Wetland Construction and Restoration	☑	50	acres
Oyster Reef Creation	☐		acres
Planting	☑	50	acres
Roadway or Bridge Construction and Maintenance	☐		miles
Seeding or Hydro mulching	☐		acres
Utility Construction and Repair	☐		LF
Surveying		**Quantity**	**Units**
Acceptance Aerial Photograph	☑	1	LS
Soil Borings	☐		LS
Pre and Post Construction Surveying	☑	1	LS
Miscellaneous		**Quantity**	**Units**
Debris Removal	☐		LS
Engineering Services	☑	1	LS
Environmental Consulting Services	☑	1	LS
Equipment Repairs	☐		LS
Fuel	☐		LS
Mobilization and Demobilization	☑	1	LS
Supplies	☐		LS

Special Considerations	✓
Beneficial Use of Dredged Materials (BU or BUDM)	X
BUDM Supplier	TBD

Assumptions & Notes

County (check all that apply)			
Aransas		Kenedy	
Brazoria		Kleberg	
Calhoun		Matagorda	
Cameron		Nueces	X
Chambers		Orange	
Galveston		Refugio	
Harris		San Patricio	
Jackson		Victoria	
Jefferson		Willacy	

Impact Area	✓
Approximate populated area the completed project will impact.	
Large scale (occurs in multiple locations)	
Metropolitan (50,000+ people)	X
Micropolitan (10,000 to 50,000 people)	
Rural (<10,000 people)	

Sector	✓	Monitoring, Operations & Maintenance	
Emergency Management		Monitoring Freq. (yrs)	1
Environmental	X	Cost (% of total project cost)	1%
Flood Risk	X		
Hydropower		Maintenance Freq. (yrs)	5
Navigation		Cost (% of total project cost)	1%
Recreation			
Regulatory		Operation Duration (yrs)	15
Water Storage		Cost (% of total project cost)	1%

Site Visitors		
Approx. number of visitors per day		8
Local (within 30 mi.)	% of visitors	100%
Non-Local	% of visitors	0%
Boaters	% of visitors	75%
Multi-Day / Overnight	% of visitors	0%

Equipment	No.	Crew Size	No.
Barge	4	Captain	1
Bulldozer	1	Deckhand	5
Crane	2	Mate	3
Dredge - Hydraulic	1	Engineer	3
Dredge - Mechanical	0	Supervisor	5
Dump Truck	4	Operator	6
Excavator	4	Laborer	12
Front-End Loader	0	TOTAL	35
Tug Boat	3		
TOTAL	19		

Primary Project Materials	✓	Quantity	Units
2000-lb Class Stone	☐		tons
250-lb Class Stone	☑	35,200	tons
Bollards	☐		each
Cable Fence	☐		LF
Concrete	☐		CY
Geotextile	☑	29,000	SY
Maintenance Dredged Material	☐		CY
Pipeline	☐		LF
Plants	☑	25,000	each
Recycled Concrete	☐		CY
Sand Fence	☐		LF
Sand or Soil Fill	☐		CY
Seeding	☐		SY
Soft Clay Fill	☑	80,650	CY
Stiff Clay Fill	☑	13,600	CY
Other:	✓	**Quantity**	**Units**
Fill in as appropriate	☐		
	☐		
	☐		
	☐		

Detailed Project Cost

Project ID	10005	Project Feasibility	
Project Name	Restore Barrier Island Backside Marshes on Mustang Island	Feasibility Index (max. 75)	2.54
		Descriptor (low, med-low, med-high, high)	Medium-Low
Region	3		
Subregion	50	Construction Contingency	
Start Year	2019	Contingency (%)	15%
Construction Duration (months)	8		
Longevity and Useful Life (years)	15		
Project Outputs	100 acres of marsh; 2 miles of		
Crew Size	35		
Brief Description of Work	Restore the estuarine wetlands on the back side of Mustang Island by depositing non-beach quality sediments, planting, constructing rock breakwaters or other restoration techniques. Restoring these wetlands will provide a buffer on the back side of the island for stormwater runoff and storm surge.		

Detailed Project Activities Cost

Construction Line Items	Quantity	Units	Unit Cost - Labor	Extended Labor Cost
Marine Construction (e.g., groins, breakwaters)	10,000	LF	$ -	$ -
Marsh / Wetland Construction and Restoration	50	acres	$ 200.00	$ 10,000.00
Planting	50	acres	$ 100.00	$ 5,000.00
Surveying Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Acceptance Aerial Photograph	1	LS	$ 5,000.00	$ 5,000.00
Pre and Post Construction Surveying	1	LS	$ 100,000.00	$ 100,000.00
Miscellaneous Activities	**Quantity**	**Units**	**Unit Cost - Labor**	**Extended Labor Cost**
Engineering Services	1	LS	$ 200,000.00	$ 200,000.00
Environmental Consulting Services	1	LS	$ 20,000.00	$ 20,000.00
Mobilization and Demobilization	1	LS	$ 500,000.00	$ 500,000.00

Detailed Project Materials Cost

Project Material Line Items	Quantity	Units	Unit Cost - Materials	Extended Material Cost
250-lb Class Stone	35,200	tons	$ 45.00	$ 1,584,000.00
Geotextile	29,000	SY	$ 2.90	$ 84,100.00
Plants	25,000	each	$ 25.00	$ 625,000.00
Soft Clay Fill	80,650	CY	$ 15.00	$ 1,209,750.00
Stiff Clay Fill	13,600	CY	$ 25.00	$ 340,000.00

Detailed Equipment Cost

Construction Line Items	Quantity	Units	Unit Cost - Equipment, per Month	Extended Equipment Cost
Barge	4	EA	$ 10,000.00	$ 320,000.00
Bulldozer	1	EA	$ 15,000.00	$ 120,000.00
Crane	2	EA	$ 15,000.00	$ 240,000.00
Dredge - Hydraulic	1	EA	$ 30,000.00	$ 240,000.00
Dump Truck	4	EA	$ 15,000.00	$ 480,000.00
Excavator	4	EA	$ 15,000.00	$ 480,000.00
Tug Boat	3	EA	$ 30,000.00	$ 720,000.00

Engineering and Design (E&D)	$ 220,000.00
Construction Cost and Management	$ 6,562,900.00
Mobilization and Demobilization	$ 500,000.00
Subtotal	$ 7,283,000.00
Project Contingency	$ 1,092,000.00
Total Project Cost	$ 8,375,000.00
Annual Operations and Maintenance (O&M)	$ 86,000.00
Total O&M	$ 1,289,800.00

Appendix F. Economic and Benefits Assessments

RECONS Results

Beaumont MSA

Economic Impact Regions

Regional Impact Area:	Beaumont-Port Arthur, TX MSA
Regional Impact Area ID:	64
Counties included	Hardin/Jefferson/Orange/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Hardin	48199	897	52,588	19,732	$1,948
Jefferson	48245	988	246,761	91,097	$9,034
Orange	48361	380	84,651	32,173	$2,869
Total		**2,265**	**384,000**	**143,002**	**$13,851**

Impact Region Profile (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$749	$248	$377	13,635
Administrative and Waste Management Services	$661	$297	$393	8,984
Agriculture, Forestry, Fishing and Hunting	$208	$37	$69	2,344
Arts, Entertainment, and Recreation	$101	$25	$35	1,470
Construction	$3,346	$1,407	$1,546	22,426
Education	$621	$507	$575	11,374
Finance, Insurance, Real Estate, Rental and Leasing	$998	$268	$609	5,916

Government	$1,264	$917	$1,047	16,763
Health Care and Social Assistance	$1,743	$941	$1,096	21,535
Imputed Rents	$1,985	$278	$1,271	12,027
Information	$833	$124	$247	2,127
Management of Companies and Enterprises	$142	$61	$81	721
Manufacturing	$51,877	$2,391	$4,483	21,966
Mining	$495	$109	$252	1,362
Professional, Scientific, and Technical Services	$2,108	$1,047	$1,237	16,259
Retail Trade	$1,586	$699	$1,084	23,661
Transportation and Warehousing	$909	$310	$472	6,085
Utilities	$697	$145	$507	970
Wholesale Trade	$1,031	$390	$671	5,646
Total	**$71,354**	**$10,199**	**$16,054**	**195,272**

North Pleasure Island Barrier Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	14%	$1,510,530	96%	96%	98%
Heavy Construction Activities	86%	$9,278,970	20%	83%	100%
Total	**100%**	**$10,789,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$10,789,500	$10,789,500	$10,789,500
Direct Impact				
	Output	$3,265,332	$9,114,866	$10,765,321
	Job	41.20	81.81	93.91
	Labor Income	$1,952,235	$4,439,684	$5,155,581
	GRP	$2,041,801	$4,881,895	$5,694,615
Total Impact				
	Output	$5,420,944	$19,664,306	$31,132,334
	Job	57.03	148.73	211.83
	Labor Income	$2,641,426	$8,081,401	$11,761,679
	GRP	$3,288,512	$11,070,249	$16,879,415

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$1,450,181	29.62	$1,180,362	$1,160,500
36	Construction of other new nonresidential structures	$1,815,151	11.58	$771,873	$881,301
	Total Direct Effects	$3,265,332	41.20	$1,952,235	$2,041,801
	Secondary Effects	$2,155,612	15.83	$689,191	$1,246,712
	Total Effects	**$5,420,944**	**57.03**	**$2,641,426**	**$3,288,512**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$1,450,181	29.62	$1,180,362	$1,160,500
36	Construction of other new nonresidential structures	$7,664,685	52.19	$3,259,322	$3,721,395
	Total Direct Effects	$9,114,866	81.81	$4,439,684	$4,881,895
	Secondary Effects	$10,549,440	66.92	$3,641,717	$6,188,354
	Total Effects	**$19,664,306**	**148.73**	**$8,081,401**	**$11,070,249**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$1,486,351	30.51	$1,209,802	$1,189,444
36	Construction of other new nonresidential structures	$9,278,970	63.40	$3,945,779	$4,505,171
	Total Direct Effects	$10,765,321	93.91	$5,155,581	$5,694,615
	Secondary Effects	$20,367,013	117.92	$6,606,098	$11,184,800
	Total Effects	**$31,132,334**	**211.83**	**$11,761,679**	**$16,879,415**

Old River Cove Dredge Placement Island Restoration (Old River and Hickory Coves)

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	2%	$302,600	96%	96%	98%
Heavy Construction Activities	98%	$14,827,400	20%	83%	100%

Total	**100%**	**$15,130,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$15,130,000	$15,130,000	$15,130,000
Direct Impact				
	Output	$3,191,045	$12,538,351	$15,125,156
	Job	24.43	89.33	107.42
	Labor Income	$1,469,878	$5,444,717	$6,547,543
	GRP	$1,640,761	$6,179,111	$7,437,350
Total Impact				
	Output	$5,292,784	$27,293,446	$43,860,864
	Job	39.41	182.38	273.63
	Labor Income	$2,165,472	$10,585,411	$15,936,063
	GRP	$2,847,712	$14,825,560	$23,246,907

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$290,511	5.93	$236,458	$232,479
36	Construction of other new nonresidential structures	$2,900,534	18.50	$1,233,420	$1,408,282
	Total Direct Effects	$3,191,045	24.43	$1,469,878	$1,640,761
	Secondary Effects	$2,101,740	14.98	$695,593	$1,206,951
	Total Effects	**$5,292,784**	**39.41**	**$2,165,472**	**$2,847,712**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$290,511	5.93	$236,458	$232,479
36	Construction of other new nonresidential structures	$12,247,841	83.40	$5,208,258	$5,946,632
	Total Direct Effects	$12,538,351	89.33	$5,444,717	$6,179,111
	Secondary Effects	$14,755,095	93.05	$5,140,694	$8,646,449
	Total Effects	**$27,293,446**	**182.38**	**$10,585,411**	**$14,825,560**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$297,756	6.11	$242,356	$238,278
36	Construction of other new nonresidential structures	$14,827,400	101.31	$6,305,187	$7,199,072
	Total Direct Effects	$15,125,156	107.42	$6,547,543	$7,437,350
	Secondary Effects	$28,735,708	166.21	$9,388,519	$15,809,558
	Total Effects	**$43,860,864**	**273.63**	**$15,936,063**	**$23,246,907**

Sabine-Neches Waterway Barrier Island Habitat Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	9%	$324,666	96%	96%	98%
Heavy Construction Activities	91%	$3,282,734	20%	83%	100%
Total	**100%**	**$3,607,400**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,607,400	$3,607,400	$3,607,400
Direct Impact				
	Output	$953,863	$3,023,324	$3,602,203
	Job	10.46	24.83	28.99
	Labor Income	$526,776	$1,406,791	$1,655,975
	GRP	$561,221	$1,565,995	$1,849,502
Total Impact				
	Output	$1,583,076	$6,546,659	$10,429,194
	Job	15.04	47.13	68.50
	Labor Income	$730,295	$2,627,749	$3,877,086
	GRP	$924,276	$3,631,911	$5,601,510

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$311,695	6.37	$253,701	$249,432
36	Construction of other new nonresidential structures	$642,168	4.10	$273,075	$311,789
	Total Direct Effects	$953,863	10.46	$526,776	$561,221
	Secondary Effects	$629,213	4.58	$203,519	$363,055
	Total Effects	**$1,583,076**	**15.04**	**$730,295**	**$924,276**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$311,695	6.37	$253,701	$249,432
36	Construction of other new nonresidential structures	$2,711,629	18.46	$1,153,090	$1,316,563
	Total Direct Effects	$3,023,324	24.83	$1,406,791	$1,565,995
	Secondary Effects	$3,523,335	22.30	$1,220,958	$2,065,916
	Total Effects	**$6,546,659**	**47.13**	**$2,627,749**	**$3,631,911**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$319,469	6.56	$260,029	$255,653
36	Construction of other new nonresidential structures	$3,282,734	22.43	$1,395,946	$1,593,849
	Total Direct Effects	$3,602,203	28.99	$1,655,975	$1,849,502
	Secondary Effects	$6,826,991	39.51	$2,221,111	$3,752,007
	Total Effects	**$10,429,194**	**68.50**	**$3,877,086**	**$5,601,510**

Willow Lake Shoreline Stabilization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	5%	$328,365	96%	96%	98%
Heavy Construction Activities	95%	$6,238,935	20%	83%	100%
Total	**100%**	**$6,567,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$6,567,300	$6,567,300	$6,567,300
Direct Impact				
	Output	$1,535,706	$5,468,778	$6,562,044
	Job	14.22	41.53	49.26
	Labor Income	$775,579	$2,448,074	$2,916,029
	GRP	$844,838	$2,754,442	$3,287,724
Total Impact				
	Output	$2,547,931	$11,877,501	$19,015,994
	Job	21.51	82.01	121.31
	Labor Income	$1,106,898	$4,675,750	$6,977,644
	GRP	$1,427,463	$6,510,913	$10,136,402

Table 5: Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$315,246	6.44	$256,592	$252,274
36	Construction of other new nonresidential structures	$1,220,460	7.78	$518,987	$592,564
	Total Direct Effects	$1,535,706	14.22	$775,579	$844,838
	Secondary Effects	$1,012,225	7.29	$331,319	$582,626
	Total Effects	**$2,547,931**	**21.51**	**$1,106,898**	**$1,427,463**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$315,246	6.44	$256,592	$252,274
36	Construction of other new nonresidential structures	$5,153,532	35.09	$2,191,482	$2,502,168
	Total Direct Effects	$5,468,778	41.53	$2,448,074	$2,754,442
	Secondary Effects	$6,408,722	40.47	$2,227,676	$3,756,470
	Total Effects	**$11,877,501**	**82.01**	**$4,675,750**	**$6,510,913**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$323,109	6.63	$262,992	$258,566
36	Construction of other new nonresidential structures	$6,238,935	42.63	$2,653,038	$3,029,158
	Total Direct Effects	$6,562,044	49.26	$2,916,029	$3,287,724
	Secondary Effects	$12,453,950	72.05	$4,061,614	$6,848,678
	Total Effects	**$19,015,994**	**121.31**	**$6,977,644**	**$10,136,402**

Brownsville MSA

Impact Region Definition (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Cameron	48061	945	408,253	119,722	$8,874
Total		**945**	**408,253**	**119,722**	**$8,874**

Impact Region Profile (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$589	$187	$289	11,182
Administrative and Waste Management Services	$430	$196	$255	7,996
Agriculture, Forestry, Fishing and Hunting	$250	$60	$99	3,558
Arts, Entertainment, and Recreation	$132	$31	$47	1,782
Construction	$802	$247	$271	6,945
Education	$741	$629	$712	13,730
Finance, Insurance, Real Estate, Rental and Leasing	$881	$213	$588	5,040
Government	$1,513	$1,018	$1,182	18,799

Health Care and Social Assistance	$1,815	$1,006	$1,147	32,569
Imputed Rents	$1,308	$176	$788	9,588
Information	$1,015	$100	$187	2,039
Management of Companies and Enterprises	$33	$12	$16	220
Manufacturing	$3,233	$381	$501	7,217
Mining	$29	$6	$17	59
Professional, Scientific, and Technical Services	$482	$220	$267	4,436
Retail Trade	$1,069	$446	$716	18,691
Transportation and Warehousing	$565	$237	$343	4,715
Utilities	$120	$24	$76	293
Wholesale Trade	$394	$144	$248	3,308
Total	**$15,401**	**$5,334**	**$7,749**	**152,166**

Bahia Grande Hydrologic Restoration

Economic Impact Regions

Regional Impact Area:	Brownsville-Harlingen, TX MSA
Regional Impact Area ID:	75
Counties included	Cameron/
State Impact Area:	Texas
National Impact:	Yes

Input Assumptions (Spending and LPCs)

Category	**Spending (%)**	**Spending Amount**	**Local LPC (%)**	**State LPC (%)**	**National LPC (%)**
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$5,208,500	85%	85%	100%
Total	**100%**	**$5,208,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	**Impact Areas**	**Regional**	**State**	**National**
Total Spending		$5,208,500	$5,208,500	$5,208,500
Direct Impact				
	Output	$4,452,194	$4,452,194	$5,208,500
	Job	38.55	38.55	45.10
	Labor Income	$977,853	$977,853	$1,260,866
	GRP	$1,342,272	$1,342,272	$1,687,830
Total Impact				
	Output	$7,561,115	$9,706,251	$15,110,818

Job	61.36	71.65	102.36
Labor Income	$1,808,524	$2,811,181	$4,500,026
GRP	$2,936,547	$4,420,603	$7,137,453

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,452,194	38.55	$977,853	$1,342,272
	Total Direct Effects	$4,452,194	38.55	$977,853	$1,342,272
	Secondary Effects	$3,108,922	22.82	$830,671	$1,594,275
	Total Effects	**$7,561,115**	**61.36**	**$1,808,524**	**$2,936,547**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,452,194	38.55	$977,853	$1,342,272
	Total Direct Effects	$4,452,194	38.55	$977,853	$1,342,272
	Secondary Effects	$5,254,057	33.10	$1,833,328	$3,078,331
	Total Effects	**$9,706,251**	**71.65**	**$2,811,181**	**$4,420,603**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,208,500	45.10	$1,260,866	$1,687,830
	Total Direct Effects	$5,208,500	45.10	$1,260,866	$1,687,830
	Secondary Effects	$9,902,318	57.26	$3,239,160	$5,449,623
	Total Effects	**$15,110,818**	**102.36**	**$4,500,026**	**$7,137,453**

Bahia Grande Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$5,370,500	85%	85%	100%
Total	**100%**	**$5,370,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,370,500	$5,370,500	$5,370,500
Direct Impact				
	Output	$4,590,670	$4,590,670	$5,370,500
	Job	39.75	39.75	46.50
	Labor Income	$1,008,267	$1,008,267	$1,300,083
	GRP	$1,384,021	$1,384,021	$1,740,326
Total Impact				
	Output	$7,796,289	$10,008,144	$15,580,810
	Job	63.27	73.88	105.55
	Labor Income	$1,864,774	$2,898,617	$4,639,990
	GRP	$3,027,883	$4,558,097	$7,359,449

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,590,670	39.75	$1,008,267	$1,384,021
	Total Direct Effects	$4,590,670	39.75	$1,008,267	$1,384,021
	Secondary Effects	$3,205,618	23.53	$856,507	$1,643,862
	Total Effects	**$7,796,289**	**63.27**	**$1,864,774**	**$3,027,883**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,590,670	39.75	$1,008,267	$1,384,021
	Total Direct Effects	$4,590,670	39.75	$1,008,267	$1,384,021
	Secondary Effects	$5,417,474	34.13	$1,890,350	$3,174,076
	Total Effects	**$10,008,144**	**73.88**	**$2,898,617**	**$4,558,097**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,370,500	46.50	$1,300,083	$1,740,326
	Total Direct Effects	$5,370,500	46.50	$1,300,083	$1,740,326
	Secondary Effects	$10,210,310	59.05	$3,339,908	$5,619,122
	Total Effects	**$15,580,810**	**105.55**	**$4,639,990**	**$7,359,449**

Bird Island and Heron Island Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$7,014,900	85%	85%	100%
Total	**100%**	**$7,014,900**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,014,900	$7,014,900	$7,014,900
Direct Impact				
	Output	$5,996,293	$5,996,293	$7,014,900
	Job	51.92	51.92	60.74
	Labor Income	$1,316,990	$1,316,990	$1,698,156
	GRP	$1,807,796	$1,807,796	$2,273,199
Total Impact				
	Output	$10,183,444	$13,072,550	$20,351,518
	Job	82.65	96.50	137.86
	Labor Income	$2,435,752	$3,786,148	$6,060,714

GRP	$3,954,994	$5,953,747	$9,612,848

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,996,293	51.92	$1,316,990	$1,807,796
	Total Direct Effects	$5,996,293	51.92	$1,316,990	$1,807,796
	Secondary Effects	$4,187,151	30.73	$1,118,762	$2,147,198
	Total Effects	**$10,183,444**	**82.65**	**$2,435,752**	**$3,954,994**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,996,293	51.92	$1,316,990	$1,807,796
	Total Direct Effects	$5,996,293	51.92	$1,316,990	$1,807,796
	Secondary Effects	$7,076,257	44.58	$2,469,158	$4,145,950
	Total Effects	**$13,072,550**	**96.50**	**$3,786,148**	**$5,953,747**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,014,900	60.74	$1,698,156	$2,273,199
	Total Direct Effects	$7,014,900	60.74	$1,698,156	$2,273,199
	Secondary Effects	$13,336,618	77.12	$4,362,558	$7,339,648
	Total Effects	**$20,351,518**	**137.86**	**$6,060,714**	**$9,612,848**

City of South Padre Island Gulf Shoreline Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$74,090,000	85%	85%	100%
Total	**100%**	**$74,090,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$74,090,000	$74,090,000	$74,090,000
Direct Impact				
	Output	$63,331,673	$63,331,673	$74,090,000
	Job	548.36	548.36	641.51
	Labor Income	$13,909,787	$13,909,787	$17,935,595
	GRP	$19,093,589	$19,093,589	$24,009,084
Total Impact				
	Output	$107,555,539	$138,069,718	$214,948,745
	Job	872.90	1,019.20	1,456.09
	Labor Income	$25,725,936	$39,988,554	$64,012,077
	GRP	$41,771,869	$62,882,306	$101,529,014

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$63,331,673	548.36	$13,909,787	$19,093,589
	Total Direct Effects	$63,331,673	548.36	$13,909,787	$19,093,589
	Secondary Effects	$44,223,866	324.54	$11,816,149	$22,678,280
	Total Effects	**$107,555,539**	**872.90**	**$25,725,936**	**$41,771,869**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$63,331,673	548.36	$13,909,787	$19,093,589

	Total Direct Effects	$63,331,673	548.36	$13,909,787	$19,093,589
	Secondary Effects	$74,738,045	470.85	$26,078,767	$43,788,717
	Total Effects	**$138,069,718**	**1,019.20**	**$39,988,554**	**$62,882,306**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$74,090,000	641.51	$17,935,595	$24,009,084
	Total Direct Effects	$74,090,000	641.51	$17,935,595	$24,009,084
	Secondary Effects	$140,858,745	814.58	$46,076,482	$77,519,930
	Total Effects	**$214,948,745**	**1,456.09**	**$64,012,077**	**$101,529,014**

Corpus Christi MSA

Economic Impact Regions

Regional Impact Area:	Corpus Christi, TX MSA
Regional Impact Area ID:	94
Counties included	Aransas/Nueces/San Patricio/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Aransas	48007	243	25,862	10,615	$951
Nueces	48355	844	325,578	117,349	$12,005
San Patricio	48409	705	70,499	23,745	$2,256
Total		**1,791**	**421,939**	**151,709**	**$15,212**

Impact Region Profile (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$1,037	$333	$513	19,298
Administrative and Waste Management Services	$820	$388	$497	15,242
Agriculture, Forestry, Fishing and Hunting	$334	$70	$150	3,965
Arts, Entertainment, and Recreation	$211	$55	$80	2,852
Construction	$3,566	$1,393	$1,530	25,716
Education	$785	$649	$737	14,711
Finance, Insurance, Real Estate, Rental and Leasing	$1,542	$400	$926	8,231
Government	$2,237	$1,544	$1,932	23,550
Health Care and Social Assistance	$2,174	$1,176	$1,360	26,859
Imputed Rents	$2,206	$316	$1,415	13,301
Information	$954	$152	$286	2,688
Management of Companies and Enterprises	$105	$49	$65	440
Manufacturing	$25,955	$1,066	$1,647	10,852
Mining	$3,497	$712	$2,046	5,200
Professional, Scientific, and Technical Services	$2,058	$796	$1,147	13,354
Retail Trade	$1,724	$731	$1,172	27,832
Transportation and Warehousing	$808	$332	$465	5,490
Utilities	$510	$98	$320	812
Wholesale Trade	$1,318	$502	$858	7,237
Total	**$51,842**	**$10,761**	**$17,143**	**227,631**

Causeway Island Rookery Habitat Protection

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,529,300	$2,529,300	$2,529,300
Direct Impact				
	Output	$2,264,478	$2,264,478	$2,521,608
	Job	23.95	23.95	25.77
	Labor Income	$1,080,277	$1,080,277	$1,184,234
	GRP	$1,184,938	$1,184,938	$1,304,871

Total Impact				
	Output	$4,115,905	$4,869,611	$7,283,883
	Job	37.39	40.51	53.36
	Labor Income	$1,678,898	$1,976,529	$2,724,154
	GRP	$2,274,319	$2,713,702	$3,918,115

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$470,575	12.02	$361,065	$353,003
36	Construction of other new nonresidential structures	$1,793,903	11.92	$719,212	$831,935
	Total Direct Effects	$2,264,478	23.95	$1,080,277	$1,184,938
	Secondary Effects	$1,851,427	13.45	$598,622	$1,089,381
	Total Effects	**$4,115,905**	**37.39**	**$1,678,898**	**$2,274,319**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$470,575	12.02	$361,065	$353,003
36	Construction of other new nonresidential structures	$1,793,903	11.92	$719,212	$831,935
	Total Direct Effects	$2,264,478	23.95	$1,080,277	$1,184,938
	Secondary Effects	$2,605,132	16.56	$896,252	$1,528,764
	Total Effects	**$4,869,611**	**40.51**	**$1,976,529**	**$2,713,702**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$472,875	12.08	$362,856	$354,757
36	Construction of other new nonresidential structures	$2,048,733	13.69	$821,378	$950,114
	Total Direct Effects	$2,521,608	25.77	$1,184,234	$1,304,871
	Secondary Effects	$4,762,275	27.58	$1,539,920	$2,613,244
	Total Effects	**$7,283,883**	**53.36**	**$2,724,154**	**$3,918,115**

Dagger Island Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$1,938,300	88%	88%	100%
Total	**100%**	**$1,938,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,938,300	$1,938,300	$1,938,300
Direct Impact				
	Output	$1,697,206	$1,697,206	$1,938,300
	Job	11.28	11.28	12.96
	Labor Income	$680,444	$680,444	$777,103
	GRP	$787,091	$787,091	$898,900
Total Impact				
	Output	$3,109,647	$3,700,088	$5,623,366
	Job	21.40	23.90	34.27
	Labor Income	$1,141,435	$1,379,321	$1,982,530
	GRP	$1,611,569	$1,960,571	$2,926,932

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,697,206	11.28	$680,444	$787,091
	Total Direct Effects	$1,697,206	11.28	$680,444	$787,091
	Secondary Effects	$1,412,441	10.12	$460,991	$824,478
	Total Effects	**$3,109,647**	**21.40**	**$1,141,435**	**$1,611,569**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,697,206	11.28	$680,444	$787,091
	Total Direct Effects	$1,697,206	11.28	$680,444	$787,091
	Secondary Effects	$2,002,882	12.62	$698,877	$1,173,480
	Total Effects	**$3,700,088**	**23.90**	**$1,379,321**	**$1,960,571**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,938,300	12.96	$777,103	$898,900
	Total Direct Effects	$1,938,300	12.96	$777,103	$898,900
	Secondary Effects	$3,685,066	21.31	$1,205,426	$2,028,032
	Total Effects	**$5,623,366**	**34.27**	**$1,982,530**	**$2,926,932**

Flour Bluff Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$3,368,100	88%	88%	100%
Total	**100%**	**$3,368,100**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,368,100	$3,368,100	$3,368,100
Direct Impact				
	Output	$2,949,162	$2,949,162	$3,368,100
	Job	19.60	19.60	22.51
	Labor Income	$1,182,378	$1,182,378	$1,350,339
	GRP	$1,367,694	$1,367,694	$1,561,979
Total Impact				
	Output	$5,403,499	$6,429,483	$9,771,479
	Job	37.19	41.53	59.54
	Labor Income	$1,983,422	$2,396,786	$3,444,956

GRP	$2,800,354	$3,406,800	$5,086,003

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,949,162	19.60	$1,182,378	$1,367,694
	Total Direct Effects	$2,949,162	19.60	$1,182,378	$1,367,694
	Secondary Effects	$2,454,337	17.59	$801,043	$1,432,660
	Total Effects	**$5,403,499**	**37.19**	**$1,983,422**	**$2,800,354**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,949,162	19.60	$1,182,378	$1,367,694
	Total Direct Effects	$2,949,162	19.60	$1,182,378	$1,367,694
	Secondary Effects	$3,480,321	21.93	$1,214,408	$2,039,106
	Total Effects	**$6,429,483**	**41.53**	**$2,396,786**	**$3,406,800**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,368,100	22.51	$1,350,339	$1,561,979
	Total Direct Effects	$3,368,100	22.51	$1,350,339	$1,561,979
	Secondary Effects	$6,403,379	37.03	$2,094,617	$3,524,023
	Total Effects	**$9,771,479**	**59.54**	**$3,444,956**	**$5,086,003**

Fulton Beach Road Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$6,548,500	88%	88%	100%
Total	**100%**	**$6,548,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$6,548,500	$6,548,500	$6,548,500
Direct Impact				
	Output	$5,733,970	$5,733,970	$6,548,500
	Job	38.11	38.11	43.77
	Labor Income	$2,298,864	$2,298,864	$2,625,425
	GRP	$2,659,168	$2,659,168	$3,036,912
Total Impact				
	Output	$10,505,868	$12,500,659	$18,998,405
	Job	72.31	80.74	115.77
	Labor Income	$3,856,310	$4,660,003	$6,697,930
	GRP	$5,444,648	$6,623,744	$9,888,569

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,733,970	38.11	$2,298,864	$2,659,168
	Total Direct Effects	$5,733,970	38.11	$2,298,864	$2,659,168
	Secondary Effects	$4,771,898	34.20	$1,557,446	$2,785,480
	Total Effects	**$10,505,868**	**72.31**	**$3,856,310**	**$5,444,648**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,733,970	38.11	$2,298,864	$2,659,168

	Total Direct Effects	$5,733,970	38.11	$2,298,864	$2,659,168
	Secondary Effects	$6,766,689	42.63	$2,361,139	$3,964,576
	Total Effects	**$12,500,659**	**80.74**	**$4,660,003**	**$6,623,744**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,548,500	43.77	$2,625,425	$3,036,912
	Total Direct Effects	$6,548,500	43.77	$2,625,425	$3,036,912
	Secondary Effects	$12,449,905	72.00	$4,072,504	$6,851,657
	Total Effects	**$18,998,405**	**115.77**	**$6,697,930**	**$9,888,569**

Goose Island State Park Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$1,341,000	88%	88%	100%
Total	**100%**	**$1,341,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,341,000	$1,341,000	$1,341,000
Direct Impact				
	Output	$1,174,201	$1,174,201	$1,341,000
	Job	7.80	7.80	8.96
	Labor Income	$470,761	$470,761	$537,634
	GRP	$544,544	$544,544	$621,898
Total Impact				
	Output	$2,151,389	$2,559,881	$3,890,488
	Job	14.81	16.53	23.71
	Labor Income	$789,694	$954,274	$1,371,600
	GRP	$1,114,954	$1,356,408	$2,024,978

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,174,201	7.80	$470,761	$544,544
	Total Direct Effects	$1,174,201	7.80	$470,761	$544,544
	Secondary Effects	$977,188	7.00	$318,933	$570,410
	Total Effects	**$2,151,389**	**14.81**	**$789,694**	**$1,114,954**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,174,201	7.80	$470,761	$544,544
	Total Direct Effects	$1,174,201	7.80	$470,761	$544,544
	Secondary Effects	$1,385,681	8.73	$483,513	$811,865
	Total Effects	**$2,559,881**	**16.53**	**$954,274**	**$1,356,408**

Table 7: Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,341,000	8.96	$537,634	$621,898
	Total Direct Effects	$1,341,000	8.96	$537,634	$621,898
	Secondary Effects	$2,549,488	14.74	$833,966	$1,403,080
	Total Effects	**$3,890,488**	**23.71**	**$1,371,600**	**$2,024,978**

Indian Point Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%

Heavy Construction Activities	100%	$1,800,600	88%	88%	100%
Total	**100%**	**$1,800,600**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts / Impact Areas		Regional	State	National
Total Spending		$1,800,600	$1,800,600	$1,800,600
Direct Impact				
	Output	$1,576,634	$1,576,634	$1,800,600
	Job	10.48	10.48	12.04
	Labor Income	$632,104	$632,104	$721,897
	GRP	$731,175	$731,175	$835,041
Total Impact				
	Output	$2,888,733	$3,437,228	$5,223,872
	Job	19.88	22.20	31.83
	Labor Income	$1,060,345	$1,281,332	$1,841,688
	GRP	$1,497,081	$1,821,289	$2,718,998

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,576,634	10.48	$632,104	$731,175
	Total Direct Effects	$1,576,634	10.48	$632,104	$731,175
	Secondary Effects	$1,312,099	9.40	$428,241	$765,906
	Total Effects	**$2,888,733**	**19.88**	**$1,060,345**	**$1,497,081**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,576,634	10.48	$632,104	$731,175
	Total Direct Effects	$1,576,634	10.48	$632,104	$731,175
	Secondary Effects	$1,860,594	11.72	$649,228	$1,090,114
	Total Effects	**$3,437,228**	**22.20**	**$1,281,332**	**$1,821,289**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,800,600	12.04	$721,897	$835,041
	Total Direct Effects	$1,800,600	12.04	$721,897	$835,041
	Secondary Effects	$3,423,272	19.80	$1,119,791	$1,883,957
	Total Effects	**$5,223,872**	**31.83**	**$1,841,688**	**$2,718,998**

Nueces River Delta Shoreline Stabilization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$3,625,300	88%	88%	100%
Total	**100%**	**$3,625,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,625,300	$3,625,300	$3,625,300
Direct Impact				
	Output	$3,174,370	$3,174,370	$3,625,300
	Job	21.10	21.10	24.23
	Labor Income	$1,272,669	$1,272,669	$1,453,456
	GRP	$1,472,136	$1,472,136	$1,681,258
Total Impact				
	Output	$5,816,129	$6,920,461	$10,517,663
	Job	40.03	44.70	64.09
	Labor Income	$2,134,883	$2,579,813	$3,708,025
	GRP	$3,014,199	$3,666,955	$5,474,388

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,174,370	21.10	$1,272,669	$1,472,136
	Total Direct Effects	$3,174,370	21.10	$1,272,669	$1,472,136
	Secondary Effects	$2,641,759	18.93	$862,214	$1,542,063
	Total Effects	**$5,816,129**	**40.03**	**$2,134,883**	**$3,014,199**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,174,370	21.10	$1,272,669	$1,472,136
	Total Direct Effects	$3,174,370	21.10	$1,272,669	$1,472,136
	Secondary Effects	$3,746,091	23.60	$1,307,145	$2,194,820
	Total Effects	**$6,920,461**	**44.70**	**$2,579,813**	**$3,666,955**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,625,300	24.23	$1,453,456	$1,681,258
	Total Direct Effects	$3,625,300	24.23	$1,453,456	$1,681,258
	Secondary Effects	$6,892,363	39.86	$2,254,570	$3,793,130
	Total Effects	**$10,517,663**	**64.09**	**$3,708,025**	**$5,474,388**

Shamrock Island Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$7,217,300	88%	88%	100%
Total	**100%**	**$7,217,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,217,300	$7,217,300	$7,217,300
Direct Impact				
	Output	$6,319,582	$6,319,582	$7,217,300
	Job	42.01	42.01	48.24
	Labor Income	$2,533,648	$2,533,648	$2,893,561
	GRP	$2,930,750	$2,930,750	$3,347,072
Total Impact				
	Output	$11,578,835	$13,777,355	$20,938,717
	Job	79.70	88.99	127.59
	Labor Income	$4,250,156	$5,135,930	$7,381,991
	GRP	$6,000,712	$7,300,228	$10,898,491

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,319,582	42.01	$2,533,648	$2,930,750
	Total Direct Effects	$6,319,582	42.01	$2,533,648	$2,930,750
	Secondary Effects	$5,259,253	37.69	$1,716,508	$3,069,962
	Total Effects	**$11,578,835**	**79.70**	**$4,250,156**	**$6,000,712**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,319,582	42.01	$2,533,648	$2,930,750
	Total Direct Effects	$6,319,582	42.01	$2,533,648	$2,930,750
	Secondary Effects	$7,457,772	46.98	$2,602,283	$4,369,479
	Total Effects	**$13,777,355**	**88.99**	**$5,135,930**	**$7,300,228**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,217,300	48.24	$2,893,561	$3,347,072
	Total Direct Effects	$7,217,300	48.24	$2,893,561	$3,347,072
	Secondary Effects	$13,721,417	79.35	$4,488,430	$7,551,418
	Total Effects	**$20,938,717**	**127.59**	**$7,381,991**	**$10,898,491**

Houston MSA

Economic Impact Regions

Regional Impact Area:	Houston Sugar Land Baytown TX MSA
Regional Impact Area ID:	19
Counties included	Austin/Brazoria/Chambers/Fort Bend/Galveston/Harris/Liberty/Montgomery/San Jacinto/Waller/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Austin	48015	657	27,467	10,062	$1,061
Brazoria	48039	1,442	311,212	106,478	$11,602
Chambers	48071	629	34,498	12,175	$1,422
Fort Bend	48157	886	547,876	163,740	$25,503
Galveston	48167	408	297,079	112,536	$11,937
Harris	48201	1,774	4,091,773	1,425,897	$196,779
Liberty	48291	1,176	77,344	25,224	$2,556
Montgomery	48339	1,077	452,286	156,734	$20,366
San Jacinto	48407	628	25,788	10,091	$783
Waller	48473	519	38,727	12,653	$1,235

Total	9,195	5,904,050	2,035,590	$273,247

Impact Region Profile (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$13,236	$4,560	$7,005	216,742
Administrative and Waste Management Services	$19,024	$9,951	$12,493	298,005
Agriculture, Forestry, Fishing and Hunting	$1,092	$272	$394	17,834
Arts, Entertainment, and Recreation	$3,725	$1,342	$1,812	49,670
Construction	$46,428	$18,719	$20,539	324,726
Education	$15,369	$12,441	$14,035	232,139
Finance, Insurance, Real Estate, Rental and Leasing	$60,950	$16,224	$39,111	284,513
Government	$14,071	$10,846	$12,346	178,925
Health Care and Social Assistance	$24,457	$13,352	$15,725	259,514
Imputed Rents	$41,885	$5,351	$27,360	193,605
Information	$18,119	$3,659	$7,479	50,197
Management of Companies and Enterprises	$6,314	$2,651	$3,597	32,227
Manufacturing	$297,676	$30,969	$57,878	246,808
Mining	$146,320	$32,033	$91,390	128,560
Professional, Scientific, and Technical Services	$61,245	$28,206	$37,002	343,983
Retail Trade	$23,550	$10,251	$16,149	336,109
Transportation and Warehousing	$33,952	$12,636	$17,865	167,737
Utilities	$44,650	$9,551	$32,358	17,197
Wholesale Trade	$37,816	$14,498	$24,901	164,951
Total	**$909,877**	**$237,514**	**$439,440**	**3,543,441**

Boggy Cut GIWW Stabilization

**NOTE: 24 month construction. Total cost ($9.3M) divided by 2 for annual equivalent. Annual cost divided in 2 – half in Galveston County, other half in Matagorda County.

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$2,317,500	83%	83%	100%

Total		**100%**	**$2,317,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,317,500	$2,317,500	$2,317,500
Direct Impact				
	Output	$1,914,442	$1,914,442	$2,317,500
	Job	12.01	12.01	14.81
	Labor Income	$831,903	$831,903	$1,007,048
	GRP	$945,449	$945,449	$1,144,500
Total Impact				
	Output	$3,884,954	$4,173,684	$6,723,495
	Job	23.75	26.24	40.29
	Labor Income	$1,571,742	$1,620,233	$2,448,299
	GRP	$2,152,365	$2,269,130	$3,569,286

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,914,442	12.01	$831,903	$945,449
	Total Direct Effects	$1,914,442	12.01	$831,903	$945,449
	Secondary Effects	$1,970,512	11.74	$739,839	$1,206,916
	Total Effects	**$3,884,954**	**23.75**	**$1,571,742**	**$2,152,365**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,914,442	12.01	$831,903	$945,449
	Total Direct Effects	$1,914,442	12.01	$831,903	$945,449
	Secondary Effects	$2,259,243	14.23	$788,330	$1,323,681
	Total Effects	**$4,173,684**	**26.24**	**$1,620,233**	**$2,269,130**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,317,500	14.81	$1,007,048	$1,144,500
	Total Direct Effects	$2,317,500	14.81	$1,007,048	$1,144,500
	Secondary Effects	$4,405,995	25.48	$1,441,250	$2,424,787
	Total Effects	**$6,723,495**	**40.29**	**$2,448,299**	**$3,569,286**

Dickinson Bay Rookery Island Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$3,191,300	83%	83%	100%
Total	**100%**	**$3,191,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,191,300	$3,191,300	$3,191,300
Direct Impact				
	Output	$2,636,271	$2,636,271	$3,191,300
	Job	16.54	16.54	20.39
	Labor Income	$1,145,567	$1,145,567	$1,386,750
	GRP	$1,301,925	$1,301,925	$1,576,027
Total Impact				
	Output	$5,349,753	$5,747,348	$9,258,549
	Job	32.70	36.14	55.48
	Labor Income	$2,164,358	$2,231,133	$3,371,416
	GRP	$2,963,902	$3,124,693	$4,915,065

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,636,271	16.54	$1,145,567	$1,301,925
	Total Direct Effects	$2,636,271	16.54	$1,145,567	$1,301,925
	Secondary Effects	$2,713,482	16.16	$1,018,791	$1,661,976
	Total Effects	**$5,349,753**	**32.70**	**$2,164,358**	**$2,963,902**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,636,271	16.54	$1,145,567	$1,301,925
	Total Direct Effects	$2,636,271	16.54	$1,145,567	$1,301,925
	Secondary Effects	$3,111,077	19.60	$1,085,566	$1,822,767
	Total Effects	**$5,747,348**	**36.14**	**$2,231,133**	**$3,124,693**

Table 7: Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,191,300	20.39	$1,386,750	$1,576,027
	Total Direct Effects	$3,191,300	20.39	$1,386,750	$1,576,027
	Secondary Effects	$6,067,249	35.09	$1,984,666	$3,339,038
	Total Effects	**$9,258,549**	**55.48**	**$3,371,416**	**$4,915,065**

Galveston Island West of Seawall to 8 Mile Road Beach Nourishment

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$10,463,300	83%	83%	100%
Total	**100%**	**$10,463,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$10,463,300	$10,463,300	$10,463,300
Direct Impact				
	Output	$8,643,528	$8,643,528	$10,463,300
	Job	54.23	54.23	66.87
	Labor Income	$3,755,965	$3,755,965	$4,546,730
	GRP	$4,268,616	$4,268,616	$5,167,312
Total Impact				
	Output	$17,540,210	$18,843,801	$30,355,962
	Job	107.22	118.49	181.90
	Labor Income	$7,096,271	$7,315,204	$11,053,844
	GRP	$9,717,730	$10,244,914	$16,115,001

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$8,643,528	54.23	$3,755,965	$4,268,616
	Total Direct Effects	$8,643,528	54.23	$3,755,965	$4,268,616
	Secondary Effects	$8,896,682	52.99	$3,340,306	$5,449,114
	Total Effects	**$17,540,210**	**107.22**	**$7,096,271**	**$9,717,730**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$8,643,528	54.23	$3,755,965	$4,268,616
	Total Direct Effects	$8,643,528	54.23	$3,755,965	$4,268,616
	Secondary Effects	$10,200,273	64.26	$3,559,239	$5,976,299
	Total Effects	**$18,843,801**	**118.49**	**$7,315,204**	**$10,244,914**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$10,463,300	66.87	$4,546,730	$5,167,312
	Total Direct Effects	$10,463,300	66.87	$4,546,730	$5,167,312
	Secondary Effects	$19,892,662	115.04	$6,507,114	$10,947,689
	Total Effects	**$30,355,962**	**181.90**	**$11,053,844**	**$16,115,001**

IH 45 Causeway Marsh

**NOTE: Total Cost ($10M) divided by 1.75 due to 21 month construction timeline. Plantings = 6% of budget.

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	6%	$343,101	75%	75%	98%
Heavy Construction Activities	94%	$5,375,242	83%	83%	100%
Total	**100%**	**$5,718,343**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,718,343	$5,718,343	$5,718,343
Direct Impact				
	Output	$4,698,667	$4,698,667	$5,712,851
	Job	34.69	34.69	43.28
	Labor Income	$2,125,615	$2,125,615	$2,593,651
	GRP	$2,384,397	$2,384,397	$2,906,570
Total Impact				
	Output	$9,504,818	$10,213,759	$16,551,355
	Job	63.34	69.47	105.99
	Labor Income	$3,921,059	$4,043,480	$6,126,287
	GRP	$5,325,682	$5,616,132	$8,865,973

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$258,284	6.83	$196,087	$191,509
36	Construction of other new nonresidential structures	$4,440,383	27.86	$1,929,527	$2,192,888
	Total Direct Effects	$4,698,667	34.69	$2,125,615	$2,384,397
	Secondary Effects	$4,806,151	28.66	$1,795,445	$2,941,285
	Total Effects	**$9,504,818**	**63.34**	**$3,921,059**	**$5,325,682**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$258,284	6.83	$196,087	$191,509
36	Construction of other new nonresidential structures	$4,440,383	27.86	$1,929,527	$2,192,888
	Total Direct Effects	$4,698,667	34.69	$2,125,615	$2,384,397
	Secondary Effects	$5,515,092	34.78	$1,917,865	$3,231,735
	Total Effects	**$10,213,759**	**69.47**	**$4,043,480**	**$5,616,132**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$337,609	8.93	$257,890	$252,001
36	Construction of other new nonresidential structures	$5,375,242	34.35	$2,335,762	$2,654,569
	Total Direct Effects	$5,712,851	43.28	$2,593,651	$2,906,570
	Secondary Effects	$10,838,504	62.71	$3,532,636	$5,959,403
	Total Effects	**$16,551,355**	**105.99**	**$6,126,287**	**$8,865,973**

Pierce Marsh Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	6%	$1,098,438	75%	75%	98%
Heavy Construction Activities	94%	$17,208,862	83%	83%	100%
Total	**100%**	**$18,307,300**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$18,307,300	$18,307,300	$18,307,300
Direct Impact				
	Output	$15,042,803	$15,042,803	$18,289,717
	Job	111.05	111.05	138.55
	Labor Income	$6,805,164	$6,805,164	$8,303,586
	GRP	$7,633,656	$7,633,656	$9,305,396
Total Impact				
	Output	$30,429,718	$32,699,394	$52,989,234
	Job	202.79	222.41	339.31
	Labor Income	$12,553,288	$12,945,219	$19,613,335
	GRP	$17,050,194	$17,980,071	$28,384,451

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$826,898	21.86	$627,774	$613,116
36	Construction of other new nonresidential structures	$14,215,905	89.19	$6,177,390	$7,020,540
	Total Direct Effects	$15,042,803	111.05	$6,805,164	$7,633,656
	Secondary Effects	$15,386,915	91.74	$5,748,124	$9,416,538
	Total Effects	**$30,429,718**	**202.79**	**$12,553,288**	**$17,050,194**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$826,898	21.86	$627,774	$613,116
36	Construction of other new nonresidential structures	$14,215,905	89.19	$6,177,390	$7,020,540
	Total Direct Effects	$15,042,803	111.05	$6,805,164	$7,633,656
	Secondary Effects	$17,656,592	111.36	$6,140,055	$10,346,415
	Total Effects	**$32,699,394**	**222.41**	**$12,945,219**	**$17,980,071**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$1,080,855	28.57	$825,635	$806,781
36	Construction of other new nonresidential structures	$17,208,862	109.97	$7,477,952	$8,498,615
	Total Direct Effects	$18,289,717	138.55	$8,303,586	$9,305,396
	Secondary Effects	$34,699,516	200.77	$11,309,749	$19,079,054
	Total Effects	**$52,989,234**	**339.31**	**$19,613,335**	**$28,384,451**

Matagorda Ship Channel Region

Economic Impact Regions

Regional Impact Area:	MATAGORDA SHIP CHANNEL, TX
Regional Impact Area ID:	7004
Counties included	Calhoun/Goliad/Matagorda/Victoria/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX
Impact Area Type	N/A
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Calhoun	48057	533	21,057	7,583	$648
Goliad	48175	859	7,327	2,829	$204
Matagorda	48321	1,139	37,061	13,674	$1,124
Victoria	48469	889	87,552	31,942	$3,349
Total		**3,420**	**152,997**	**56,028**	**$5,326**

Impact Region Profile (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX
Impact Area Type	N/A
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$0	$0	$0	0
Administrative and Waste Management Services	$10	$5	$7	109
Agriculture, Forestry, Fishing and Hunting	$0	$0	$0	0
Arts, Entertainment, and Recreation	$0	$0	$0	0
Construction	$0	$0	$0	0
Education	$0	$0	$0	0
Finance, Insurance, Real Estate, Rental and Leasing	$0	$0	$0	0
Government	$0	$0	$0	0
Health Care and Social Assistance	$0	$0	$0	0
Imputed Rents	$0	$0	$0	0
Information	$0	$0	$0	0
Management of Companies and Enterprises	$0	$0	$0	0
Manufacturing	$0	$0	$0	0
Mining	$0	$0	$0	0
Professional, Scientific, and Technical Services	$0	$0	$0	0
Retail Trade	$0	$0	$0	0
Transportation and Warehousing	$0	$0	$0	0
Utilities	$0	$0	$0	0
Wholesale Trade	$0	$0	$0	0
Total	**$10**	**$5**	**$7**	**109**

Boggy Cut GIWW Stabilization

**NOTE: Construction timeline of 24 months. Total cost ($9.3M) divided by 2 for annual equivalent. Half assumed to be in Matagorda County, other half in Galveston County.

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$2,317,500	100%	100%	100%
Total	**100%**	**$2,317,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts / Impact Areas	Regional	State	National
Total Spending	$2,317,500	$2,317,500	$2,317,500
Direct Impact			

	Output	$2,317,500	$2,317,500	$2,317,500
	Job	16.36	16.36	16.36
	Labor Income	$843,337	$843,337	$843,337
	GRP	$997,960	$997,960	$997,960
Total Impact				
	Output	$3,618,386	$5,052,394	$6,723,495
	Job	25.77	33.59	41.84
	Labor Income	$1,242,526	$1,797,639	$2,284,587
	GRP	$1,733,529	$2,600,323	$3,422,747

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,317,500	16.36	$843,337	$997,960
	Total Direct Effects	$2,317,500	16.36	$843,337	$997,960
	Secondary Effects	$1,300,886	9.41	$399,189	$735,569
	Total Effects	**$3,618,386**	**25.77**	**$1,242,526**	**$1,733,529**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,317,500	16.36	$843,337	$997,960
	Total Direct Effects	$2,317,500	16.36	$843,337	$997,960
	Secondary Effects	$2,734,894	17.23	$954,302	$1,602,363
	Total Effects	**$5,052,394**	**33.59**	**$1,797,639**	**$2,600,323**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,317,500	16.36	$843,337	$997,960
	Total Direct Effects	$2,317,500	16.36	$843,337	$997,960

	Secondary Effects	$4,405,995	25.48	$1,441,250	$2,424,787
	Total Effects	**$6,723,495**	**41.84**	**$2,284,587**	**$3,422,747**

Chinquapin Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$1,319,700	100%	100%	100%
Total	**100%**	**$1,319,700**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,319,700	$1,319,700	$1,319,700
Direct Impact				
	Output	$1,319,700	$1,319,700	$1,319,700
	Job	9.31	9.31	9.31
	Labor Income	$480,238	$480,238	$480,238
	GRP	$568,288	$568,288	$568,288
Total Impact				
	Output	$2,060,489	$2,877,085	$3,828,693
	Job	14.67	19.13	23.82
	Labor Income	$707,556	$1,023,665	$1,300,958
	GRP	$987,158	$1,480,754	$1,949,082

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$740,789	5.36	$227,318	$418,869
	Total Effects	**$2,060,489**	**14.67**	**$707,556**	**$987,158**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$1,557,385	9.81	$543,427	$912,466
	Total Effects	**$2,877,085**	**19.13**	**$1,023,665**	**$1,480,754**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$2,508,993	14.51	$820,720	$1,380,794
	Total Effects	**$3,828,693**	**23.82**	**$1,300,958**	**$1,949,082**

Oliver Point Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$1,319,700	100%	100%	100%
Total	**100%**	**$1,319,700**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,319,700	$1,319,700	$1,319,700
Direct Impact				
	Output	$1,319,700	$1,319,700	$1,319,700
	Job	9.31	9.31	9.31
	Labor Income	$480,238	$480,238	$480,238

	GRP	$568,288	$568,288	$568,288
Total Impact				
	Output	$2,060,489	$2,877,085	$3,828,693
	Job	14.67	19.13	23.82
	Labor Income	$707,556	$1,023,665	$1,300,958
	GRP	$987,158	$1,480,754	$1,949,082

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$740,789	5.36	$227,318	$418,869
	Total Effects	**$2,060,489**	**14.67**	**$707,556**	**$987,158**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$1,557,385	9.81	$543,427	$912,466
	Total Effects	**$2,877,085**	**19.13**	**$1,023,665**	**$1,480,754**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,319,700	9.31	$480,238	$568,288
	Total Direct Effects	$1,319,700	9.31	$480,238	$568,288
	Secondary Effects	$2,508,993	14.51	$820,720	$1,380,794
	Total Effects	**$3,828,693**	**23.82**	**$1,300,958**	**$1,949,082**

Half Moon Oyster Restoration – Phase 3

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$2,231,900	100%	100%	100%
Total	**100%**	**$2,231,900**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,231,900	$2,231,900	$2,231,900
Direct Impact				
	Output	$2,231,900	$2,231,900	$2,231,900
	Job	15.75	15.75	15.75
	Labor Income	$812,187	$812,187	$812,187
	GRP	$961,099	$961,099	$961,099
Total Impact				
	Output	$3,484,736	$4,865,777	$6,475,153
	Job	24.82	32.35	40.29
	Labor Income	$1,196,631	$1,731,241	$2,200,203
	GRP	$1,669,498	$2,504,277	$3,296,323

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,231,900	15.75	$812,187	$961,099
	Total Direct Effects	$2,231,900	15.75	$812,187	$961,099
	Secondary Effects	$1,252,836	9.06	$384,444	$708,399
	Total Effects	**$3,484,736**	**24.82**	**$1,196,631**	**$1,669,498**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,231,900	15.75	$812,187	$961,099
	Total Direct Effects	$2,231,900	15.75	$812,187	$961,099
	Secondary Effects	$2,633,877	16.59	$919,054	$1,543,178
	Total Effects	**$4,865,777**	**32.35**	**$1,731,241**	**$2,504,277**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,231,900	15.75	$812,187	$961,099
	Total Direct Effects	$2,231,900	15.75	$812,187	$961,099
	Secondary Effects	$4,243,253	24.54	$1,388,016	$2,335,224
	Total Effects	**$6,475,153**	**40.29**	**$2,200,203**	**$3,296,323**

Redfish Lake Living Shoreline (Redfish Lake Shoreline Stabilization)

**NOTE: 14 month construction timeline. Total cost ($4.7M) divided by 1.167 to get 12-month equivalent.

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$4,013,111	100%	100%	100%
Total	**100%**	**$4,013,111**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts / Impact Areas	Regional	State	National
Total Spending	$4,013,111	$4,013,111	$4,013,111
Direct Impact			

	Output	$4,013,111	$4,013,111	$4,013,111
	Job	28.32	28.32	28.32
	Labor Income	$1,460,369	$1,460,369	$1,460,369
	GRP	$1,728,123	$1,728,123	$1,728,123
Total Impact				
	Output	$6,265,797	$8,749,005	$11,642,775
	Job	44.62	58.16	72.45
	Labor Income	$2,151,626	$3,112,891	$3,956,117
	GRP	$3,001,874	$4,502,863	$5,927,017

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,013,111	28.32	$1,460,369	$1,728,123
	Total Direct Effects	$4,013,111	28.32	$1,460,369	$1,728,123
	Secondary Effects	$2,252,686	16.30	$691,258	$1,273,751
	Total Effects	**$6,265,797**	**44.62**	**$2,151,626**	**$3,001,874**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,013,111	28.32	$1,460,369	$1,728,123
	Total Direct Effects	$4,013,111	28.32	$1,460,369	$1,728,123
	Secondary Effects	$4,735,894	29.84	$1,652,522	$2,774,741
	Total Effects	**$8,749,005**	**58.16**	**$3,112,891**	**$4,502,863**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,013,111	28.32	$1,460,369	$1,728,123

	Total Direct Effects	$4,013,111	28.32	$1,460,369	$1,728,123
	Secondary Effects	$7,629,664	44.12	$2,495,749	$4,198,894
	Total Effects	**$11,642,775**	**72.45**	**$3,956,117**	**$5,927,017**

Sargent Beach Dune & Beach Restoration

**NOTE: 20 month construction timeline. Total cost ($66M) divided by 1.67 to get 12-month equivalent.

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$39,658,680	100%	100%	100%
Total	**100%**	**$39,658,680**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$39,658,680	$39,658,680	$39,658,680
Direct Impact				
	Output	$39,658,680	$39,658,680	$39,658,680
	Job	279.90	279.90	279.90
	Labor Income	$14,431,769	$14,431,769	$14,431,769
	GRP	$17,077,789	$17,077,789	$17,077,789
Total Impact				
	Output	$61,920,345	$86,460,099	$115,057,140
	Job	440.96	574.75	715.93
	Labor Income	$21,262,970	$30,762,451	$39,095,454
	GRP	$29,665,352	$44,498,550	$58,572,431

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$39,658,680	279.90	$14,431,769	$17,077,789
	Total Direct Effects	$39,658,680	279.90	$14,431,769	$17,077,789
	Secondary Effects	$22,261,665	161.05	$6,831,202	$12,587,563

	Total Effects	**$61,920,345**	**440.96**	**$21,262,970**	**$29,665,352**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$39,658,680	279.90	$14,431,769	$17,077,789
	Total Direct Effects	$39,658,680	279.90	$14,431,769	$17,077,789
	Secondary Effects	$46,801,419	294.85	$16,330,683	$27,420,762
	Total Effects	**$86,460,099**	**574.75**	**$30,762,451**	**$44,498,550**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$39,658,680	279.90	$14,431,769	$17,077,789
	Total Direct Effects	$39,658,680	279.90	$14,431,769	$17,077,789
	Secondary Effects	$75,398,460	436.02	$24,663,686	$41,494,643
	Total Effects	**$115,057,140**	**715.93**	**$39,095,454**	**$58,572,431**

Beaumont MSA

Economic Impact Regions

Regional Impact Area:	Beaumont-Port Arthur, TX MSA
Regional Impact Area ID:	64
Counties included	Hardin/Jefferson/Orange/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Hardin	48199	897	52,588	19,732	$1,948
Jefferson	48245	988	246,761	91,097	$9,034
Orange	48361	380	84,651	32,173	$2,869
Total		**2,265**	**384,000**	**143,002**	**$13,851**

Impact Region Profile (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$749	$248	$377	13,635
Administrative and Waste Management Services	$661	$297	$393	8,984
Agriculture, Forestry, Fishing and Hunting	$208	$37	$69	2,344
Arts, Entertainment, and Recreation	$101	$25	$35	1,470
Construction	$3,346	$1,407	$1,546	22,426
Education	$621	$507	$575	11,374
Finance, Insurance, Real Estate, Rental and Leasing	$998	$268	$609	5,916

Government	$1,264	$917	$1,047	16,763
Health Care and Social Assistance	$1,743	$941	$1,096	21,535
Imputed Rents	$1,985	$278	$1,271	12,027
Information	$833	$124	$247	2,127
Management of Companies and Enterprises	$142	$61	$81	721
Manufacturing	$51,877	$2,391	$4,483	21,966
Mining	$495	$109	$252	1,362
Professional, Scientific, and Technical Services	$2,108	$1,047	$1,237	16,259
Retail Trade	$1,586	$699	$1,084	23,661
Transportation and Warehousing	$909	$310	$472	6,085
Utilities	$697	$145	$507	970
Wholesale Trade	$1,031	$390	$671	5,646
Total	**$71,354**	**$10,199**	**$16,054**	**195,272**

McFaddin National Wildlife Refuge Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$73,214,800	20%	83%	100%
Total	**100%**	**$73,214,800**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$73,214,800	$73,214,800	$73,214,800
Direct Impact				
	Output	$14,322,270	$60,477,441	$73,214,800
	Job	91.34	411.82	500.26
	Labor Income	$6,090,387	$25,717,361	$31,133,782
	GRP	$6,953,819	$29,363,303	$35,547,608
Total Impact				
	Output	$23,749,855	$131,847,191	$212,409,628
	Job	158.01	861.44	1,305.21
	Labor Income	$9,237,951	$50,620,810	$76,665,978
	GRP	$12,357,751	$71,178,550	$112,151,822

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$14,322,270	91.34	$6,090,387	$6,953,819
	Total Direct Effects	$14,322,270	91.34	$6,090,387	$6,953,819
	Secondary Effects	$9,427,585	66.67	$3,147,564	$5,403,932
	Total Effects	**$23,749,855**	**158.01**	**$9,237,951**	**$12,357,751**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$60,477,441	411.82	$25,717,361	$29,363,303
	Total Direct Effects	$60,477,441	411.82	$25,717,361	$29,363,303
	Secondary Effects	$71,369,750	449.62	$24,903,449	$41,815,247
	Total Effects	**$131,847,191**	**861.44**	**$50,620,810**	**$71,178,550**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$73,214,800	500.26	$31,133,782	$35,547,608
	Total Direct Effects	$73,214,800	500.26	$31,133,782	$35,547,608
	Secondary Effects	$139,194,828	804.96	$45,532,196	$76,604,213
	Total Effects	**$212,409,628**	**1,305.21**	**$76,665,978**	**$112,151,822**

Salt Bayou Siphons

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$7,330,700	20%	83%	100%
Total	**100%**	**$7,330,700**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,330,700	$7,330,700	$7,330,700
Direct Impact				
	Output	$1,434,031	$6,055,360	$7,330,700
	Job	9.15	41.23	50.09
	Labor Income	$609,806	$2,574,975	$3,117,299
	GRP	$696,258	$2,940,028	$3,559,237
Total Impact				
	Output	$2,377,976	$13,201,323	$21,267,712
	Job	15.82	86.25	130.69
	Labor Income	$924,958	$5,068,456	$7,676,252
	GRP	$1,237,331	$7,126,819	$11,229,306

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,434,031	9.15	$609,806	$696,258
	Total Direct Effects	$1,434,031	9.15	$609,806	$696,258
	Secondary Effects	$943,946	6.68	$315,153	$541,074
	Total Effects	**$2,377,976**	**15.82**	**$924,958**	**$1,237,331**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,055,360	41.23	$2,574,975	$2,940,028
	Total Direct Effects	$6,055,360	41.23	$2,574,975	$2,940,028
	Secondary Effects	$7,145,963	45.02	$2,493,481	$4,186,791
	Total Effects	**$13,201,323**	**86.25**	**$5,068,456**	**$7,126,819**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,330,700	50.09	$3,117,299	$3,559,237
	Total Direct Effects	$7,330,700	50.09	$3,117,299	$3,559,237
	Secondary Effects	$13,937,012	80.60	$4,558,954	$7,670,068
	Total Effects	**$21,267,712**	**130.69**	**$7,676,252**	**$11,229,306**

East Galveston Bay Ecosystem Oyster Reefs

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$2,894,933	20%	83%	100%
Total	**100%**	**$2,894,933**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,894,933	$2,894,933	$2,894,933
Direct Impact				
	Output	$566,306	$2,391,294	$2,894,933
	Job	3.61	16.28	19.78
	Labor Income	$240,816	$1,016,871	$1,231,038
	GRP	$274,956	$1,161,033	$1,405,562
Total Impact				
	Output	$939,076	$5,213,274	$8,398,734
	Job	6.25	34.06	51.61
	Labor Income	$365,271	$2,001,561	$3,031,394
	GRP	$488,629	$2,814,419	$4,434,513

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$566,306	3.61	$240,816	$274,956
	Total Direct Effects	$566,306	3.61	$240,816	$274,956
	Secondary Effects	$372,769	2.64	$124,456	$213,673
	Total Effects	**$939,076**	**6.25**	**$365,271**	**$488,629**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,391,294	16.28	$1,016,871	$1,161,033
	Total Direct Effects	$2,391,294	16.28	$1,016,871	$1,161,033
	Secondary Effects	$2,821,979	17.78	$984,689	$1,653,386
	Total Effects	**$5,213,274**	**34.06**	**$2,001,561**	**$2,814,419**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,894,933	19.78	$1,231,038	$1,405,562
	Total Direct Effects	$2,894,933	19.78	$1,231,038	$1,405,562
	Secondary Effects	$5,503,801	31.83	$1,800,355	$3,028,951
	Total Effects	**$8,398,734**	**51.61**	**$3,031,394**	**$4,434,513**

Old River Cove Marsh Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$6,740,170	20%	83%	100%
Total	**100%**	**$6,740,170**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$6,740,170	$6,740,170	$6,740,170
Direct Impact				
	Output	$1,318,511	$5,567,566	$6,740,170
	Job	8.41	37.91	46.05
	Labor Income	$560,682	$2,367,546	$2,866,183
	GRP	$640,170	$2,703,192	$3,272,520
Total Impact				
	Output	$2,186,417	$12,137,880	$19,554,475
	Job	14.55	79.30	120.16
	Labor Income	$850,448	$4,660,163	$7,057,886
	GRP	$1,137,657	$6,552,712	$10,324,720

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,318,511	8.41	$560,682	$640,170
	Total Direct Effects	$1,318,511	8.41	$560,682	$640,170
	Secondary Effects	$867,905	6.14	$289,765	$497,487
	Total Effects	**$2,186,417**	**14.55**	**$850,448**	**$1,137,657**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,567,566	37.91	$2,367,546	$2,703,192
	Total Direct Effects	$5,567,566	37.91	$2,367,546	$2,703,192
	Secondary Effects	$6,570,314	41.39	$2,292,617	$3,849,520
	Total Effects	**$12,137,880**	**79.30**	**$4,660,163**	**$6,552,712**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,740,170	46.05	$2,866,183	$3,272,520
	Total Direct Effects	$6,740,170	46.05	$2,866,183	$3,272,520
	Secondary Effects	$12,814,305	74.10	$4,191,704	$7,052,200
	Total Effects	**$19,554,475**	**120.16**	**$7,057,886**	**$10,324,720**

Bessie Heights Marsh Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$4,147,385	20%	83%	100%
Total	**100%**	**$4,147,385**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,147,385	$4,147,385	$4,147,385
Direct Impact				
	Output	$811,311	$3,425,854	$4,147,385
	Job	5.17	23.33	28.34
	Labor Income	$345,001	$1,456,807	$1,763,629
	GRP	$393,912	$1,663,338	$2,013,659
Total Impact				
	Output	$1,345,354	$7,468,723	$12,032,328
	Job	8.95	48.80	73.94
	Labor Income	$523,300	$2,867,508	$4,342,883
	GRP	$700,027	$4,032,038	$6,353,043

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$811,311	5.17	$345,001	$393,912
	Total Direct Effects	$811,311	5.17	$345,001	$393,912
	Secondary Effects	$534,043	3.78	$178,299	$306,116
	Total Effects	**$1,345,354**	**8.95**	**$523,300**	**$700,027**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,425,854	23.33	$1,456,807	$1,663,338
	Total Direct Effects	$3,425,854	23.33	$1,456,807	$1,663,338
	Secondary Effects	$4,042,869	25.47	$1,410,701	$2,368,700
	Total Effects	**$7,468,723**	**48.80**	**$2,867,508**	**$4,032,038**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,147,385	28.34	$1,763,629	$2,013,659
	Total Direct Effects	$4,147,385	28.34	$1,763,629	$2,013,659
	Secondary Effects	$7,884,943	45.60	$2,579,254	$4,339,384
	Total Effects	**$12,032,328**	**73.94**	**$4,342,883**	**$6,353,043**

Brownsville MSA

Impact Region Definition (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)

Cameron	48061	945	408,253	119,722	$8,874
Total		**945**	**408,253**	**119,722**	**$8,874**

Impact Region Profile (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$589	$187	$289	11,182
Administrative and Waste Management Services	$430	$196	$255	7,996
Agriculture, Forestry, Fishing and Hunting	$250	$60	$99	3,558
Arts, Entertainment, and Recreation	$132	$31	$47	1,782
Construction	$802	$247	$271	6,945
Education	$741	$629	$712	13,730
Finance, Insurance, Real Estate, Rental and Leasing	$881	$213	$588	5,040
Government	$1,513	$1,018	$1,182	18,799
Health Care and Social Assistance	$1,815	$1,006	$1,147	32,569
Imputed Rents	$1,308	$176	$788	9,588
Information	$1,015	$100	$187	2,039
Management of Companies and Enterprises	$33	$12	$16	220
Manufacturing	$3,233	$381	$501	7,217
Mining	$29	$6	$17	59
Professional, Scientific, and Technical Services	$482	$220	$267	4,436
Retail Trade	$1,069	$446	$716	18,691
Transportation and Warehousing	$565	$237	$343	4,715
Utilities	$120	$24	$76	293
Wholesale Trade	$394	$144	$248	3,308
Total	**$15,401**	**$5,334**	**$7,749**	**152,166**

Paso Corvinas Wetland and Hydrologic Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$2,656,500	85%	85%	100%
Total	**100%**	**$2,656,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,656,500	$2,656,500	$2,656,500
Direct Impact				
	Output	$2,270,760	$2,270,760	$2,656,500
	Job	19.66	19.66	23.00
	Labor Income	$498,736	$498,736	$643,081
	GRP	$684,601	$684,601	$860,847
Total Impact				
	Output	$3,856,408	$4,950,495	$7,706,996
	Job	31.30	36.54	52.21
	Labor Income	$922,405	$1,433,791	$2,295,156
	GRP	$1,497,732	$2,254,648	$3,640,327

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,270,760	19.66	$498,736	$684,601
	Total Direct Effects	$2,270,760	19.66	$498,736	$684,601
	Secondary Effects	$1,585,649	11.64	$423,669	$813,131
	Total Effects	**$3,856,408**	**31.30**	**$922,405**	**$1,497,732**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,270,760	19.66	$498,736	$684,601
	Total Direct Effects	$2,270,760	19.66	$498,736	$684,601
	Secondary Effects	$2,679,736	16.88	$935,055	$1,570,046
	Total Effects	**$4,950,495**	**36.54**	**$1,433,791**	**$2,254,648**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,656,500	23.00	$643,081	$860,847
	Total Direct Effects	$2,656,500	23.00	$643,081	$860,847
	Secondary Effects	$5,050,496	29.21	$1,652,074	$2,779,480
	Total Effects	**$7,706,996**	**52.21**	**$2,295,156**	**$3,640,327**

Corpus Christi MSA

Economic Impact Regions

Regional Impact Area:	Corpus Christi, TX MSA
Regional Impact Area ID:	94
Counties included	Aransas/Nueces/San Patricio/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Aransas	48007	243	25,862	10,615	$951
Nueces	48355	844	325,578	117,349	$12,005
San Patricio	48409	705	70,499	23,745	$2,256
Total		**1,791**	**421,939**	**151,709**	**$15,212**

Impact Region Profile (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$1,037	$333	$513	19,298
Administrative and Waste Management Services	$820	$388	$497	15,242
Agriculture, Forestry, Fishing and Hunting	$334	$70	$150	3,965
Arts, Entertainment, and Recreation	$211	$55	$80	2,852
Construction	$3,566	$1,393	$1,530	25,716
Education	$785	$649	$737	14,711
Finance, Insurance, Real Estate, Rental and Leasing	$1,542	$400	$926	8,231
Government	$2,237	$1,544	$1,932	23,550
Health Care and Social Assistance	$2,174	$1,176	$1,360	26,859
Imputed Rents	$2,206	$316	$1,415	13,301
Information	$954	$152	$286	2,688
Management of Companies and Enterprises	$105	$49	$65	440
Manufacturing	$25,955	$1,066	$1,647	10,852
Mining	$3,497	$712	$2,046	5,200
Professional, Scientific, and Technical Services	$2,058	$796	$1,147	13,354
Retail Trade	$1,724	$731	$1,172	27,832
Transportation and Warehousing	$808	$332	$465	5,490
Utilities	$510	$98	$320	812
Wholesale Trade	$1,318	$502	$858	7,237
Total	**$51,842**	**$10,761**	**$17,143**	**227,631**

Corpus Christi & Nueces Bays Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$604,000	88%	88%	100%
Total	**100%**	**$604,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$604,000	$604,000	$604,000
Direct Impact				
	Output	$528,872	$528,872	$604,000
	Job	3.52	3.52	4.04
	Labor Income	$212,035	$212,035	$242,156
	GRP	$245,268	$245,268	$280,109
Total Impact				

Output	$969,007	$1,152,997	$1,752,315
Job	6.67	7.45	10.68
Labor Income	$355,686	$429,815	$617,783
GRP	$502,186	$610,940	$912,071

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$528,872	3.52	$212,035	$245,268
	Total Direct Effects	$528,872	3.52	$212,035	$245,268
	Secondary Effects	$440,135	3.15	$143,651	$256,918
	Total Effects	**$969,007**	**6.67**	**$355,686**	**$502,186**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$528,872	3.52	$212,035	$245,268
	Total Direct Effects	$528,872	3.52	$212,035	$245,268
	Secondary Effects	$624,125	3.93	$217,779	$365,672
	Total Effects	**$1,152,997**	**7.45**	**$429,815**	**$610,940**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$604,000	4.04	$242,156	$280,109
	Total Direct Effects	$604,000	4.04	$242,156	$280,109
	Secondary Effects	$1,148,315	6.64	$375,627	$631,962
	Total Effects	**$1,752,315**	**10.68**	**$617,783**	**$912,071**

Portland Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$2,995,000	88%	88%	100%
Total	**100%**	**$2,995,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,995,000	$2,995,000	$2,995,000
Direct Impact				
	Output	$2,622,469	$2,622,469	$2,995,000
	Job	17.43	17.43	20.02
	Labor Income	$1,051,401	$1,051,401	$1,200,756
	GRP	$1,216,188	$1,216,188	$1,388,952
Total Impact				
	Output	$4,804,928	$5,717,260	$8,689,047
	Job	33.07	36.93	52.95
	Labor Income	$1,763,709	$2,131,283	$3,063,343
	GRP	$2,490,146	$3,029,413	$4,522,603

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,622,469	17.43	$1,051,401	$1,216,188
	Total Direct Effects	$2,622,469	17.43	$1,051,401	$1,216,188
	Secondary Effects	$2,182,459	15.64	$712,308	$1,273,958
	Total Effects	**$4,804,928**	**33.07**	**$1,763,709**	**$2,490,146**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,622,469	17.43	$1,051,401	$1,216,188
	Total Direct Effects	$2,622,469	17.43	$1,051,401	$1,216,188
	Secondary Effects	$3,094,790	19.50	$1,079,883	$1,813,225
	Total Effects	**$5,717,260**	**36.93**	**$2,131,283**	**$3,029,413**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,995,000	20.02	$1,200,756	$1,388,952
	Total Direct Effects	$2,995,000	20.02	$1,200,756	$1,388,952
	Secondary Effects	$5,694,047	32.93	$1,862,587	$3,133,651
	Total Effects	**$8,689,047**	**52.95**	**$3,063,343**	**$4,522,603**

Long Reef Island Shoreline Stabilization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$2,680,800	88%	88%	100%
Total	**100%**	**$2,680,800**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,680,800	$2,680,800	$2,680,800
Direct Impact				
	Output	$2,347,351	$2,347,351	$2,680,800
	Job	15.60	15.60	17.92
	Labor Income	$941,100	$941,100	$1,074,787
	GRP	$1,088,600	$1,088,600	$1,243,239
Total Impact				
	Output	$4,300,852	$5,117,472	$7,777,495
	Job	29.60	33.05	47.39
	Labor Income	$1,578,681	$1,907,694	$2,741,973

GRP	$2,228,909	$2,711,603	$4,048,145

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,347,351	15.60	$941,100	$1,088,600
	Total Direct Effects	$2,347,351	15.60	$941,100	$1,088,600
	Secondary Effects	$1,953,501	14.00	$637,581	$1,140,309
	Total Effects	**$4,300,852**	**29.60**	**$1,578,681**	**$2,228,909**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,347,351	15.60	$941,100	$1,088,600
	Total Direct Effects	$2,347,351	15.60	$941,100	$1,088,600
	Secondary Effects	$2,770,121	17.45	$966,594	$1,623,003
	Total Effects	**$5,117,472**	**33.05**	**$1,907,694**	**$2,711,603**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,680,800	17.92	$1,074,787	$1,243,239
	Total Direct Effects	$2,680,800	17.92	$1,074,787	$1,243,239
	Secondary Effects	$5,096,695	29.47	$1,667,186	$2,804,905
	Total Effects	**$7,777,495**	**47.39**	**$2,741,973**	**$4,048,145**

Houston MSA

Economic Impact Regions

Regional Impact Area:	Houston Sugar Land Baytown TX MSA
Regional Impact Area ID:	19
Counties included	Austin/Brazoria/Chambers/Fort Bend/Galveston/Harris/Liberty/Montgomery/San Jacinto/Waller/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Austin	48015	657	27,467	10,062	$1,061
Brazoria	48039	1,442	311,212	106,478	$11,602
Chambers	48071	629	34,498	12,175	$1,422
Fort Bend	48157	886	547,876	163,740	$25,503
Galveston	48167	408	297,079	112,536	$11,937
Harris	48201	1,774	4,091,773	1,425,897	$196,779
Liberty	48291	1,176	77,344	25,224	$2,556
Montgomery	48339	1,077	452,286	156,734	$20,366
San Jacinto	48407	628	25,788	10,091	$783
Waller	48473	519	38,727	12,653	$1,235
Total		**9,195**	**5,904,050**	**2,035,590**	**$273,247**

Impact Region Profile (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$13,236	$4,560	$7,005	216,742
Administrative and Waste Management Services	$19,024	$9,951	$12,493	298,005

Agriculture, Forestry, Fishing and Hunting	$1,092	$272	$394	17,834
Arts, Entertainment, and Recreation	$3,725	$1,342	$1,812	49,670
Construction	$46,428	$18,719	$20,539	324,726
Education	$15,369	$12,441	$14,035	232,139
Finance, Insurance, Real Estate, Rental and Leasing	$60,950	$16,224	$39,111	284,513
Government	$14,071	$10,846	$12,346	178,925
Health Care and Social Assistance	$24,457	$13,352	$15,725	259,514
Imputed Rents	$41,885	$5,351	$27,360	193,605
Information	$18,119	$3,659	$7,479	50,197
Management of Companies and Enterprises	$6,314	$2,651	$3,597	32,227
Manufacturing	$297,676	$30,969	$57,878	246,808
Mining	$146,320	$32,033	$91,390	128,560
Professional, Scientific, and Technical Services	$61,245	$28,206	$37,002	343,983
Retail Trade	$23,550	$10,251	$16,149	336,109
Transportation and Warehousing	$33,952	$12,636	$17,865	167,737
Utilities	$44,650	$9,551	$32,358	17,197
Wholesale Trade	$37,816	$14,498	$24,901	164,951
Total	**$909,877**	**$237,514**	**$439,440**	**3,543,441**

Anahuac National Wildlife Refuge Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$5,446,119	83%	83%	100%
Total	**100%**	**$5,446,119**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,446,119	$5,446,119	$5,446,119
Direct Impact				
	Output	$4,498,933	$4,498,933	$5,446,119
	Job	28.23	28.23	34.80
	Labor Income	$1,954,970	$1,954,970	$2,366,561
	GRP	$2,221,803	$2,221,803	$2,689,572
Total Impact				
	Output	$9,129,631	$9,808,147	$15,800,195
	Job	55.81	61.67	94.68
	Labor Income	$3,693,590	$3,807,544	$5,753,495

GRP	$5,058,052	$5,332,450	$8,387,814

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,498,933	28.23	$1,954,970	$2,221,803
	Total Direct Effects	$4,498,933	28.23	$1,954,970	$2,221,803
	Secondary Effects	$4,630,698	27.58	$1,738,620	$2,836,249
	Total Effects	**$9,129,631**	**55.81**	**$3,693,590**	**$5,058,052**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,498,933	28.23	$1,954,970	$2,221,803
	Total Direct Effects	$4,498,933	28.23	$1,954,970	$2,221,803
	Secondary Effects	$5,309,214	33.45	$1,852,574	$3,110,647
	Total Effects	**$9,808,147**	**61.67**	**$3,807,544**	**$5,332,450**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,446,119	34.80	$2,366,561	$2,689,572
	Total Direct Effects	$5,446,119	34.80	$2,366,561	$2,689,572
	Secondary Effects	$10,354,076	59.88	$3,386,935	$5,698,242
	Total Effects	**$15,800,195**	**94.68**	**$5,753,495**	**$8,387,814**

Gordy Marsh Restoration & Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$5,641,000	83%	83%	100%
Total	**100%**	**$5,641,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,641,000	$5,641,000	$5,641,000
Direct Impact				
	Output	$4,659,920	$4,659,920	$5,641,000
	Job	29.24	29.24	36.05
	Labor Income	$2,024,925	$2,024,925	$2,451,244
	GRP	$2,301,307	$2,301,307	$2,785,814
Total Impact				
	Output	$9,456,321	$10,159,116	$16,365,581
	Job	57.81	63.88	98.07
	Labor Income	$3,825,759	$3,943,791	$5,959,375
	GRP	$5,239,046	$5,523,263	$8,687,959

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,659,920	29.24	$2,024,925	$2,301,307
	Total Direct Effects	$4,659,920	29.24	$2,024,925	$2,301,307
	Secondary Effects	$4,796,401	28.57	$1,800,834	$2,937,740
	Total Effects	**$9,456,321**	**57.81**	**$3,825,759**	**$5,239,046**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,659,920	29.24	$2,024,925	$2,301,307

		Sales	Jobs	Labor Income	GRP
	Total Direct Effects	$4,659,920	29.24	$2,024,925	$2,301,307
	Secondary Effects	$5,499,196	34.64	$1,918,866	$3,221,957
	Total Effects	**$10,159,116**	**63.88**	**$3,943,791**	**$5,523,263**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,641,000	36.05	$2,451,244	$2,785,814
	Total Direct Effects	$5,641,000	36.05	$2,451,244	$2,785,814
	Secondary Effects	$10,724,581	62.02	$3,508,131	$5,902,145
	Total Effects	**$16,365,581**	**98.07**	**$5,959,375**	**$8,687,959**

Galveston Bay Ecosystem Rookery Islands

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$12,489,330	83%	83%	100%
Total	**100%**	**$12,489,330**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$12,489,330	$12,489,330	$12,489,330
Direct Impact				
	Output	$10,317,192	$10,317,192	$12,489,330
	Job	64.73	64.73	79.81
	Labor Income	$4,483,240	$4,483,240	$5,427,123
	GRP	$5,095,156	$5,095,156	$6,167,869
Total Impact				
	Output	$20,936,556	$22,492,565	$36,233,848
	Job	127.98	141.43	217.13
	Labor Income	$8,470,337	$8,731,662	$13,194,222
	GRP	$11,599,394	$12,228,658	$19,235,381

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$10,317,192	64.73	$4,483,240	$5,095,156
	Total Direct Effects	$10,317,192	64.73	$4,483,240	$5,095,156
	Secondary Effects	$10,619,364	63.25	$3,987,097	$6,504,237
	Total Effects	**$20,936,556**	**127.98**	**$8,470,337**	**$11,599,394**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$10,317,192	64.73	$4,483,240	$5,095,156
	Total Direct Effects	$10,317,192	64.73	$4,483,240	$5,095,156
	Secondary Effects	$12,175,373	76.70	$4,248,421	$7,133,502
	Total Effects	**$22,492,565**	**141.43**	**$8,731,662**	**$12,228,658**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$12,489,330	79.81	$5,427,123	$6,167,869
	Total Direct Effects	$12,489,330	79.81	$5,427,123	$6,167,869
	Secondary Effects	$23,744,518	137.31	$7,767,099	$13,067,512
	Total Effects	**$36,233,848**	**217.13**	**$13,194,222**	**$19,235,381**

Bolivar Peninsula Beach & Dune Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%

Heavy Construction Activities	100%	$81,178,000	83%	83%	100%
Total	**100%**	**$81,178,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$81,178,000	$81,178,000	$81,178,000
Direct Impact				
	Output	$67,059,562	$67,059,562	$81,178,000
	Job	420.73	420.73	518.76
	Labor Income	$29,140,112	$29,140,112	$35,275,149
	GRP	$33,117,437	$33,117,437	$40,089,843
Total Impact				
	Output	$136,083,180	$146,196,907	$235,512,339
	Job	831.87	919.29	1,411.27
	Labor Income	$55,055,395	$56,753,952	$85,759,650
	GRP	$75,393,603	$79,483,687	$125,025,906

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$67,059,562	420.73	$29,140,112	$33,117,437
	Total Direct Effects	$67,059,562	420.73	$29,140,112	$33,117,437
	Secondary Effects	$69,023,618	411.13	$25,915,283	$42,276,166
	Total Effects	**$136,083,180**	**831.87**	**$55,055,395**	**$75,393,603**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$67,059,562	420.73	$29,140,112	$33,117,437
	Total Direct Effects	$67,059,562	420.73	$29,140,112	$33,117,437
	Secondary Effects	$79,137,346	498.56	$27,613,840	$46,366,250
	Total Effects	**$146,196,907**	**919.29**	**$56,753,952**	**$79,483,687**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$81,178,000	518.76	$35,275,149	$40,089,843
	Total Direct Effects	$81,178,000	518.76	$35,275,149	$40,089,843
	Secondary Effects	$154,334,339	892.51	$50,484,501	$84,936,062
	Total Effects	**$235,512,339**	**1,411.27**	**$85,759,650**	**$125,025,906**

Brazos River to Cedar Lake Creek GIWW Stabilization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$11,301,160	83%	83%	100%
Total	**100%**	**$11,301,160**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$11,301,160	$11,301,160	$11,301,160
Direct Impact				
	Output	$9,335,668	$9,335,668	$11,301,160
	Job	58.57	58.57	72.22
	Labor Income	$4,056,728	$4,056,728	$4,910,815
	GRP	$4,610,430	$4,610,430	$5,581,090
Total Impact				
	Output	$18,944,761	$20,352,739	$32,786,748
	Job	115.81	127.98	196.47
	Labor Income	$7,664,513	$7,900,977	$11,938,992
	GRP	$10,495,888	$11,065,287	$17,405,427

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,335,668	58.57	$4,056,728	$4,610,430
	Total Direct Effects	$9,335,668	58.57	$4,056,728	$4,610,430
	Secondary Effects	$9,609,093	57.24	$3,607,785	$5,885,458
	Total Effects	**$18,944,761**	**115.81**	**$7,664,513**	**$10,495,888**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,335,668	58.57	$4,056,728	$4,610,430
	Total Direct Effects	$9,335,668	58.57	$4,056,728	$4,610,430
	Secondary Effects	$11,017,071	69.41	$3,844,249	$6,454,857
	Total Effects	**$20,352,739**	**127.98**	**$7,900,977**	**$11,065,287**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$11,301,160	72.22	$4,910,815	$5,581,090
	Total Direct Effects	$11,301,160	72.22	$4,910,815	$5,581,090
	Secondary Effects	$21,485,588	124.25	$7,028,178	$11,824,337
	Total Effects	**$32,786,748**	**196.47**	**$11,938,992**	**$17,405,427**

Brazoria National Wildlife Refuge GIWW Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$7,899,636	83%	83%	100%
Total	**100%**	**$7,899,636**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,899,636	$7,899,636	$7,899,636
Direct Impact				
	Output	$6,525,735	$6,525,735	$7,899,636
	Job	40.94	40.94	50.48
	Labor Income	$2,835,698	$2,835,698	$3,432,714
	GRP	$3,222,741	$3,222,741	$3,901,244
Total Impact				
	Output	$13,242,598	$14,226,790	$22,918,300
	Job	80.95	89.46	137.33
	Labor Income	$5,357,579	$5,522,870	$8,345,488
	GRP	$7,336,742	$7,734,758	$12,166,586

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,525,735	40.94	$2,835,698	$3,222,741
	Total Direct Effects	$6,525,735	40.94	$2,835,698	$3,222,741
	Secondary Effects	$6,716,862	40.01	$2,521,882	$4,114,000
	Total Effects	**$13,242,598**	**80.95**	**$5,357,579**	**$7,336,742**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,525,735	40.94	$2,835,698	$3,222,741
	Total Direct Effects	$6,525,735	40.94	$2,835,698	$3,222,741
	Secondary Effects	$7,701,055	48.52	$2,687,172	$4,512,017
	Total Effects	**$14,226,790**	**89.46**	**$5,522,870**	**$7,734,758**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,899,636	50.48	$3,432,714	$3,901,244
	Total Direct Effects	$7,899,636	50.48	$3,432,714	$3,901,244
	Secondary Effects	$15,018,664	86.85	$4,912,774	$8,265,343
	Total Effects	**$22,918,300**	**137.33**	**$8,345,488**	**$12,166,586**

Follets Island Marsh Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$4,347,802	83%	83%	100%
Total	**100%**	**$4,347,802**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,347,802	$4,347,802	$4,347,802
Direct Impact				
	Output	$3,591,634	$3,591,634	$4,347,802
	Job	22.53	22.53	27.78
	Labor Income	$1,560,711	$1,560,711	$1,889,297
	GRP	$1,773,733	$1,773,733	$2,147,167
Total Impact				
	Output	$7,288,461	$7,830,141	$12,613,775
	Job	44.55	49.24	75.59
	Labor Income	$2,948,705	$3,039,678	$4,593,190
	GRP	$4,037,996	$4,257,056	$6,696,246

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,591,634	22.53	$1,560,711	$1,773,733
	Total Direct Effects	$3,591,634	22.53	$1,560,711	$1,773,733
	Secondary Effects	$3,696,827	22.02	$1,387,993	$2,264,264
	Total Effects	**$7,288,461**	**44.55**	**$2,948,705**	**$4,037,996**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,591,634	22.53	$1,560,711	$1,773,733
	Total Direct Effects	$3,591,634	22.53	$1,560,711	$1,773,733
	Secondary Effects	$4,238,507	26.70	$1,478,966	$2,483,324
	Total Effects	**$7,830,141**	**49.24**	**$3,039,678**	**$4,257,056**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,347,802	27.78	$1,889,297	$2,147,167
	Total Direct Effects	$4,347,802	27.78	$1,889,297	$2,147,167
	Secondary Effects	$8,265,973	47.80	$2,703,893	$4,549,080
	Total Effects	**$12,613,775**	**75.59**	**$4,593,190**	**$6,696,246**

Follets Island Nourishment and Erosion Control

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$106,338,000	83%	83%	100%
Total	**100%**	**$106,338,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$106,338,000	$106,338,000	$106,338,000
Direct Impact				
	Output	$87,843,747	$87,843,747	$106,338,000
	Job	551.13	551.13	679.55
	Labor Income	$38,171,687	$38,171,687	$46,208,194
	GRP	$43,381,729	$43,381,729	$52,515,136
Total Impact				
	Output	$178,260,282	$191,508,619	$308,506,136
	Job	1,089.69	1,204.22	1,848.67
	Labor Income	$72,119,055	$74,344,055	$112,339,669
	GRP	$98,760,809	$104,118,557	$163,775,958

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$87,843,747	551.13	$38,171,687	$43,381,729
	Total Direct Effects	$87,843,747	551.13	$38,171,687	$43,381,729
	Secondary Effects	$90,416,536	538.56	$33,947,368	$55,379,080
	Total Effects	**$178,260,282**	**1,089.69**	**$72,119,055**	**$98,760,809**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$87,843,747	551.13	$38,171,687	$43,381,729
	Total Direct Effects	$87,843,747	551.13	$38,171,687	$43,381,729
	Secondary Effects	$103,664,873	653.08	$36,172,368	$60,736,828
	Total Effects	**$191,508,619**	**1,204.22**	**$74,344,055**	**$104,118,557**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$106,338,000	679.55	$46,208,194	$52,515,136
	Total Direct Effects	$106,338,000	679.55	$46,208,194	$52,515,136
	Secondary Effects	$202,168,136	1,169.13	$66,131,475	$111,260,822
	Total Effects	**$308,506,136**	**1,848.67**	**$112,339,669**	**$163,775,958**

Victoria MSA

Economic Impact Regions

Regional Impact Area:	Victoria, TX MSA
Regional Impact Area ID:	571
Counties included	Calhoun/Goliad/Victoria/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	571
Regional Impact Area Name:	Victoria, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Calhoun	48057	533	21,057	7,583	$648
Goliad	48175	859	7,327	2,829	$204
Victoria	48469	889	87,552	31,942	$3,349
Total		**2,281**	**115,936**	**42,354**	**$4,201**

Impact Region Profile (2008)

Regional Impact Area ID:	571
Regional Impact Area Name:	Victoria, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$206	$65	$99	4,036
Administrative and Waste Management Services	$141	$68	$90	2,009
Agriculture, Forestry, Fishing and Hunting	$174	$21	$57	3,256
Arts, Entertainment, and Recreation	$40	$10	$15	524
Construction	$796	$295	$324	6,026
Education	$202	$169	$191	3,996
Finance, Insurance, Real Estate, Rental and Leasing	$353	$98	$231	2,148
Government	$342	$250	$285	5,583
Health Care and Social Assistance	$528	$301	$344	6,661
Imputed Rents	$575	$76	$360	4,121
Information	$214	$29	$54	561
Management of Companies and Enterprises	$22	$9	$12	122
Manufacturing	$6,316	$622	$995	5,919
Mining	$1,218	$290	$617	3,256
Professional, Scientific, and Technical Services	$440	$177	$231	3,196
Retail Trade	$621	$260	$424	10,077
Transportation and Warehousing	$229	$82	$125	1,332
Utilities	$221	$45	$162	456
Wholesale Trade	$379	$144	$246	2,148
Total	**$13,017**	**$3,011**	**$4,861**	**65,425**

San Antonio Bay Rookery Island Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	74%	74%	98%
Heavy Construction Activities	100%	$9,580,100	100%	100%	100%
Total	**100%**	**$9,580,100**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$9,580,100	$9,580,100	$9,580,100
Direct Impact				
	Output	$9,580,100	$9,580,100	$9,580,100
	Job	66.75	66.75	66.75
	Labor Income	$3,563,885	$3,563,885	$3,563,885
	GRP	$4,194,918	$4,194,918	$4,194,918
Total Impact				

Output	$15,097,827	$20,885,627	$27,793,636
Job	106.68	137.98	172.08
Labor Income	$5,275,914	$7,508,786	$9,521,737
GRP	$7,325,486	$10,818,781	$14,218,520

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,580,100	66.75	$3,563,885	$4,194,918
	Total Direct Effects	$9,580,100	66.75	$3,563,885	$4,194,918
	Secondary Effects	$5,517,727	39.93	$1,712,029	$3,130,568
	Total Effects	**$15,097,827**	**106.68**	**$5,275,914**	**$7,325,486**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,580,100	66.75	$3,563,885	$4,194,918
	Total Direct Effects	$9,580,100	66.75	$3,563,885	$4,194,918
	Secondary Effects	$11,305,527	71.22	$3,944,901	$6,623,862
	Total Effects	**$20,885,627**	**137.98**	**$7,508,786**	**$10,818,781**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,580,100	66.75	$3,563,885	$4,194,918
	Total Direct Effects	$9,580,100	66.75	$3,563,885	$4,194,918
	Secondary Effects	$18,213,536	105.33	$5,957,853	$10,023,602
	Total Effects	**$27,793,636**	**172.08**	**$9,521,737**	**$14,218,520**

Matagorda Ship Channel Region

Economic Impact Regions

Regional Impact Area:	MATAGORDA SHIP CHANNEL, TX
Regional Impact Area ID:	7004
Counties included	Calhoun/Goliad/Matagorda/Victoria/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX
Impact Area Type	N/A
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Calhoun	48057	533	21,057	7,583	$648
Goliad	48175	859	7,327	2,829	$204
Matagorda	48321	1,139	37,061	13,674	$1,124
Victoria	48469	889	87,552	31,942	$3,349
Total		**3,420**	**152,997**	**56,028**	**$5,326**

Impact Region Profile (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX
Impact Area Type	N/A
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$0	$0	$0	0
Administrative and Waste Management Services	$10	$5	$7	109
Agriculture, Forestry, Fishing and Hunting	$0	$0	$0	0
Arts, Entertainment, and Recreation	$0	$0	$0	0
Construction	$0	$0	$0	0
Education	$0	$0	$0	0
Finance, Insurance, Real Estate, Rental and Leasing	$0	$0	$0	0
Government	$0	$0	$0	0

Health Care and Social Assistance	$0	$0	$0	0
Imputed Rents	$0	$0	$0	0
Information	$0	$0	$0	0
Management of Companies and Enterprises	$0	$0	$0	0
Manufacturing	$0	$0	$0	0
Mining	$0	$0	$0	0
Professional, Scientific, and Technical Services	$0	$0	$0	0
Retail Trade	$0	$0	$0	0
Transportation and Warehousing	$0	$0	$0	0
Utilities	$0	$0	$0	0
Wholesale Trade	$0	$0	$0	0
Total	**$10**	**$5**	**$7**	**109**

Chester's Island Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$4,492,000	100%	100%	100%
Total	**100%**	**$4,492,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,492,000	$4,492,000	$4,492,000
Direct Impact				
	Output	$4,492,000	$4,492,000	$4,492,000
	Job	31.70	31.70	31.70
	Labor Income	$1,634,636	$1,634,636	$1,634,636
	GRP	$1,934,341	$1,934,341	$1,934,341
Total Impact				
	Output	$7,013,501	$9,793,033	$13,032,120
	Job	49.95	65.10	81.09
	Labor Income	$2,408,382	$3,484,355	$4,428,205
	GRP	$3,360,091	$5,040,195	$6,634,294

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,492,000	31.70	$1,634,636	$1,934,341
	Total Direct Effects	$4,492,000	31.70	$1,634,636	$1,934,341
	Secondary Effects	$2,521,501	18.24	$773,746	$1,425,749
	Total Effects	**$7,013,501**	**49.95**	**$2,408,382**	**$3,360,091**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,492,000	31.70	$1,634,636	$1,934,341
	Total Direct Effects	$4,492,000	31.70	$1,634,636	$1,934,341
	Secondary Effects	$5,301,033	33.40	$1,849,719	$3,105,854
	Total Effects	**$9,793,033**	**65.10**	**$3,484,355**	**$5,040,195**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,492,000	31.70	$1,634,636	$1,934,341
	Total Direct Effects	$4,492,000	31.70	$1,634,636	$1,934,341
	Secondary Effects	$8,540,120	49.39	$2,793,569	$4,699,953
	Total Effects	**$13,032,120**	**81.09**	**$4,428,205**	**$6,634,294**

Rural Texas Generic Model

Economic Impact Regions

Regional Impact Area:	Rural Area Generic Model
Regional Impact Area ID:	RURAL
Counties included	
State Impact Area:	Texas
National Impact:	Yes

Guadalupe River Delta Estuary Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	28%	71%	98%
Heavy Construction Activities	100%	$3,842,000	50%	83%	100%
Total	**100%**	**$3,842,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,842,000	$3,842,000	$3,842,000
Direct Impact				
	Output	$1,928,146	$3,173,598	$3,842,000
	Job	15.33	25.23	30.55
	Labor Income	$532,693	$998,746	$1,248,865
	GRP	$695,432	$1,243,232	$1,569,875
Total Impact				
	Output	$2,539,230	$6,918,777	$11,146,350
	Job	20.77	48.83	72.79
	Labor Income	$718,731	$2,305,573	$3,638,200
	GRP	$1,039,523	$3,437,517	$5,589,737

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,928,146	15.33	$532,693	$695,432
	Total Direct Effects	$1,928,146	15.33	$532,693	$695,432
	Secondary Effects	$611,084	5.44	$186,038	$344,091
	Total Effects	**$2,539,230**	**20.77**	**$718,731**	**$1,039,523**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,173,598	25.23	$998,746	$1,243,232
	Total Direct Effects	$3,173,598	25.23	$998,746	$1,243,232
	Secondary Effects	$3,745,180	23.59	$1,306,827	$2,194,286
	Total Effects	**$6,918,777**	**48.83**	**$2,305,573**	**$3,437,517**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,842,000	30.55	$1,248,865	$1,569,875
	Total Direct Effects	$3,842,000	30.55	$1,248,865	$1,569,875
	Secondary Effects	$7,304,350	42.24	$2,389,335	$4,019,862
	Total Effects	**$11,146,350**	**72.79**	**$3,638,200**	**$5,589,737**

Beaumont MSA

Economic Impact Regions

Regional Impact Area:	Beaumont-Port Arthur, TX MSA
Regional Impact Area ID:	64
Counties included	Hardin/Jefferson/Orange/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Hardin	48199	897	52,588	19,732	$1,948
Jefferson	48245	988	246,761	91,097	$9,034
Orange	48361	380	84,651	32,173	$2,869
Total		**2,265**	**384,000**	**143,002**	**$13,851**

Impact Region Profile (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$749	$248	$377	13,635
Administrative and Waste Management Services	$661	$297	$393	8,984
Agriculture, Forestry, Fishing and Hunting	$208	$37	$69	2,344
Arts, Entertainment, and Recreation	$101	$25	$35	1,470
Construction	$3,346	$1,407	$1,546	22,426
Education	$621	$507	$575	11,374
Finance, Insurance, Real Estate, Rental and Leasing	$998	$268	$609	5,916

Government	$1,264	$917	$1,047	16,763
Health Care and Social Assistance	$1,743	$941	$1,096	21,535
Imputed Rents	$1,985	$278	$1,271	12,027
Information	$833	$124	$247	2,127
Management of Companies and Enterprises	$142	$61	$81	721
Manufacturing	$51,877	$2,391	$4,483	21,966
Mining	$495	$109	$252	1,362
Professional, Scientific, and Technical Services	$2,108	$1,047	$1,237	16,259
Retail Trade	$1,586	$699	$1,084	23,661
Transportation and Warehousing	$909	$310	$472	6,085
Utilities	$697	$145	$507	970
Wholesale Trade	$1,031	$390	$671	5,646
Total	**$71,354**	**$10,199**	**$16,054**	**195,272**

Lower Neches WMA Wetland Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$7,873,000	20%	83%	100%
Total	**100%**	**$7,873,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,873,000	$7,873,000	$7,873,000
Direct Impact				
	Output	$1,540,115	$6,503,315	$7,873,000
	Job	9.82	44.28	53.79
	Labor Income	$654,917	$2,765,463	$3,347,906
	GRP	$747,764	$3,157,521	$3,822,538
Total Impact				
	Output	$2,553,891	$14,177,911	$22,841,024
	Job	16.99	92.63	140.35
	Labor Income	$993,384	$5,443,403	$8,244,115
	GRP	$1,328,865	$7,654,036	$12,060,011

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,540,115	9.82	$654,917	$747,764
	Total Direct Effects	$1,540,115	9.82	$654,917	$747,764
	Secondary Effects	$1,013,776	7.17	$338,467	$581,101
	Total Effects	**$2,553,891**	**16.99**	**$993,384**	**$1,328,865**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$6,503,315	44.28	$2,765,463	$3,157,521
	Total Direct Effects	$6,503,315	44.28	$2,765,463	$3,157,521
	Secondary Effects	$7,674,596	48.35	$2,677,940	$4,496,515
	Total Effects	**$14,177,911**	**92.63**	**$5,443,403**	**$7,654,036**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,873,000	53.79	$3,347,906	$3,822,538
	Total Direct Effects	$7,873,000	53.79	$3,347,906	$3,822,538
	Secondary Effects	$14,968,024	86.56	$4,896,209	$8,237,473
	Total Effects	**$22,841,024**	**140.35**	**$8,244,115**	**$12,060,011**

Sabine Neches Channel Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$10,161,000	20%	83%	100%
Total	**100%**	**$10,161,000**	-	-	-

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$10,161,000	$10,161,000	$10,161,000
Direct Impact				
	Output	$1,987,694	$8,393,266	$10,161,000
	Job	12.68	57.15	69.43
	Labor Income	$845,245	$3,569,143	$4,320,853
	GRP	$965,075	$4,075,140	$4,933,418
Total Impact				
	Output	$3,296,086	$18,298,204	$29,478,934
	Job	21.93	119.55	181.14
	Labor Income	$1,282,074	$7,025,329	$10,639,966
	GRP	$1,715,051	$9,878,402	$15,564,813

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,987,694	12.68	$845,245	$965,075
	Total Direct Effects	$1,987,694	12.68	$845,245	$965,075
	Secondary Effects	$1,308,392	9.25	$436,830	$749,976
	Total Effects	**$3,296,086**	**21.93**	**$1,282,074**	**$1,715,051**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$8,393,266	57.15	$3,569,143	$4,075,140
	Total Direct Effects	$8,393,266	57.15	$3,569,143	$4,075,140
	Secondary Effects	$9,904,938	62.40	$3,456,186	$5,803,263
	Total Effects	**$18,298,204**	**119.55**	**$7,025,329**	**$9,878,402**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$10,161,000	69.43	$4,320,853	$4,933,418
	Total Direct Effects	$10,161,000	69.43	$4,320,853	$4,933,418
	Secondary Effects	$19,317,934	111.71	$6,319,114	$10,631,394
	Total Effects	**$29,478,934**	**181.14**	**$10,639,966**	**$15,564,813**

Texas Point Beach Nourishment

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$36,091,000	20%	83%	100%
Total	**100%**	**$36,091,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$36,091,000	$36,091,000	$36,091,000
Direct Impact				
	Output	$7,060,117	$29,812,160	$36,091,000
	Job	45.02	203.00	246.60
	Labor Income	$3,002,236	$12,677,290	$15,347,298
	GRP	$3,427,863	$14,474,546	$17,523,079
Total Impact				
	Output	$11,707,415	$64,993,649	$104,706,643
	Job	77.89	424.64	643.40
	Labor Income	$4,553,818	$24,953,365	$37,792,247
	GRP	$6,091,714	$35,087,237	$55,284,879

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$7,060,117	45.02	$3,002,236	$3,427,863
	Total Direct Effects	$7,060,117	45.02	$3,002,236	$3,427,863
	Secondary Effects	$4,647,298	32.86	$1,551,582	$2,663,851
	Total Effects	**$11,707,415**	**77.89**	**$4,553,818**	**$6,091,714**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$29,812,160	203.00	$12,677,290	$14,474,546
	Total Direct Effects	$29,812,160	203.00	$12,677,290	$14,474,546
	Secondary Effects	$35,181,489	221.64	$12,276,075	$20,612,691
	Total Effects	**$64,993,649**	**424.64**	**$24,953,365**	**$35,087,237**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$36,091,000	246.60	$15,347,298	$17,523,079
	Total Direct Effects	$36,091,000	246.60	$15,347,298	$17,523,079
	Secondary Effects	$68,615,643	396.80	$22,444,950	$37,761,800
	Total Effects	**$104,706,643**	**643.40**	**$37,792,247**	**$55,284,879**

Brownsville MSA

Impact Region Definition (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)

Cameron	48061	945	408,253	119,722	$8,874
Total		**945**	**408,253**	**119,722**	**$8,874**

Impact Region Profile (2008)

Regional Impact Area ID:	75
Regional Impact Area Name:	Brownsville-Harlingen, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$589	$187	$289	11,182
Administrative and Waste Management Services	$430	$196	$255	7,996
Agriculture, Forestry, Fishing and Hunting	$250	$60	$99	3,558
Arts, Entertainment, and Recreation	$132	$31	$47	1,782
Construction	$802	$247	$271	6,945
Education	$741	$629	$712	13,730
Finance, Insurance, Real Estate, Rental and Leasing	$881	$213	$588	5,040
Government	$1,513	$1,018	$1,182	18,799
Health Care and Social Assistance	$1,815	$1,006	$1,147	32,569
Imputed Rents	$1,308	$176	$788	9,588
Information	$1,015	$100	$187	2,039
Management of Companies and Enterprises	$33	$12	$16	220
Manufacturing	$3,233	$381	$501	7,217
Mining	$29	$6	$17	59
Professional, Scientific, and Technical Services	$482	$220	$267	4,436
Retail Trade	$1,069	$446	$716	18,691
Transportation and Warehousing	$565	$237	$343	4,715
Utilities	$120	$24	$76	293
Wholesale Trade	$394	$144	$248	3,308
Total	**$15,401**	**$5,334**	**$7,749**	**152,166**

City of S Padre Island Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$2,532,000	85%	85%	100%
Total	**100%**	**$2,532,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,532,000	$2,532,000	$2,532,000
Direct Impact				
	Output	$2,164,338	$2,164,338	$2,532,000
	Job	18.74	18.74	21.92
	Labor Income	$475,362	$475,362	$612,943
	GRP	$652,517	$652,517	$820,502
Total Impact				
	Output	$3,675,673	$4,718,485	$7,345,799
	Job	29.83	34.83	49.76
	Labor Income	$879,175	$1,366,595	$2,187,590
	GRP	$1,427,539	$2,148,981	$3,469,719

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,164,338	18.74	$475,362	$652,517
	Total Direct Effects	$2,164,338	18.74	$475,362	$652,517
	Secondary Effects	$1,511,335	11.09	$403,813	$775,022
	Total Effects	**$3,675,673**	**29.83**	**$879,175**	**$1,427,539**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,164,338	18.74	$475,362	$652,517
	Total Direct Effects	$2,164,338	18.74	$475,362	$652,517
	Secondary Effects	$2,554,147	16.09	$891,233	$1,496,464
	Total Effects	**$4,718,485**	**34.83**	**$1,366,595**	**$2,148,981**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,532,000	21.92	$612,943	$820,502
	Total Direct Effects	$2,532,000	21.92	$612,943	$820,502
	Secondary Effects	$4,813,799	27.84	$1,574,648	$2,649,217
	Total Effects	**$7,345,799**	**49.76**	**$2,187,590**	**$3,469,719**

Restore Barrier Islands Backside Wetlands on S Padre Island

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	71%	71%	98%
Heavy Construction Activities	100%	$5,500,000	85%	85%	100%
Total	**100%**	**$5,500,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,500,000	$5,500,000	$5,500,000
Direct Impact				
	Output	$4,701,366	$4,701,366	$5,500,000
	Job	40.71	40.71	47.62
	Labor Income	$1,032,580	$1,032,580	$1,331,432
	GRP	$1,417,394	$1,417,394	$1,782,291
Total Impact				
	Output	$7,984,282	$10,249,473	$15,956,514
	Job	64.80	75.66	108.09
	Labor Income	$1,909,740	$2,968,512	$4,751,875
	GRP	$3,100,895	$4,668,008	$7,536,909

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$4,701,366	40.71	$1,032,580	$1,417,394
	Total Direct Effects	$4,701,366	40.71	$1,032,580	$1,417,394
	Secondary Effects	$3,282,916	24.09	$877,160	$1,683,500
	Total Effects	**$7,984,282**	**64.80**	**$1,909,740**	**$3,100,895**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,701,366	40.71	$1,032,580	$1,417,394
	Total Direct Effects	$4,701,366	40.71	$1,032,580	$1,417,394
	Secondary Effects	$5,548,107	34.95	$1,935,932	$3,250,613
	Total Effects	**$10,249,473**	**75.66**	**$2,968,512**	**$4,668,008**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,500,000	47.62	$1,331,432	$1,782,291
	Total Direct Effects	$5,500,000	47.62	$1,331,432	$1,782,291
	Secondary Effects	$10,456,514	60.47	$3,420,443	$5,754,618
	Total Effects	**$15,956,514**	**108.09**	**$4,751,875**	**$7,536,909**

Corpus Christi MSA

Economic Impact Regions

Regional Impact Area:	Corpus Christi, TX MSA
Regional Impact Area ID:	94
Counties included	Aransas/Nueces/San Patricio/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Aransas	48007	243	25,862	10,615	$951
Nueces	48355	844	325,578	117,349	$12,005
San Patricio	48409	705	70,499	23,745	$2,256
Total		**1,791**	**421,939**	**151,709**	**$15,212**

Impact Region Profile (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$1,037	$333	$513	19,298
Administrative and Waste Management Services	$820	$388	$497	15,242
Agriculture, Forestry, Fishing and Hunting	$334	$70	$150	3,965
Arts, Entertainment, and Recreation	$211	$55	$80	2,852
Construction	$3,566	$1,393	$1,530	25,716
Education	$785	$649	$737	14,711
Finance, Insurance, Real Estate, Rental and Leasing	$1,542	$400	$926	8,231
Government	$2,237	$1,544	$1,932	23,550
Health Care and Social Assistance	$2,174	$1,176	$1,360	26,859
Imputed Rents	$2,206	$316	$1,415	13,301
Information	$954	$152	$286	2,688
Management of Companies and Enterprises	$105	$49	$65	440
Manufacturing	$25,955	$1,066	$1,647	10,852
Mining	$3,497	$712	$2,046	5,200
Professional, Scientific, and Technical Services	$2,058	$796	$1,147	13,354
Retail Trade	$1,724	$731	$1,172	27,832
Transportation and Warehousing	$808	$332	$465	5,490
Utilities	$510	$98	$320	812
Wholesale Trade	$1,318	$502	$858	7,237
Total	**$51,842**	**$10,761**	**$17,143**	**227,631**

Aransas NWR Dagger Point Shoreline Preservation

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$2,554,000	88%	88%	100%
Total	**100%**	**$2,554,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,554,000	$2,554,000	$2,554,000
Direct Impact				
	Output	$2,236,323	$2,236,323	$2,554,000
	Job	14.86	14.86	17.07
	Labor Income	$896,587	$896,587	$1,023,950
	GRP	$1,037,110	$1,037,110	$1,184,435
Total Impact				
	Output	$4,097,425	$4,875,419	$7,409,625
	Job	28.20	31.49	45.15
	Labor Income	$1,504,011	$1,817,462	$2,612,279
	GRP	$2,123,484	$2,583,346	$3,856,670

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,236,323	14.86	$896,587	$1,037,110
	Total Direct Effects	$2,236,323	14.86	$896,587	$1,037,110
	Secondary Effects	$1,861,102	13.34	$607,424	$1,086,374
	Total Effects	**$4,097,425**	**28.20**	**$1,504,011**	**$2,123,484**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,236,323	14.86	$896,587	$1,037,110
	Total Direct Effects	$2,236,323	14.86	$896,587	$1,037,110
	Secondary Effects	$2,639,096	16.63	$920,875	$1,546,236
	Total Effects	**$4,875,419**	**31.49**	**$1,817,462**	**$2,583,346**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,554,000	17.07	$1,023,950	$1,184,435
	Total Direct Effects	$2,554,000	17.07	$1,023,950	$1,184,435
	Secondary Effects	$4,855,625	28.08	$1,588,330	$2,672,235
	Total Effects	**$7,409,625**	**45.15**	**$2,612,279**	**$3,856,670**

Copano Bay Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$2,172,000	88%	88%	100%
Total	**100%**	**$2,172,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,172,000	$2,172,000	$2,172,000
Direct Impact				
	Output	$1,901,838	$1,901,838	$2,172,000
	Job	12.64	12.64	14.52
	Labor Income	$762,485	$762,485	$870,798
	GRP	$881,990	$881,990	$1,007,280
Total Impact				
	Output	$3,484,576	$4,146,206	$6,301,372
	Job	23.98	26.78	38.40
	Labor Income	$1,279,057	$1,545,625	$2,221,563

GRP	$1,805,876	$2,196,957	$3,279,831

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,901,838	12.64	$762,485	$881,990
	Total Direct Effects	$1,901,838	12.64	$762,485	$881,990
	Secondary Effects	$1,582,738	11.34	$516,572	$923,885
	Total Effects	**$3,484,576**	**23.98**	**$1,279,057**	**$1,805,876**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,901,838	12.64	$762,485	$881,990
	Total Direct Effects	$1,901,838	12.64	$762,485	$881,990
	Secondary Effects	$2,244,369	14.14	$783,140	$1,314,966
	Total Effects	**$4,146,206**	**26.78**	**$1,545,625**	**$2,196,957**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,172,000	14.52	$870,798	$1,007,280
	Total Direct Effects	$2,172,000	14.52	$870,798	$1,007,280
	Secondary Effects	$4,129,372	23.88	$1,350,764	$2,272,551
	Total Effects	**$6,301,372**	**38.40**	**$2,221,563**	**$3,279,831**

Lamar Beach Road Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	4%	$138,800	98%	98%	98%
Heavy Construction Activities	96%	$3,331,200	88%	88%	100%
Total	**100%**	**$3,470,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,470,000	$3,470,000	$3,470,000
Direct Impact				
	Output	$3,052,766	$3,052,766	$3,467,778
	Job	22.86	22.86	25.75
	Labor Income	$1,273,709	$1,273,709	$1,440,347
	GRP	$1,454,666	$1,454,666	$1,647,330
Total Impact				
	Output	$5,583,762	$6,635,944	$10,051,489
	Job	41.05	45.48	63.84
	Labor Income	$2,098,142	$2,520,319	$3,588,791
	GRP	$2,934,574	$3,554,737	$5,268,396

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$135,914	3.47	$104,285	$101,956
36	Construction of other new nonresidential structures	$2,916,851	19.39	$1,169,424	$1,352,710
	Total Direct Effects	$3,052,766	22.86	$1,273,709	$1,454,666
	Secondary Effects	$2,530,996	18.19	$824,433	$1,479,908
	Total Effects	**$5,583,762**	**41.05**	**$2,098,142**	**$2,934,574**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$135,914	3.47	$104,285	$101,956
36	Construction of other new nonresidential structures	$2,916,851	19.39	$1,169,424	$1,352,710

	Total Direct Effects	$3,052,766	22.86	$1,273,709	$1,454,666
	Secondary Effects	$3,583,179	22.62	$1,246,610	$2,100,071
	Total Effects	**$6,635,944**	**45.48**	**$2,520,319**	**$3,554,737**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$136,578	3.49	$104,802	$102,463
36	Construction of other new nonresidential structures	$3,331,200	22.27	$1,335,545	$1,544,867
	Total Direct Effects	$3,467,778	25.75	$1,440,347	$1,647,330
	Secondary Effects	$6,583,711	38.09	$2,148,444	$3,621,067
	Total Effects	**$10,051,489**	**63.84**	**$3,588,791**	**$5,268,396**

Newcomb's Point Shoreline Stabilization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$2,682,000	88%	88%	100%
Total	**100%**	**$2,682,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,682,000	$2,682,000	$2,682,000
Direct Impact				
	Output	$2,348,402	$2,348,402	$2,682,000
	Job	15.61	15.61	17.93
	Labor Income	$941,521	$941,521	$1,075,268
	GRP	$1,089,087	$1,089,087	$1,243,796
Total Impact				
	Output	$4,302,777	$5,119,763	$7,780,976
	Job	29.62	33.07	47.41
	Labor Income	$1,579,388	$1,908,548	$2,743,200
	GRP	$2,229,907	$2,712,817	$4,049,957

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,348,402	15.61	$941,521	$1,089,087
	Total Direct Effects	$2,348,402	15.61	$941,521	$1,089,087
	Secondary Effects	$1,954,376	14.01	$637,867	$1,140,820
	Total Effects	**$4,302,777**	**29.62**	**$1,579,388**	**$2,229,907**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,348,402	15.61	$941,521	$1,089,087
	Total Direct Effects	$2,348,402	15.61	$941,521	$1,089,087
	Secondary Effects	$2,771,361	17.46	$967,027	$1,623,729
	Total Effects	**$5,119,763**	**33.07**	**$1,908,548**	**$2,712,817**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,682,000	17.93	$1,075,268	$1,243,796
	Total Direct Effects	$2,682,000	17.93	$1,075,268	$1,243,796
	Secondary Effects	$5,098,976	29.49	$1,667,933	$2,806,161
	Total Effects	**$7,780,976**	**47.41**	**$2,743,200**	**$4,049,957**

Tern Island and Triangle Tree Island Rookery Habitat Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%

Heavy Construction Activities	100%	$3,507,000	88%	88%	100%
Total	**100%**	**$3,507,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,507,000	$3,507,000	$3,507,000
Direct Impact				
	Output	$3,070,785	$3,070,785	$3,507,000
	Job	20.41	20.41	23.44
	Labor Income	$1,231,139	$1,231,139	$1,406,027
	GRP	$1,424,097	$1,424,097	$1,626,395
Total Impact				
	Output	$5,626,339	$6,694,634	$10,174,453
	Job	38.73	43.24	62.00
	Labor Income	$2,065,218	$2,495,630	$3,587,026
	GRP	$2,915,841	$3,547,296	$5,295,749

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,070,785	20.41	$1,231,139	$1,424,097
	Total Direct Effects	$3,070,785	20.41	$1,231,139	$1,424,097
	Secondary Effects	$2,555,554	18.32	$834,078	$1,491,743
	Total Effects	**$5,626,339**	**38.73**	**$2,065,218**	**$2,915,841**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,070,785	20.41	$1,231,139	$1,424,097
	Total Direct Effects	$3,070,785	20.41	$1,231,139	$1,424,097
	Secondary Effects	$3,623,849	22.83	$1,264,490	$2,123,199
	Total Effects	**$6,694,634**	**43.24**	**$2,495,630**	**$3,547,296**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,507,000	23.44	$1,406,027	$1,626,395
	Total Direct Effects	$3,507,000	23.44	$1,406,027	$1,626,395
	Secondary Effects	$6,667,453	38.56	$2,180,999	$3,669,353
	Total Effects	**$10,174,453**	**62.00**	**$3,587,026**	**$5,295,749**

Houston MSA

Economic Impact Regions

Regional Impact Area:	Houston Sugar Land Baytown TX MSA
Regional Impact Area ID:	19
Counties included	Austin/Brazoria/Chambers/Fort Bend/Galveston/Harris/Liberty/Montgomery/San Jacinto/Waller/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Austin	48015	657	27,467	10,062	$1,061
Brazoria	48039	1,442	311,212	106,478	$11,602
Chambers	48071	629	34,498	12,175	$1,422
Fort Bend	48157	886	547,876	163,740	$25,503
Galveston	48167	408	297,079	112,536	$11,937
Harris	48201	1,774	4,091,773	1,425,897	$196,779
Liberty	48291	1,176	77,344	25,224	$2,556
Montgomery	48339	1,077	452,286	156,734	$20,366
San Jacinto	48407	628	25,788	10,091	$783

Waller	48473	519	38,727	12,653	$1,235
Total		**9,195**	**5,904,050**	**2,035,590**	**$273,247**

Impact Region Profile (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$13,236	$4,560	$7,005	216,742
Administrative and Waste Management Services	$19,024	$9,951	$12,493	298,005
Agriculture, Forestry, Fishing and Hunting	$1,092	$272	$394	17,834
Arts, Entertainment, and Recreation	$3,725	$1,342	$1,812	49,670
Construction	$46,428	$18,719	$20,539	324,726
Education	$15,369	$12,441	$14,035	232,139
Finance, Insurance, Real Estate, Rental and Leasing	$60,950	$16,224	$39,111	284,513
Government	$14,071	$10,846	$12,346	178,925
Health Care and Social Assistance	$24,457	$13,352	$15,725	259,514
Imputed Rents	$41,885	$5,351	$27,360	193,605
Information	$18,119	$3,659	$7,479	50,197
Management of Companies and Enterprises	$6,314	$2,651	$3,597	32,227
Manufacturing	$297,676	$30,969	$57,878	246,808
Mining	$146,320	$32,033	$91,390	128,560
Professional, Scientific, and Technical Services	$61,245	$28,206	$37,002	343,983
Retail Trade	$23,550	$10,251	$16,149	336,109
Transportation and Warehousing	$33,952	$12,636	$17,865	167,737
Utilities	$44,650	$9,551	$32,358	17,197
Wholesale Trade	$37,816	$14,498	$24,901	164,951
Total	**$909,877**	**$237,514**	**$439,440**	**3,543,441**

Candy Abshier WMA Shoreline Protection and Marsh Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$1,623,000	83%	83%	100%
Total	**100%**	**$1,623,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts / Impact Areas		Regional	State	National
Total Spending		$1,623,000	$1,623,000	$1,623,000
Direct Impact				
	Output	$1,340,729	$1,340,729	$1,623,000
	Job	8.41	8.41	10.37
	Labor Income	$582,601	$582,601	$705,260
	GRP	$662,120	$662,120	$801,520
Total Impact				
	Output	$2,720,725	$2,922,930	$4,708,622
	Job	16.63	18.38	28.22
	Labor Income	$1,100,728	$1,134,688	$1,714,601
	GRP	$1,507,352	$1,589,125	$2,499,656

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,340,729	8.41	$582,601	$662,120
	Total Direct Effects	$1,340,729	8.41	$582,601	$662,120
	Secondary Effects	$1,379,996	8.22	$518,127	$845,232
	Total Effects	**$2,720,725**	**16.63**	**$1,100,728**	**$1,507,352**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,340,729	8.41	$582,601	$662,120
	Total Direct Effects	$1,340,729	8.41	$582,601	$662,120
	Secondary Effects	$1,582,201	9.97	$552,086	$927,005
	Total Effects	**$2,922,930**	**18.38**	**$1,134,688**	**$1,589,125**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,623,000	10.37	$705,260	$801,520
	Total Direct Effects	$1,623,000	10.37	$705,260	$801,520
	Secondary Effects	$3,085,622	17.84	$1,009,342	$1,698,135
	Total Effects	**$4,708,622**	**28.22**	**$1,714,601**	**$2,499,656**

Dollar Bay Wetland Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$1,961,000	83%	83%	100%
Total	**100%**	**$1,961,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,961,000	$1,961,000	$1,961,000
Direct Impact				
	Output	$1,619,944	$1,619,944	$1,961,000
	Job	10.16	10.16	12.53
	Labor Income	$703,932	$703,932	$852,134
	GRP	$800,011	$800,011	$968,442
Total Impact				
	Output	$3,287,333	$3,531,648	$5,689,222
	Job	20.10	22.21	34.09
	Labor Income	$1,329,962	$1,370,993	$2,071,678
	GRP	$1,821,268	$1,920,071	$3,020,225

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$1,619,944	10.16	$703,932	$800,011
	Total Direct Effects	$1,619,944	10.16	$703,932	$800,011
	Secondary Effects	$1,667,389	9.93	$626,030	$1,021,257
	Total Effects	**$3,287,333**	**20.10**	**$1,329,962**	**$1,821,268**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,619,944	10.16	$703,932	$800,011
	Total Direct Effects	$1,619,944	10.16	$703,932	$800,011
	Secondary Effects	$1,911,704	12.04	$667,062	$1,120,060
	Total Effects	**$3,531,648**	**22.21**	**$1,370,993**	**$1,920,071**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,961,000	12.53	$852,134	$968,442
	Total Direct Effects	$1,961,000	12.53	$852,134	$968,442
	Secondary Effects	$3,728,222	21.56	$1,219,544	$2,051,783
	Total Effects	**$5,689,222**	**34.09**	**$2,071,678**	**$3,020,225**

Galveston Island State Park Wetland Restoration and Shoreline Protection – Phase 3

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	11%	$626,230	75%	75%	98%
Heavy Construction Activities	89%	$5,066,770	83%	83%	100%
Total	**100%**	**$5,693,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,693,000	$5,693,000	$5,693,000
Direct Impact				
	Output	$4,656,982	$4,656,982	$5,682,976
	Job	38.72	38.72	48.67
	Labor Income	$2,176,696	$2,176,696	$2,672,420
	GRP	$2,416,586	$2,416,586	$2,962,184
Total Impact				
	Output	$9,395,363	$10,098,266	$16,445,967
	Job	67.00	73.07	110.97
	Labor Income	$3,939,228	$4,063,405	$6,169,824
	GRP	$5,314,361	$5,605,462	$8,875,541

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$471,422	12.46	$357,900	$349,543
36	Construction of other new nonresidential structures	$4,185,560	26.26	$1,818,796	$2,067,043
	Total Direct Effects	$4,656,982	38.72	$2,176,696	$2,416,586
	Secondary Effects	$4,738,381	28.28	$1,762,531	$2,897,774
	Total Effects	**$9,395,363**	**67.00**	**$3,939,228**	**$5,314,361**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$471,422	12.46	$357,900	$349,543
36	Construction of other new nonresidential structures	$4,185,560	26.26	$1,818,796	$2,067,043
	Total Direct Effects	$4,656,982	38.72	$2,176,696	$2,416,586
	Secondary Effects	$5,441,284	34.35	$1,886,709	$3,188,875
	Total Effects	**$10,098,266**	**73.07**	**$4,063,405**	**$5,605,462**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$616,206	16.29	$470,702	$459,954
36	Construction of other new nonresidential structures	$5,066,770	32.38	$2,201,718	$2,502,230
	Total Direct Effects	$5,682,976	48.67	$2,672,420	$2,962,184
	Secondary Effects	$10,762,991	62.30	$3,497,404	$5,913,358
	Total Effects	**$16,445,967**	**110.97**	**$6,169,824**	**$8,875,541**

Oyster Bay – West Bay Breach Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$4,518,000	83%	83%	100%
Total	**100%**	**$4,518,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,518,000	$4,518,000	$4,518,000
Direct Impact				
	Output	$3,732,232	$3,732,232	$4,518,000
	Job	23.42	23.42	28.87
	Labor Income	$1,621,807	$1,621,807	$1,963,255
	GRP	$1,843,167	$1,843,167	$2,231,219
Total Impact				
	Output	$7,573,774	$8,136,658	$13,107,551
	Job	46.30	51.16	78.54
	Labor Income	$3,064,134	$3,158,668	$4,772,994
	GRP	$4,196,067	$4,423,702	$6,958,376

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$3,732,232	23.42	$1,621,807	$1,843,167
	Total Direct Effects	$3,732,232	23.42	$1,621,807	$1,843,167
	Secondary Effects	$3,841,542	22.88	$1,442,327	$2,352,900
	Total Effects	**$7,573,774**	**46.30**	**$3,064,134**	**$4,196,067**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,732,232	23.42	$1,621,807	$1,843,167
	Total Direct Effects	$3,732,232	23.42	$1,621,807	$1,843,167
	Secondary Effects	$4,404,426	27.75	$1,536,861	$2,580,536
	Total Effects	**$8,136,658**	**51.16**	**$3,158,668**	**$4,423,702**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,518,000	28.87	$1,963,255	$2,231,219
	Total Direct Effects	$4,518,000	28.87	$1,963,255	$2,231,219
	Secondary Effects	$8,589,551	49.67	$2,809,739	$4,727,157
	Total Effects	**$13,107,551**	**78.54**	**$4,772,994**	**$6,958,376**

Packery Channel Nature Park Habitat Restoration – Phase 2

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	1%	$24,120	98%	98%	98%
Heavy Construction Activities	99%	$2,387,880	88%	88%	100%
Total	**100%**	**$2,412,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts / Impact Areas		Regional	State	National
Total Spending		$2,412,000	$2,412,000	$2,412,000
Direct Impact				
	Output	$2,114,484	$2,114,484	$2,411,614
	Job	14.50	14.50	16.57
	Labor Income	$856,392	$856,392	$975,561
	GRP	$987,371	$987,371	$1,125,201
Total Impact				
	Output	$3,872,528	$4,606,426	$6,994,942
	Job	27.11	30.21	43.07
	Labor Income	$1,429,897	$1,725,278	$2,473,922
	GRP	$2,014,021	$2,447,511	$3,647,199

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$23,619	0.60	$18,122	$17,717
36	Construction of other new nonresidential structures	$2,090,866	13.90	$838,270	$969,653
	Total Direct Effects	$2,114,484	14.50	$856,392	$987,371
	Secondary Effects	$1,758,044	12.61	$573,505	$1,026,650
	Total Effects	**$3,872,528**	**27.11**	**$1,429,897**	**$2,014,021**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$23,619	0.60	$18,122	$17,717
36	Construction of other new nonresidential structures	$2,090,866	13.90	$838,270	$969,653
	Total Direct Effects	$2,114,484	14.50	$856,392	$987,371
	Secondary Effects	$2,491,942	15.71	$868,886	$1,460,140
	Total Effects	**$4,606,426**	**30.21**	**$1,725,278**	**$2,447,511**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$23,734	0.61	$18,212	$17,805
36	Construction of other new nonresidential structures	$2,387,880	15.96	$957,349	$1,107,396
	Total Direct Effects	$2,411,614	16.57	$975,561	$1,125,201
	Secondary Effects	$4,583,328	26.51	$1,498,361	$2,521,998
	Total Effects	**$6,994,942**	**43.07**	**$2,473,922**	**$3,647,199**

Port Aransas Nature Preserve Stabilization and Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	98%	98%	98%
Heavy Construction Activities	100%	$4,314,000	88%	88%	100%
Total	**100%**	**$4,314,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,314,000	$4,314,000	$4,314,000
Direct Impact				
	Output	$3,777,407	$3,777,407	$4,314,000
	Job	25.11	25.11	28.83
	Labor Income	$1,514,438	$1,514,438	$1,729,569
	GRP	$1,751,798	$1,751,798	$2,000,647
Total Impact				
	Output	$6,921,022	$8,235,144	$12,515,709
	Job	47.64	53.19	76.26
	Labor Income	$2,540,447	$3,069,902	$4,412,441
	GRP	$3,586,808	$4,363,569	$6,514,360

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,777,407	25.11	$1,514,438	$1,751,798
	Total Direct Effects	$3,777,407	25.11	$1,514,438	$1,751,798

	Secondary Effects	$3,143,615	22.53	$1,026,009	$1,835,010
	Total Effects	**$6,921,022**	**47.64**	**$2,540,447**	**$3,586,808**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,777,407	25.11	$1,514,438	$1,751,798
	Total Direct Effects	$3,777,407	25.11	$1,514,438	$1,751,798
	Secondary Effects	$4,457,738	28.08	$1,555,464	$2,611,770
	Total Effects	**$8,235,144**	**53.19**	**$3,069,902**	**$4,363,569**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,314,000	28.83	$1,729,569	$2,000,647
	Total Direct Effects	$4,314,000	28.83	$1,729,569	$2,000,647
	Secondary Effects	$8,201,709	47.43	$2,682,871	$4,513,713
	Total Effects	**$12,515,709**	**76.26**	**$4,412,441**	**$6,514,360**

Matagorda Ship Channel Region

Economic Impact Regions

Regional Impact Area:	MATAGORDA SHIP CHANNEL, TX
Regional Impact Area ID:	7004
Counties included	Calhoun/Goliad/Matagorda/Victoria/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX

Impact Area Type	N/A
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Calhoun	48057	533	21,057	7,583	$648
Goliad	48175	859	7,327	2,829	$204
Matagorda	48321	1,139	37,061	13,674	$1,124
Victoria	48469	889	87,552	31,942	$3,349
Total		**3,420**	**152,997**	**56,028**	**$5,326**

Impact Region Profile (2008)

Regional Impact Area ID:	7004
Regional Impact Area Name:	MATAGORDA SHIP CHANNEL, TX
Impact Area Type	N/A
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$0	$0	$0	0
Administrative and Waste Management Services	$10	$5	$7	109
Agriculture, Forestry, Fishing and Hunting	$0	$0	$0	0
Arts, Entertainment, and Recreation	$0	$0	$0	0
Construction	$0	$0	$0	0
Education	$0	$0	$0	0
Finance, Insurance, Real Estate, Rental and Leasing	$0	$0	$0	0
Government	$0	$0	$0	0
Health Care and Social Assistance	$0	$0	$0	0
Imputed Rents	$0	$0	$0	0
Information	$0	$0	$0	0
Management of Companies and Enterprises	$0	$0	$0	0
Manufacturing	$0	$0	$0	0
Mining	$0	$0	$0	0
Professional, Scientific, and Technical Services	$0	$0	$0	0
Retail Trade	$0	$0	$0	0
Transportation and Warehousing	$0	$0	$0	0
Utilities	$0	$0	$0	0
Wholesale Trade	$0	$0	$0	0
Total	**$10**	**$5**	**$7**	**109**

Welder Flats Wildlife Management Area

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$1,522,000	100%	100%	100%
Total	**100%**	**$1,522,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,522,000	$1,522,000	$1,522,000
Direct Impact				
	Output	$1,522,000	$1,522,000	$1,522,000
	Job	10.74	10.74	10.74
	Labor Income	$553,855	$553,855	$553,855
	GRP	$655,402	$655,402	$655,402
Total Impact				
	Output	$2,376,347	$3,318,120	$4,415,603
	Job	16.92	22.06	27.48
	Labor Income	$816,019	$1,180,585	$1,500,385
	GRP	$1,138,481	$1,707,742	$2,247,862

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,522,000	10.74	$553,855	$655,402
	Total Direct Effects	$1,522,000	10.74	$553,855	$655,402
	Secondary Effects	$854,347	6.18	$262,164	$483,079
	Total Effects	**$2,376,347**	**16.92**	**$816,019**	**$1,138,481**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,522,000	10.74	$553,855	$655,402
	Total Direct Effects	$1,522,000	10.74	$553,855	$655,402
	Secondary Effects	$1,796,120	11.32	$626,730	$1,052,340
	Total Effects	**$3,318,120**	**22.06**	**$1,180,585**	**$1,707,742**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,522,000	10.74	$553,855	$655,402
	Total Direct Effects	$1,522,000	10.74	$553,855	$655,402
	Secondary Effects	$2,893,603	16.73	$946,530	$1,592,460
	Total Effects	**$4,415,603**	**27.48**	**$1,500,385**	**$2,247,862**

Mad Island Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	9%	$632,530	87%	87%	98%
Heavy Construction Activities	91%	$6,722,470	100%	100%	100%
Total	**100%**	**$7,355,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$7,355,000	$7,355,000	$7,355,000
Direct Impact				
	Output	$7,270,936	$7,270,936	$7,344,875
	Job	63.28	63.28	65.41
	Labor Income	$2,850,542	$2,850,542	$2,908,149
	GRP	$3,288,447	$3,288,447	$3,344,832
Total Impact				
	Output	$11,403,015	$15,778,579	$21,267,026
	Job	93.00	117.02	145.98
	Labor Income	$4,103,146	$5,802,363	$7,438,715

GRP	$5,613,315	$8,272,656	$10,996,696

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$548,466	15.83	$404,240	$393,623
36	Construction of other new nonresidential structures	$6,722,470	47.45	$2,446,303	$2,894,825
	Total Direct Effects	$7,270,936	63.28	$2,850,542	$3,288,447
	Secondary Effects	$4,132,079	29.72	$1,252,604	$2,324,868
	Total Effects	**$11,403,015**	**93.00**	**$4,103,146**	**$5,613,315**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$548,466	15.83	$404,240	$393,623
36	Construction of other new nonresidential structures	$6,722,470	47.45	$2,446,303	$2,894,825
	Total Direct Effects	$7,270,936	63.28	$2,850,542	$3,288,447
	Secondary Effects	$8,507,642	53.74	$2,951,820	$4,984,209
	Total Effects	**$15,778,579**	**117.02**	**$5,802,363**	**$8,272,656**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$622,405	17.97	$461,846	$450,008
36	Construction of other new nonresidential structures	$6,722,470	47.45	$2,446,303	$2,894,825
	Total Direct Effects	$7,344,875	65.41	$2,908,149	$3,344,832
	Secondary Effects	$13,922,151	80.57	$4,530,567	$7,651,864
	Total Effects	**$21,267,026**	**145.98**	**$7,438,715**	**$10,996,696**

Lavaca Bay Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$1,234,000	100%	100%	100%
Total	**100%**	**$1,234,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$1,234,000	$1,234,000	$1,234,000
Direct Impact				
	Output	$1,234,000	$1,234,000	$1,234,000
	Job	8.71	8.71	8.71
	Labor Income	$449,052	$449,052	$449,052
	GRP	$531,384	$531,384	$531,384
Total Impact				
	Output	$1,926,683	$2,690,250	$3,580,061
	Job	13.72	17.88	22.28
	Labor Income	$661,608	$957,189	$1,216,475
	GRP	$923,053	$1,384,595	$1,822,511

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,234,000	8.71	$449,052	$531,384
	Total Direct Effects	$1,234,000	8.71	$449,052	$531,384
	Secondary Effects	$692,683	5.01	$212,556	$391,668
	Total Effects	**$1,926,683**	**13.72**	**$661,608**	**$923,053**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,234,000	8.71	$449,052	$531,384

	Total Direct Effects	$1,234,000	8.71	$449,052	$531,384
	Secondary Effects	$1,456,250	9.17	$508,138	$853,211
	Total Effects	**$2,690,250**	**17.88**	**$957,189**	**$1,384,595**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,234,000	8.71	$449,052	$531,384
	Total Direct Effects	$1,234,000	8.71	$449,052	$531,384
	Secondary Effects	$2,346,061	13.57	$767,423	$1,291,127
	Total Effects	**$3,580,061**	**22.28**	**$1,216,475**	**$1,822,511**

Ocean Drive Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$4,491,000	100%	100%	100%
Total	**100%**	**$4,491,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,491,000	$4,491,000	$4,491,000
Direct Impact				
	Output	$4,491,000	$4,491,000	$4,491,000
	Job	31.70	31.70	31.70
	Labor Income	$1,634,272	$1,634,272	$1,634,272
	GRP	$1,933,911	$1,933,911	$1,933,911
Total Impact				
	Output	$7,011,940	$9,790,853	$13,029,219
	Job	49.93	65.09	81.07
	Labor Income	$2,407,846	$3,483,580	$4,427,220
	GRP	$3,359,343	$5,039,073	$6,632,818

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,491,000	31.70	$1,634,272	$1,933,911
	Total Direct Effects	$4,491,000	31.70	$1,634,272	$1,933,911
	Secondary Effects	$2,520,940	18.24	$773,574	$1,425,432
	Total Effects	**$7,011,940**	**49.93**	**$2,407,846**	**$3,359,343**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,491,000	31.70	$1,634,272	$1,933,911
	Total Direct Effects	$4,491,000	31.70	$1,634,272	$1,933,911
	Secondary Effects	$5,299,853	33.39	$1,849,308	$3,105,162
	Total Effects	**$9,790,853**	**65.09**	**$3,483,580**	**$5,039,073**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,491,000	31.70	$1,634,272	$1,933,911
	Total Direct Effects	$4,491,000	31.70	$1,634,272	$1,933,911
	Secondary Effects	$8,538,219	49.38	$2,792,948	$4,698,907
	Total Effects	**$13,029,219**	**81.07**	**$4,427,220**	**$6,632,818**

Port Lavaca Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%

Heavy Construction Activities	100%	$2,361,000	100%	100%	100%
Total	**100%**	**$2,361,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,361,000	$2,361,000	$2,361,000
Direct Impact				
	Output	$2,361,000	$2,361,000	$2,361,000
	Job	16.66	16.66	16.66
	Labor Income	$859,166	$859,166	$859,166
	GRP	$1,016,692	$1,016,692	$1,016,692
Total Impact				
	Output	$3,686,304	$5,147,229	$6,849,696
	Job	26.25	34.22	42.62
	Labor Income	$1,265,848	$1,831,381	$2,327,469
	GRP	$1,766,067	$2,649,132	$3,486,992

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,361,000	16.66	$859,166	$1,016,692
	Total Direct Effects	$2,361,000	16.66	$859,166	$1,016,692
	Secondary Effects	$1,325,304	9.59	$406,682	$749,375
	Total Effects	**$3,686,304**	**26.25**	**$1,265,848**	**$1,766,067**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,361,000	16.66	$859,166	$1,016,692
	Total Direct Effects	$2,361,000	16.66	$859,166	$1,016,692
	Secondary Effects	$2,786,229	17.55	$972,214	$1,632,440
	Total Effects	**$5,147,229**	**34.22**	**$1,831,381**	**$2,649,132**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,361,000	16.66	$859,166	$1,016,692
	Total Direct Effects	$2,361,000	16.66	$859,166	$1,016,692
	Secondary Effects	$4,488,696	25.96	$1,468,303	$2,470,300
	Total Effects	**$6,849,696**	**42.62**	**$2,327,469**	**$3,486,992**

Palacios Shoreline Revitalization

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$4,400,000	100%	100%	100%
Total	**100%**	**$4,400,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,400,000	$4,400,000	$4,400,000
Direct Impact				
	Output	$4,400,000	$4,400,000	$4,400,000
	Job	31.05	31.05	31.05
	Labor Income	$1,601,157	$1,601,157	$1,601,157
	GRP	$1,894,724	$1,894,724	$1,894,724
Total Impact				
	Output	$6,869,858	$9,592,463	$12,765,211
	Job	48.92	63.77	79.43
	Labor Income	$2,359,057	$3,412,993	$4,337,512
	GRP	$3,291,273	$4,936,968	$6,498,418

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,400,000	31.05	$1,601,157	$1,894,724
	Total Direct Effects	$4,400,000	31.05	$1,601,157	$1,894,724
	Secondary Effects	$2,469,858	17.87	$757,899	$1,396,549
	Total Effects	**$6,869,858**	**48.92**	**$2,359,057**	**$3,291,273**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,400,000	31.05	$1,601,157	$1,894,724
	Total Direct Effects	$4,400,000	31.05	$1,601,157	$1,894,724
	Secondary Effects	$5,192,463	32.71	$1,811,836	$3,042,243
	Total Effects	**$9,592,463**	**63.77**	**$3,412,993**	**$4,936,968**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,400,000	31.05	$1,601,157	$1,894,724
	Total Direct Effects	$4,400,000	31.05	$1,601,157	$1,894,724
	Secondary Effects	$8,365,211	48.38	$2,736,355	$4,603,694
	Total Effects	**$12,765,211**	**79.43**	**$4,337,512**	**$6,498,418**

Coon Islands Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	87%	87%	98%
Heavy Construction Activities	100%	$5,402,000	100%	100%	100%
Total	**100%**	**$5,402,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$5,402,000	$5,402,000	$5,402,000
Direct Impact				
	Output	$5,402,000	$5,402,000	$5,402,000
	Job	38.13	38.13	38.13
	Labor Income	$1,965,784	$1,965,784	$1,965,784
	GRP	$2,326,205	$2,326,205	$2,326,205
Total Impact				
	Output	$8,434,313	$11,776,929	$15,672,198
	Job	60.06	78.29	97.52
	Labor Income	$2,896,278	$4,190,224	$5,325,282
	GRP	$4,040,786	$6,061,250	$7,978,286

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,402,000	38.13	$1,965,784	$2,326,205
	Total Direct Effects	$5,402,000	38.13	$1,965,784	$2,326,205
	Secondary Effects	$3,032,313	21.94	$930,494	$1,714,581
	Total Effects	**$8,434,313**	**60.06**	**$2,896,278**	**$4,040,786**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,402,000	38.13	$1,965,784	$2,326,205
	Total Direct Effects	$5,402,000	38.13	$1,965,784	$2,326,205
	Secondary Effects	$6,374,929	40.16	$2,224,440	$3,735,045
	Total Effects	**$11,776,929**	**78.29**	**$4,190,224**	**$6,061,250**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$5,402,000	38.13	$1,965,784	$2,326,205
	Total Direct Effects	$5,402,000	38.13	$1,965,784	$2,326,205
	Secondary Effects	$10,270,198	59.39	$3,359,497	$5,652,081
	Total Effects	**$15,672,198**	**97.52**	**$5,325,282**	**$7,978,286**

Restore East Matagorda Bay

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	78%	$500,760	87%	87%	98%
Heavy Construction Activities	22%	$141,240	100%	100%	100%
Total	**100%**	**$642,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$642,000	$642,000	$642,000
Direct Impact				
	Output	$575,448	$575,448	$633,984
	Job	13.53	13.53	15.22
	Labor Income	$371,425	$371,425	$417,030
	GRP	$372,443	$372,443	$417,082
Total Impact				
	Output	$938,583	$1,196,882	$1,806,205
	Job	16.02	17.56	22.05
	Labor Income	$470,693	$574,966	$781,852
	GRP	$568,620	$736,234	$1,054,262

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$434,208	12.53	$320,028	$311,622
36	Construction of other new nonresidential structures	$141,240	1.00	$51,397	$60,821
	Total Direct Effects	$575,448	13.53	$371,425	$372,443
	Secondary Effects	$363,135	2.49	$99,268	$196,177
	Total Effects	**$938,583**	**16.02**	**$470,693**	**$568,620**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$434,208	12.53	$320,028	$311,622
36	Construction of other new nonresidential structures	$141,240	1.00	$51,397	$60,821
	Total Direct Effects	$575,448	13.53	$371,425	$372,443
	Secondary Effects	$621,434	4.03	$203,541	$363,791
	Total Effects	**$1,196,882**	**17.56**	**$574,966**	**$736,234**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$492,744	14.22	$365,633	$356,261
36	Construction of other new nonresidential structures	$141,240	1.00	$51,397	$60,821
	Total Direct Effects	$633,984	15.22	$417,030	$417,082
	Secondary Effects	$1,172,221	6.83	$364,822	$637,181
	Total Effects	**$1,806,205**	**22.05**	**$781,852**	**$1,054,262**

Micropolitan Texas Generic Model

Economic Impact Regions

Regional Impact Area:	Mircopolitan Area Generic Model
Regional Impact Area ID:	MICROPOLITAN
Counties included	
State Impact Area:	Texas
National Impact:	Yes

Mansfield Rookery Island Shoreline Protection

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	34%	71%	98%
Heavy Construction Activities	100%	$3,711,000	63%	83%	100%
Total	**100%**	**$3,711,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$3,711,000	$3,711,000	$3,711,000
Direct Impact				
	Output	$2,322,530	$3,065,388	$3,711,000
	Job	17.96	23.70	28.69
	Labor Income	$676,477	$954,458	$1,196,048
	GRP	$877,328	$1,204,067	$1,511,722
Total Impact				
	Output	$3,294,227	$6,682,869	$10,766,295
	Job	26.50	46.49	69.49
	Labor Income	$992,762	$2,216,726	$3,503,915
	GRP	$1,434,091	$3,323,534	$5,394,519

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,322,530	17.96	$676,477	$877,328
	Total Direct Effects	$2,322,530	17.96	$676,477	$877,328
	Secondary Effects	$971,696	8.55	$316,285	$556,763
	Total Effects	**$3,294,227**	**26.50**	**$992,762**	**$1,434,091**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,065,388	23.70	$954,458	$1,204,067
	Total Direct Effects	$3,065,388	23.70	$954,458	$1,204,067
	Secondary Effects	$3,617,481	22.79	$1,262,268	$2,119,467
	Total Effects	**$6,682,869**	**46.49**	**$2,216,726**	**$3,323,534**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,711,000	28.69	$1,196,048	$1,511,722
	Total Direct Effects	$3,711,000	28.69	$1,196,048	$1,511,722
	Secondary Effects	$7,055,295	40.80	$2,307,866	$3,882,797
	Total Effects	**$10,766,295**	**69.49**	**$3,503,915**	**$5,394,519**

Restore Upper and Lower Laguna Madre

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	34%	71%	98%
Heavy Construction Activities	100%	$12,004,000	63%	83%	100%
Total	**100%**	**$12,004,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$12,004,000	$12,004,000	$12,004,000
Direct Impact				
	Output	$7,512,707	$9,915,635	$12,004,000
	Job	58.08	76.66	92.81
	Labor Income	$2,188,207	$3,087,392	$3,868,866
	GRP	$2,837,900	$3,894,803	$4,889,978
Total Impact				
	Output	$10,655,860	$21,617,128	$34,825,816
	Job	85.73	150.38	224.78
	Labor Income	$3,211,296	$7,170,460	$11,334,139

GRP	$4,638,865	$10,750,660	$17,449,692

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,512,707	58.08	$2,188,207	$2,837,900
	Total Direct Effects	$7,512,707	58.08	$2,188,207	$2,837,900
	Secondary Effects	$3,143,153	27.65	$1,023,089	$1,800,965
	Total Effects	**$10,655,860**	**85.73**	**$3,211,296**	**$4,638,865**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,915,635	76.66	$3,087,392	$3,894,803
	Total Direct Effects	$9,915,635	76.66	$3,087,392	$3,894,803
	Secondary Effects	$11,701,493	73.72	$4,083,068	$6,855,857
	Total Effects	**$21,617,128**	**150.38**	**$7,170,460**	**$10,750,660**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$12,004,000	92.81	$3,868,866	$4,889,978
	Total Direct Effects	$12,004,000	92.81	$3,868,866	$4,889,978
	Secondary Effects	$22,821,816	131.98	$7,465,273	$12,559,714
	Total Effects	**$34,825,816**	**224.78**	**$11,334,139**	**$17,449,692**

Beaumont MSA

Economic Impact Regions

Regional Impact Area:	Beaumont-Port Arthur, TX MSA
Regional Impact Area ID:	64
Counties included	Hardin/Jefferson/Orange/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Hardin	48199	897	52,588	19,732	$1,948
Jefferson	48245	988	246,761	91,097	$9,034
Orange	48361	380	84,651	32,173	$2,869
Total		**2,265**	**384,000**	**143,002**	**$13,851**

Impact Region Profile (2008)

Regional Impact Area ID:	64
Regional Impact Area Name:	Beaumont-Port Arthur, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$749	$248	$377	13,635
Administrative and Waste Management Services	$661	$297	$393	8,984
Agriculture, Forestry, Fishing and Hunting	$208	$37	$69	2,344
Arts, Entertainment, and Recreation	$101	$25	$35	1,470
Construction	$3,346	$1,407	$1,546	22,426
Education	$621	$507	$575	11,374
Finance, Insurance, Real Estate, Rental and Leasing	$998	$268	$609	5,916

Government	$1,264	$917	$1,047	16,763
Health Care and Social Assistance	$1,743	$941	$1,096	21,535
Imputed Rents	$1,985	$278	$1,271	12,027
Information	$833	$124	$247	2,127
Management of Companies and Enterprises	$142	$61	$81	721
Manufacturing	$51,877	$2,391	$4,483	21,966
Mining	$495	$109	$252	1,362
Professional, Scientific, and Technical Services	$2,108	$1,047	$1,237	16,259
Retail Trade	$1,586	$699	$1,084	23,661
Transportation and Warehousing	$909	$310	$472	6,085
Utilities	$697	$145	$507	970
Wholesale Trade	$1,031	$390	$671	5,646
Total	**$71,354**	**$10,199**	**$16,054**	**195,272**

Sabine Pass Jetty Repair

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$105,000,000	20%	83%	100%
Total	**100%**	**$105,000,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$105,000,000	$105,000,000	$105,000,000
Direct Impact				
	Output	$20,540,087	$86,732,892	$105,000,000
	Job	130.99	590.60	717.44
	Labor Income	$8,734,444	$36,882,200	$44,650,086
	GRP	$9,972,724	$42,110,978	$50,980,114
Total Impact				
	Output	$34,060,528	$189,086,839	$304,624,352
	Job	226.60	1,235.42	1,871.85
	Labor Income	$13,248,481	$72,597,140	$109,949,460
	GRP	$17,722,699	$102,079,740	$160,840,995

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$20,540,087	130.99	$8,734,444	$9,972,724
	Total Direct Effects	$20,540,087	130.99	$8,734,444	$9,972,724
	Secondary Effects	$13,520,441	95.61	$4,514,036	$7,749,975
	Total Effects	**$34,060,528**	**226.60**	**$13,248,481**	**$17,722,699**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$86,732,892	590.60	$36,882,200	$42,110,978
	Total Direct Effects	$86,732,892	590.60	$36,882,200	$42,110,978
	Secondary Effects	$102,353,947	644.82	$35,714,939	$59,968,762
	Total Effects	**$189,086,839**	**1,235.42**	**$72,597,140**	**$102,079,740**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$105,000,000	717.44	$44,650,086	$50,980,114
	Total Direct Effects	$105,000,000	717.44	$44,650,086	$50,980,114
	Secondary Effects	$199,624,352	1,154.42	$65,299,374	$109,860,881
	Total Effects	**$304,624,352**	**1,871.85**	**$109,949,460**	**$160,840,995**

I-10 Drainage Improvements at Cow Bayou

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$4,967,000	20%	83%	100%
Total	**100%**	**$4,967,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,967,000	$4,967,000	$4,967,000
Direct Impact				
	Output	$971,644	$4,102,879	$4,967,000
	Job	6.20	27.94	33.94
	Labor Income	$413,181	$1,744,704	$2,112,162
	GRP	$471,757	$1,992,050	$2,411,602
Total Impact				
	Output	$1,611,225	$8,944,708	$14,410,182
	Job	10.72	58.44	88.55
	Labor Income	$626,716	$3,434,190	$5,201,133
	GRP	$838,368	$4,828,858	$7,608,545

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$971,644	6.20	$413,181	$471,757
	Total Direct Effects	$971,644	6.20	$413,181	$471,757
	Secondary Effects	$639,581	4.52	$213,535	$366,611
	Total Effects	**$1,611,225**	**10.72**	**$626,716**	**$838,368**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,102,879	27.94	$1,744,704	$1,992,050
	Total Direct Effects	$4,102,879	27.94	$1,744,704	$1,992,050
	Secondary Effects	$4,841,829	30.50	$1,689,487	$2,836,808
	Total Effects	**$8,944,708**	**58.44**	**$3,434,190**	**$4,828,858**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,967,000	33.94	$2,112,162	$2,411,602
	Total Direct Effects	$4,967,000	33.94	$2,112,162	$2,411,602
	Secondary Effects	$9,443,182	54.61	$3,088,971	$5,196,943
	Total Effects	**$14,410,182**	**88.55**	**$5,201,133**	**$7,608,545**

Improve State Highway 73 at Bridge City

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$2,738,000	20%	83%	100%
Total	**100%**	**$2,738,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,738,000	$2,738,000	$2,738,000
Direct Impact				
	Output	$535,607	$2,261,663	$2,738,000
	Job	3.42	15.40	18.71
	Labor Income	$227,761	$961,747	$1,164,304
	GRP	$260,051	$1,098,094	$1,329,367
Total Impact				
	Output	$888,169	$4,930,664	$7,943,443
	Job	5.91	32.22	48.81
	Labor Income	$345,470	$1,893,057	$2,867,063
	GRP	$462,140	$2,661,851	$4,194,120

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0

36	Construction of other new nonresidential structures	$535,607	3.42	$227,761	$260,051
	Total Direct Effects	$535,607	3.42	$227,761	$260,051
	Secondary Effects	$352,562	2.49	$117,709	$202,090
	Total Effects	**$888,169**	**5.91**	**$345,470**	**$462,140**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,261,663	15.40	$961,747	$1,098,094
	Total Direct Effects	$2,261,663	15.40	$961,747	$1,098,094
	Secondary Effects	$2,669,001	16.81	$931,310	$1,563,757
	Total Effects	**$4,930,664**	**32.22**	**$1,893,057**	**$2,661,851**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,738,000	18.71	$1,164,304	$1,329,367
	Total Direct Effects	$2,738,000	18.71	$1,164,304	$1,329,367
	Secondary Effects	$5,205,443	30.10	$1,702,759	$2,864,753
	Total Effects	**$7,943,443**	**48.81**	**$2,867,063**	**$4,194,120**

Replace Water Control Structure at Star Lake

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	96%	96%	98%
Heavy Construction Activities	100%	$2,023,000	20%	83%	100%
Total	**100%**	**$2,023,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,023,000	$2,023,000	$2,023,000
Direct Impact				
	Output	$395,739	$1,671,054	$2,023,000
	Job	2.52	11.38	13.82
	Labor Income	$168,284	$710,597	$860,258
	GRP	$192,141	$811,338	$982,217
Total Impact				
	Output	$656,233	$3,643,073	$5,869,096
	Job	4.37	23.80	36.06
	Labor Income	$255,254	$1,398,705	$2,118,360
	GRP	$341,457	$1,966,736	$3,098,870

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$395,739	2.52	$168,284	$192,141
	Total Direct Effects	$395,739	2.52	$168,284	$192,141
	Secondary Effects	$260,494	1.84	$86,970	$149,316
	Total Effects	**$656,233**	**4.37**	**$255,254**	**$341,457**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$1,671,054	11.38	$710,597	$811,338
	Total Direct Effects	$1,671,054	11.38	$710,597	$811,338
	Secondary Effects	$1,972,019	12.42	$688,108	$1,155,398
	Total Effects	**$3,643,073**	**23.80**	**$1,398,705**	**$1,966,736**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP

	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,023,000	13.82	$860,258	$982,217
	Total Direct Effects	$2,023,000	13.82	$860,258	$982,217
	Secondary Effects	$3,846,096	22.24	$1,258,101	$2,116,653
	Total Effects	**$5,869,096**	**36.06**	**$2,118,360**	**$3,098,870**

Corpus Christi MSA

Economic Impact Regions

Regional Impact Area:	Corpus Christi, TX MSA
Regional Impact Area ID:	94
Counties included	Aransas/Nueces/San Patricio/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Aransas	48007	243	25,862	10,615	$951
Nueces	48355	844	325,578	117,349	$12,005
San Patricio	48409	705	70,499	23,745	$2,256
Total		**1,791**	**421,939**	**151,709**	**$15,212**

Impact Region Profile (2008)

Regional Impact Area ID:	94
Regional Impact Area Name:	Corpus Christi, TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment

Accomodations and Food Service	$1,037	$333	$513	19,298
Administrative and Waste Management Services	$820	$388	$497	15,242
Agriculture, Forestry, Fishing and Hunting	$334	$70	$150	3,965
Arts, Entertainment, and Recreation	$211	$55	$80	2,852
Construction	$3,566	$1,393	$1,530	25,716
Education	$785	$649	$737	14,711
Finance, Insurance, Real Estate, Rental and Leasing	$1,542	$400	$926	8,231
Government	$2,237	$1,544	$1,932	23,550
Health Care and Social Assistance	$2,174	$1,176	$1,360	26,859
Imputed Rents	$2,206	$316	$1,415	13,301
Information	$954	$152	$286	2,688
Management of Companies and Enterprises	$105	$49	$65	440
Manufacturing	$25,955	$1,066	$1,647	10,852
Mining	$3,497	$712	$2,046	5,200
Professional, Scientific, and Technical Services	$2,058	$796	$1,147	13,354
Retail Trade	$1,724	$731	$1,172	27,832
Transportation and Warehousing	$808	$332	$465	5,490
Utilities	$510	$98	$320	812
Wholesale Trade	$1,318	$502	$858	7,237
Total	**$51,842**	**$10,761**	**$17,143**	**227,631**

Indian Point Marsh Area Living Shoreline

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	2%	$64,101	98%	98%	98%
Heavy Construction Activities	98%	$2,722,899	88%	88%	100%
Total	**100%**	**$2,787,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,787,000	$2,787,000	$2,787,000
Direct Impact				
	Output	$2,446,982	$2,446,982	$2,785,974
	Job	17.45	17.45	19.81
	Labor Income	$1,004,040	$1,004,040	$1,140,065
	GRP	$1,152,781	$1,152,781	$1,310,083
Total Impact				
	Output	$4,478,981	$5,325,716	$8,078,387

Job	32.04	35.61	50.42
Labor Income	$1,666,489	$2,006,829	$2,868,889
GRP	$2,340,066	$2,839,743	$4,221,683

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$62,768	1.60	$48,161	$47,086
36	Construction of other new nonresidential structures	$2,384,213	15.85	$955,879	$1,105,695
	Total Direct Effects	$2,446,982	17.45	$1,004,040	$1,152,781
	Secondary Effects	$2,032,000	14.59	$662,449	$1,187,285
	Total Effects	**$4,478,981**	**32.04**	**$1,666,489**	**$2,340,066**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$62,768	1.60	$48,161	$47,086
36	Construction of other new nonresidential structures	$2,384,213	15.85	$955,879	$1,105,695
	Total Direct Effects	$2,446,982	17.45	$1,004,040	$1,152,781
	Secondary Effects	$2,878,734	18.16	$1,002,789	$1,686,962
	Total Effects	**$5,325,716**	**35.61**	**$2,006,829**	**$2,839,743**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$63,075	1.61	$48,400	$47,320
36	Construction of other new nonresidential structures	$2,722,899	18.20	$1,091,665	$1,262,763
	Total Direct Effects	$2,785,974	19.81	$1,140,065	$1,310,083
	Secondary Effects	$5,292,413	30.61	$1,728,824	$2,911,600
	Total Effects	**$8,078,387**	**50.42**	**$2,868,889**	**$4,221,683**

Restore Barrier Island Backside Marshes on Mustang Island

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	8%	$628,125	98%	98%	98%
Heavy Construction Activities	93%	$7,746,875	88%	88%	100%
Total	**100%**	**$8,375,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$8,375,000	$8,375,000	$8,375,000
Direct Impact				
	Output	$7,398,352	$7,398,352	$8,364,946
	Job	60.80	60.80	67.57
	Labor Income	$3,191,485	$3,191,485	$3,580,149
	GRP	$3,607,188	$3,607,188	$4,056,351
Total Impact				
	Output	$13,512,101	$16,041,365	$24,226,730
	Job	104.85	115.45	159.36
	Labor Income	$5,179,506	$6,190,648	$8,745,355
	GRP	$7,187,255	$8,674,267	$12,775,739

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$615,065	15.71	$471,930	$461,393
36	Construction of other new nonresidential structures	$6,783,286	45.09	$2,719,556	$3,145,796
	Total Direct Effects	$7,398,352	60.80	$3,191,485	$3,607,188
	Secondary Effects	$6,113,749	44.05	$1,988,020	$3,580,067
	Total Effects	**$13,512,101**	**104.85**	**$5,179,506**	**$7,187,255**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				

19	Support activities for agriculture and forestry	$615,065	15.71	$471,930	$461,393
36	Construction of other new nonresidential structures	$6,783,286	45.09	$2,719,556	$3,145,796
	Total Direct Effects	$7,398,352	60.80	$3,191,485	$3,607,188
	Secondary Effects	$8,643,013	54.65	$2,999,162	$5,067,079
	Total Effects	**$16,041,365**	**115.45**	**$6,190,648**	**$8,674,267**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$618,071	15.79	$474,271	$463,684
36	Construction of other new nonresidential structures	$7,746,875	51.78	$3,105,878	$3,592,666
	Total Direct Effects	$8,364,946	67.57	$3,580,149	$4,056,351
	Secondary Effects	$15,861,784	91.79	$5,165,206	$8,719,388
	Total Effects	**$24,226,730**	**159.36**	**$8,745,355**	**$12,775,739**

Houston MSA

Economic Impact Regions

Regional Impact Area:	Houston Sugar Land Baytown TX MSA
Regional Impact Area ID:	19
Counties included	Austin/Brazoria/Chambers/Fort Bend/Galveston/Harris/Liberty/Montgomery/San Jacinto/Waller/
State Impact Area:	Texas
National Impact:	Yes

Impact Region Definition (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

County	FIPS	Area (sq. mi)	Population	Households	Total Personal Income (in millions)
Austin	48015	657	27,467	10,062	$1,061
Brazoria	48039	1,442	311,212	106,478	$11,602
Chambers	48071	629	34,498	12,175	$1,422

Fort Bend	48157	886	547,876	163,740	$25,503
Galveston	48167	408	297,079	112,536	$11,937
Harris	48201	1,774	4,091,773	1,425,897	$196,779
Liberty	48291	1,176	77,344	25,224	$2,556
Montgomery	48339	1,077	452,286	156,734	$20,366
San Jacinto	48407	628	25,788	10,091	$783
Waller	48473	519	38,727	12,653	$1,235
Total		**9,195**	**5,904,050**	**2,035,590**	**$273,247**

Impact Region Profile (2008)

Regional Impact Area ID:	19
Regional Impact Area Name:	Houston Sugar Land Baytown TX MSA
Impact Area Type	Metropolitan Impact Area
State Impact Region::	Texas

Section	Output (millions)	Labor Income (millions)	GRP (millions)	Employment
Accomodations and Food Service	$13,236	$4,560	$7,005	216,742
Administrative and Waste Management Services	$19,024	$9,951	$12,493	298,005
Agriculture, Forestry, Fishing and Hunting	$1,092	$272	$394	17,834
Arts, Entertainment, and Recreation	$3,725	$1,342	$1,812	49,670
Construction	$46,428	$18,719	$20,539	324,726
Education	$15,369	$12,441	$14,035	232,139
Finance, Insurance, Real Estate, Rental and Leasing	$60,950	$16,224	$39,111	284,513
Government	$14,071	$10,846	$12,346	178,925
Health Care and Social Assistance	$24,457	$13,352	$15,725	259,514
Imputed Rents	$41,885	$5,351	$27,360	193,605
Information	$18,119	$3,659	$7,479	50,197
Management of Companies and Enterprises	$6,314	$2,651	$3,597	32,227
Manufacturing	$297,676	$30,969	$57,878	246,808
Mining	$146,320	$32,033	$91,390	128,560
Professional, Scientific, and Technical Services	$61,245	$28,206	$37,002	343,983
Retail Trade	$23,550	$10,251	$16,149	336,109
Transportation and Warehousing	$33,952	$12,636	$17,865	167,737
Utilities	$44,650	$9,551	$32,358	17,197
Wholesale Trade	$37,816	$14,498	$24,901	164,951
Total	**$909,877**	**$237,514**	**$439,440**	**3,543,441**

IH-45 Causeway Marsh Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	6%	$250,809	75%	75%	98%
Heavy Construction Activities	94%	$4,000,191	83%	83%	100%
Total	**100%**	**$4,251,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,251,000	$4,251,000	$4,251,000
Direct Impact				
	Output	$3,493,287	$3,493,287	$4,246,985
	Job	25.72	25.72	32.09
	Labor Income	$1,579,272	$1,579,272	$1,926,765
	GRP	$1,771,915	$1,771,915	$2,159,713
Total Impact				
	Output	$7,066,861	$7,593,928	$12,304,709
	Job	47.03	51.58	78.71
	Labor Income	$2,914,373	$3,005,346	$4,553,209
	GRP	$3,958,913	$4,174,804	$6,590,209

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$188,808	4.99	$143,341	$139,994
36	Construction of other new nonresidential structures	$3,304,480	20.73	$1,435,931	$1,631,921
	Total Direct Effects	$3,493,287	25.72	$1,579,272	$1,771,915
	Secondary Effects	$3,573,573	21.31	$1,335,101	$2,186,998
	Total Effects	**$7,066,861**	**47.03**	**$2,914,373**	**$3,958,913**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$188,808	4.99	$143,341	$139,994
36	Construction of other new nonresidential structures	$3,304,480	20.73	$1,435,931	$1,631,921

	Total Direct Effects	$3,493,287	25.72	$1,579,272	$1,771,915
	Secondary Effects	$4,100,641	25.86	$1,426,074	$2,402,889
	Total Effects	**$7,593,928**	**51.58**	**$3,005,346**	**$4,174,804**

Table 7: Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$246,794	6.52	$188,519	$184,214
36	Construction of other new nonresidential structures	$4,000,191	25.56	$1,738,246	$1,975,499
	Total Direct Effects	$4,246,985	32.09	$1,926,765	$2,159,713
	Secondary Effects	$8,057,723	46.62	$2,626,444	$4,430,496
	Total Effects	**$12,304,709**	**78.71**	**$4,553,209**	**$6,590,209**

Green's Lake Shoreline Protection & Wetland Restoration – Phase 2

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$4,101,000	83%	83%	100%
Total	**100%**	**$4,101,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$4,101,000	$4,101,000	$4,101,000
Direct Impact				
	Output	$3,387,756	$3,387,756	$4,101,000
	Job	21.25	21.25	26.21
	Labor Income	$1,472,118	$1,472,118	$1,782,052
	GRP	$1,673,047	$1,673,047	$2,025,283
Total Impact				
	Output	$6,874,734	$7,385,665	$11,897,757
	Job	42.02	46.44	71.30
	Labor Income	$2,781,322	$2,867,131	$4,332,459
	GRP	$3,808,780	$4,015,406	$6,316,135

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,387,756	21.25	$1,472,118	$1,673,047
	Total Direct Effects	$3,387,756	21.25	$1,472,118	$1,673,047
	Secondary Effects	$3,486,977	20.77	$1,309,204	$2,135,733
	Total Effects	**$6,874,734**	**42.02**	**$2,781,322**	**$3,808,780**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$3,387,756	21.25	$1,472,118	$1,673,047
	Total Direct Effects	$3,387,756	21.25	$1,472,118	$1,673,047
	Secondary Effects	$3,997,909	25.19	$1,395,013	$2,342,359
	Total Effects	**$7,385,665**	**46.44**	**$2,867,131**	**$4,015,406**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$4,101,000	26.21	$1,782,052	$2,025,283
	Total Direct Effects	$4,101,000	26.21	$1,782,052	$2,025,283
	Secondary Effects	$7,796,757	45.09	$2,550,407	$4,290,852
	Total Effects	**$11,897,757**	**71.30**	**$4,332,459**	**$6,316,135**

Elevate State Highway 87 and State Highway 124 to Improve Evacuation Capabilities

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)

Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$10,906,500	83%	83%	100%
Total	**100%**	**$10,906,500**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$10,906,500	$10,906,500	$10,906,500
Direct Impact				
	Output	$9,009,647	$9,009,647	$10,906,500
	Job	56.53	56.53	69.70
	Labor Income	$3,915,059	$3,915,059	$4,739,319
	GRP	$4,449,424	$4,449,424	$5,386,187
Total Impact				
	Output	$18,283,170	$19,641,979	$31,641,767
	Job	111.76	123.51	189.61
	Labor Income	$7,396,852	$7,625,058	$11,522,058
	GRP	$10,129,349	$10,678,864	$16,797,593

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,009,647	56.53	$3,915,059	$4,449,424
	Total Direct Effects	$9,009,647	56.53	$3,915,059	$4,449,424
	Secondary Effects	$9,273,524	55.24	$3,481,794	$5,679,926
	Total Effects	**$18,283,170**	**111.76**	**$7,396,852**	**$10,129,349**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$9,009,647	56.53	$3,915,059	$4,449,424
	Total Direct Effects	$9,009,647	56.53	$3,915,059	$4,449,424
	Secondary Effects	$10,632,332	66.98	$3,710,000	$6,229,440

	Total Effects	**$19,641,979**	**123.51**	**$7,625,058**	**$10,678,864**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$10,906,500	69.70	$4,739,319	$5,386,187
	Total Direct Effects	$10,906,500	69.70	$4,739,319	$5,386,187
	Secondary Effects	$20,735,267	119.91	$6,782,739	$11,411,407
	Total Effects	**$31,641,767**	**189.61**	**$11,522,058**	**$16,797,593**

Living Shoreline and Wetland Restoration Near Smith Point and Rollover Pass

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$8,820,000	83%	83%	100%
Total	**100%**	**$8,820,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$8,820,000	$8,820,000	$8,820,000
Direct Impact				
	Output	$7,286,030	$7,286,030	$8,820,000
	Job	45.71	45.71	56.36
	Labor Income	$3,166,077	$3,166,077	$3,832,649
	GRP	$3,598,214	$3,598,214	$4,355,767
Total Impact				
	Output	$14,785,455	$15,884,313	$25,588,446
	Job	90.38	99.88	153.33
	Labor Income	$5,981,776	$6,166,324	$9,317,797
	GRP	$8,191,525	$8,635,913	$13,584,080

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,286,030	45.71	$3,166,077	$3,598,214
	Total Direct Effects	$7,286,030	45.71	$3,166,077	$3,598,214
	Secondary Effects	$7,499,425	44.67	$2,815,699	$4,593,311
	Total Effects	**$14,785,455**	**90.38**	**$5,981,776**	**$8,191,525**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$7,286,030	45.71	$3,166,077	$3,598,214
	Total Direct Effects	$7,286,030	45.71	$3,166,077	$3,598,214
	Secondary Effects	$8,598,283	54.17	$3,000,247	$5,037,699
	Total Effects	**$15,884,313**	**99.88**	**$6,166,324**	**$8,635,913**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$8,820,000	56.36	$3,832,649	$4,355,767
	Total Direct Effects	$8,820,000	56.36	$3,832,649	$4,355,767
	Secondary Effects	$16,768,446	96.97	$5,485,147	$9,228,314
	Total Effects	**$25,588,446**	**153.33**	**$9,317,797**	**$13,584,080**

Texas City Levee Erosion Control and Marsh and Oyster Reef Restoration

Input Assumptions (Spending and LPCs)

Category	Spending (%)	Spending Amount	Local LPC (%)	State LPC (%)	National LPC (%)
Planting and Forestry Activities	0%	$0	75%	75%	98%
Heavy Construction Activities	100%	$2,783,000	83%	83%	100%
Total	**100%**	**$2,783,000**	**-**	**-**	**-**

Overall Summary Economic Impacts

Impacts	Impact Areas	Regional	State	National
Total Spending		$2,783,000	$2,783,000	$2,783,000
Direct Impact				
	Output	$2,298,982	$2,298,982	$2,783,000
	Job	14.42	14.42	17.78
	Labor Income	$999,001	$999,001	$1,209,327
	GRP	$1,135,355	$1,135,355	$1,374,388
Total Impact				
	Output	$4,665,297	$5,012,023	$8,073,996
	Job	28.52	31.52	48.38
	Labor Income	$1,887,447	$1,945,678	$2,940,071
	GRP	$2,584,695	$2,724,914	$4,286,224

Economic Impact at Regional Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,298,982	14.42	$999,001	$1,135,355
	Total Direct Effects	$2,298,982	14.42	$999,001	$1,135,355
	Secondary Effects	$2,366,315	14.09	$888,446	$1,449,341
	Total Effects	**$4,665,297**	**28.52**	**$1,887,447**	**$2,584,695**

Economic Impact at State Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,298,982	14.42	$999,001	$1,135,355
	Total Direct Effects	$2,298,982	14.42	$999,001	$1,135,355
	Secondary Effects	$2,713,041	17.09	$946,677	$1,589,560
	Total Effects	**$5,012,023**	**31.52**	**$1,945,678**	**$2,724,914**

Economic Impact at National Level

IMPLAN No.	Industry Sector	Sales	Jobs	Labor Income	GRP
	Direct Effects				
19	Support activities for agriculture and forestry	$0	0.00	$0	$0
36	Construction of other new nonresidential structures	$2,783,000	17.78	$1,209,327	$1,374,388
	Total Direct Effects	$2,783,000	17.78	$1,209,327	$1,374,388
	Secondary Effects	$5,290,996	30.60	$1,730,744	$2,911,836
	Total Effects	**$8,073,996**	**48.38**	**$2,940,071**	**$4,286,224**