TEXAS COASTAL RESILIENCY MASTER PLAN

TECHNICAL REPORT – MARCH 2017

George P. Bush, Commissioner
Texas General Land Office

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Abbreviations & Acronyms

ADVSD	Abandoned or Derelict Vessels, Structures and Debris
ADLH	Altered, Degraded or Lost Habitat
BSE	Bay Shoreline Erosion
CFD	Coastal Flood Damage
CM	Construction Management
Crouch	Crouch Environmental Services, Inc.
Database	Project geospatial database
E&D	Engineering and design
EFCSSD	Existing and Future Coastal Storm Surge Damage
GBEDD	Gulf Beach Erosion and Dune Degradation
GLO	Texas General Land Office
HRI	Harte Research Institute for Gulf of Mexico Studies
HUC	Hydrologic Unit Code
ICR	Impacts on Coastal Resources
IMPLAN	Impact Analysis for Planning model
IOC	Issue of Concern
IWQQ	Impacts on Water Quality and Quantity
NHD	National Hydrography Dataset
NWI	National Wetland Inventory
O&M	Operation and Maintenance
Plan	Texas Coastal Resiliency Master Plan
Report	Technical Report to the Plan
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
TAC	Technical Advisory Committee
TPWD	Texas Parks & Wildlife Department

TXNDD	Texas Natural Diversity Database
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

SECTION 1. Introduction

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

The Texas General Land Office (GLO) has prepared a Texas Coastal Resiliency Master Plan (Plan) to guide the restoration, enhancement and protection of the state's natural resources. The 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 Plan identifies coastal Drivers and Pressures, the Issues of Concern (IOCs) these Drivers and Pressures create, and proposes projects grouped into Resiliency Strategies to reduce impacts. The 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 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 Plan development, the outcome of coastal analysis tasks (i.e., project identification, project screening, Technical Advisory Committee analysis, technical assessments), and the rationale for Plan outcomes and proposed solutions (i.e., Resiliency Strategies).

B. Planning and Technical Approach Overview

Plan development took place from March 2016 through March 2017, consistent with the planning process outlined in the Plan. Plan development tasks included literature review and data analysis, evaluation of coastal Issues of Concern, development and application of evaluation criteria, identification 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 development of Resiliency Strategies. This initial planning process also entailed the development of a project geospatial database (Database) comprised of projects proposed by various coastal technical experts, agencies, stakeholders and organizations. Future planning phases will entail more detailed analyses of projects and Resiliency Strategies, based on the framework and concepts established by the Plan.

The Plan is a continuation of the GLO's 2012 Coastal Planning Study and features a number of elements developed at that time. While the 2012 study yielded valuable insights into coastal restoration and protection needs, it did not result in a formal plan document. However, key outcomes of the study have been introduced into this Plan through review of data and information, as well as communications with GLO staff involved in that effort. Among others, these included a preliminary list of coastal projects and planning documents.

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 Plan and its technical approach. SECTION 2 introduces the various partners involved in the collaborative Plan development effort. SECTION 3 presents the methodology and planning principles used to guide the technical assessment. 0 identifies the steps taken to collect and organize relevant coastal data and information. 0 describes the steps taken to screen identified projects to ensure their relevance and contributions to coastal resiliency goals. SECTION 6 discusses the Technical Advisory Committee's role in the analysis of the proposed projects. SECTION 7 introduces the technical assessment methodology used to prioritize coastal projects for potential inclusion in the Plan. SECTION 8 describes the Resiliency Strategy formulation process that serves as the centerpiece of the Plan results.

SECTION 2. Texas Coastal Resiliency Master Plan Partners

Development of all aspects of the 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.

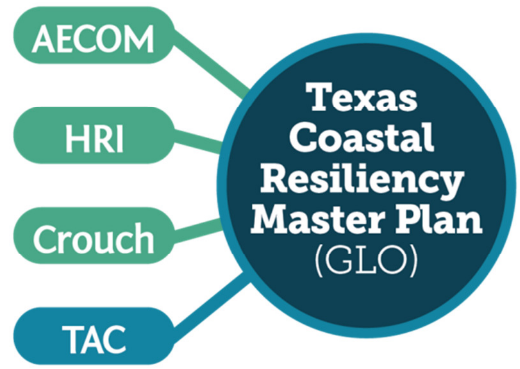

Figure 2-1: The GLO's Planning Team

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. Toward 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, such as coastal flooding, storm surge, erosion and habitat loss. The GLO managed a Planning Team, listed and described alphabetically below, that was responsible for overseeing the direction and approach of 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 Plan development process. AECOM's responsibilities included participating in planning activities, liaison 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 screening, planning level engineering, analysis of benefits and socio-economic impacts, project technical assessments, analysis of Resiliency Strategies, Report production and Plan preparation assistance.

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

- Alpine Ocean Seismic Services, Inc. - Sediment source and geotechnical services
- 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 beneficial use of dredged material planning

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 Plan, prepared an educational pamphlet ("Shoring Up Our Future"), and generated the Plan and other materials for the Texas State Legislature, the TAC and public consumption.

D. Harte Research Institute

Harte Research Institute (HRI) has been involved in coastal planning with the GLO since the agency's planning process commenced in 2012. At that time, HRI assisted the GLO in developing a preliminary list of projects that were subsequently evaluated by a Technical Advisory Committee. That body was reassembled and expanded in 2016 to support the Plan effort and is described in the next subsection.

For the development of the Plan, 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 Plan development. In addition, HRI performed characterizations of coastal environments, ecosystem services and 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 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 Plan outcomes.

SECTION 3. TECHNICAL ASSESSMENT METHODOLOGY

A. TECHNICAL PROCESS OVERVIEW

The technical process is structured around the Planning Process presented in Figure 3-1. The technical process was composed of four elements (i.e., analyzing existing data and information, project screening, TAC analysis, Planning Team technical analysis), followed by the development of recommended Resiliency Strategies. These four technical elements are described in detail in 0 through 7 and the development of the Resiliency Strategies is detailed in SECTION 8.

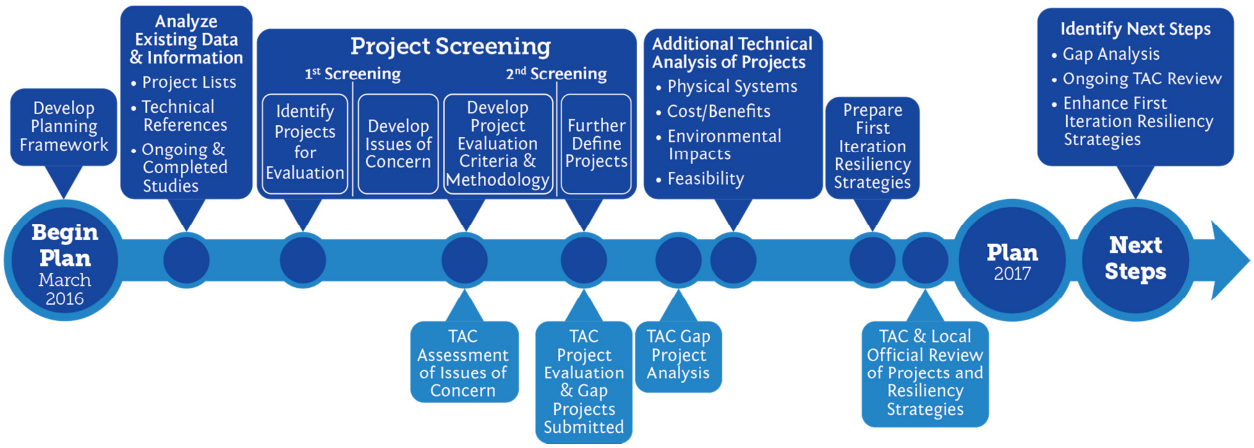

Figure 3-1: The Planning Process

Beginning with a comprehensive list of coastal resiliency projects proposed to date, the Planning Team conducted multiple screenings to identify projects that aligned with Plan goals. The screening process is described in detail in 0. Projects aligned with Plan goals were subsequently analyzed through parallel technical analyses – one conducted by the TAC and the other by the Planning Team. The former determined the relevance of individual projects to specific regional coastal resiliency needs, while the latter focused on a range of factors, including:

- Cost Assessment;
- Economic and Benefits Assessment;
- Physical and Risk Assessment;
- Feasibility and Constructability Assessment;
- Environmental Assessment; and
- Sediment Management.

At the completion of the prior steps, the TAC and local stakeholders were engaged through a series of regional meetings in November 2016 to present the draft findings of the Plan, and allow for feedback prior to finalizing the Plan.

Figure 3-2 presents the summary of TAC engagement at the time of the November regional meetings.

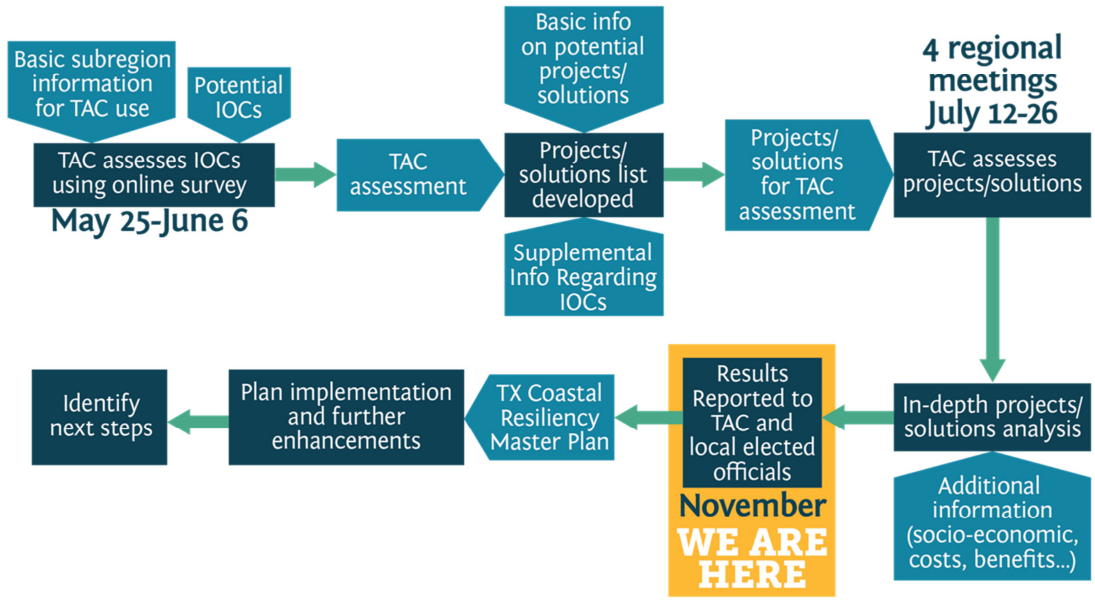

Figure 3-2: TAC Process Overview (November 2016)

Upon completion of the concurrent analyses, the final step in the process was to define recommended Resiliency Strategies for incorporation into the Plan, and to group projects into these strategies. The Resiliency Strategies are described in detail in the Plan and the final list of strategies is shown in Figure 3-3.

Figure 3-3: Texas Coastal Master Plan Resiliency Strategies

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 3-1 (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 3-1: 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 west side of Galveston Bay	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

I. Subregions

The 2012 coastal planning effort, referenced in SECTION 1, delineated coastal regions into subregions to better represent TAC feedback (the 2012 TAC being similar in function to the current TAC described in SECTION 2). For the 2012 effort, these subregions were based on the spatial distribution of the projects evaluated by the TAC, as well as geographic features such as water bodies, landmasses and population centers. This subregion approach allowed for a more refined understanding of the Texas coast and associated issues and opportunities.

One of the lessons learned from the 2012 effort was that subregions should be based on a standard ecology-driven dataset that could be utilized along the entire Texas coast, as opposed to a geopolitical data set that resulted in ecologically arbitrary boundaries. This approach was used to generate the Plan's subregions and, due to this adjustment, some challenges were encountered in consistently incorporating 2012 results to the 2017 efforts.

Several different datasets were considered for use in developing the new subregion boundaries, 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 watersheds were chosen because they highlight similarities in coastal attributes, coincide neatly with the bay systems, and are small enough to provide for local-level analysis that could be combined to make larger units for landscape-level analysis. Using the watershed dataset also allowed for contiguous coverage across the Texas coast. The subregions were based on the 64 resultant HUC-10 watersheds and four Gulf-facing beaches and dunes subregions, with Figure 3-4 showing the 2016 subregions compared to the previous 2012 iteration. For Gulf-facing beaches and dunes, a line was drawn 1,000 ft 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.

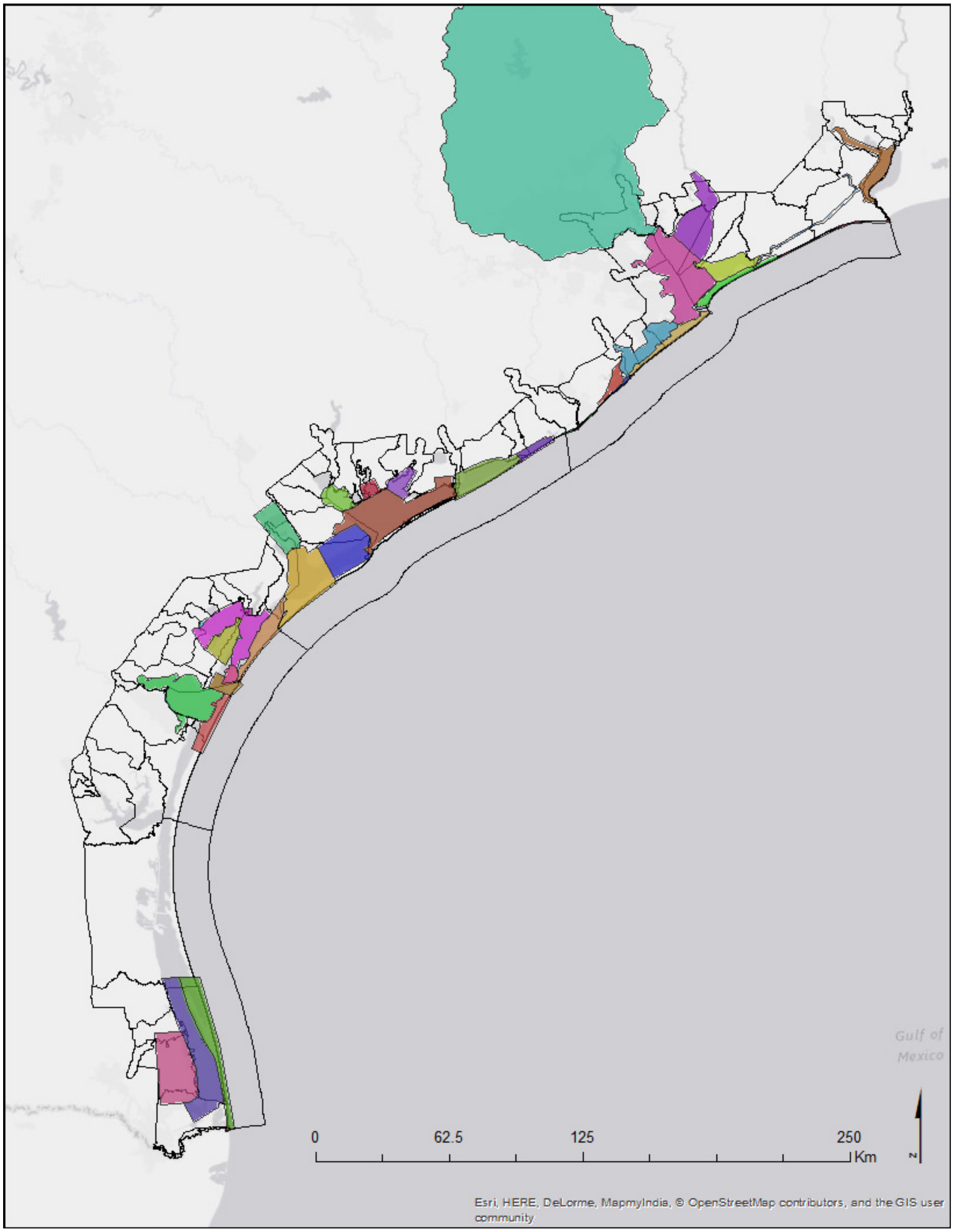

Figure 3-4: Texas Coastal Subregions, 2012 (Color) and 2017 (Hollow)

The list of subregions is given in Table 3-2. Maps showing the location of each subregion are provided in Figure 3-5 through Figure 3-8.

Table 3-2: 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

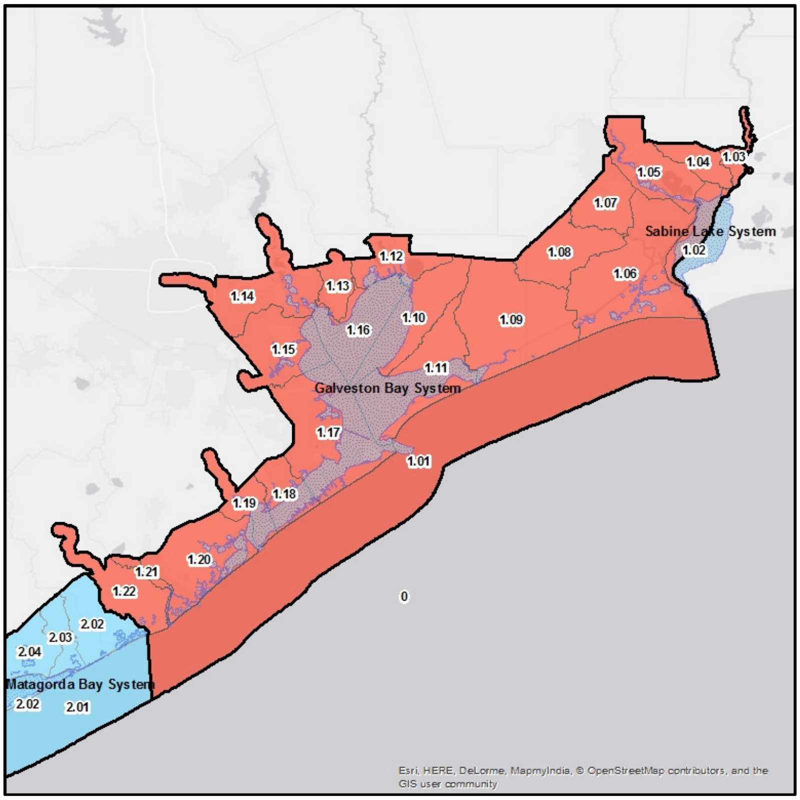

Figure 3-5: Region 1 Subregions

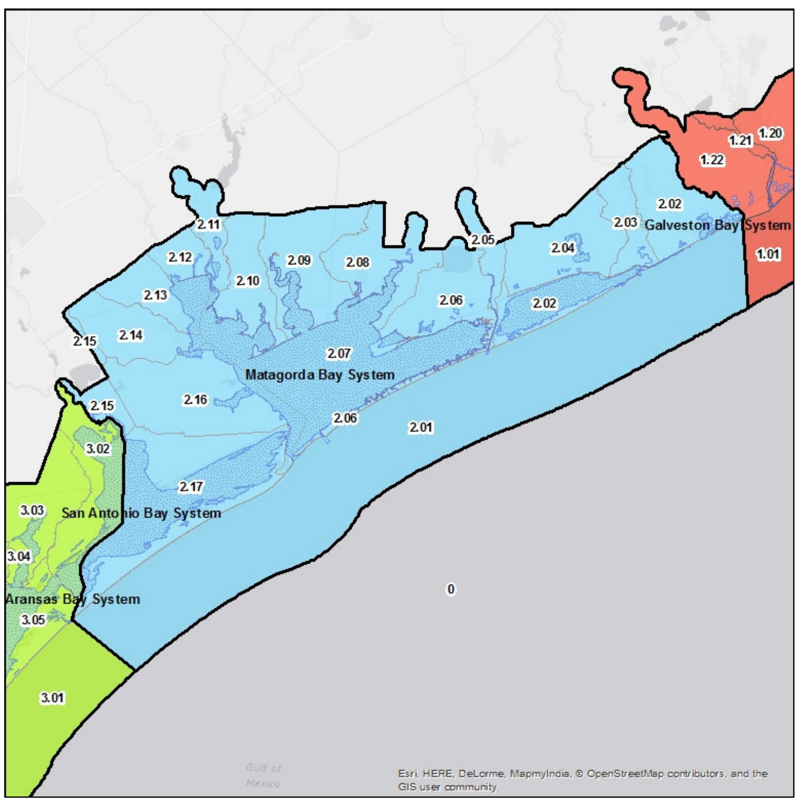

Figure 3-6: Region 2 Subregions

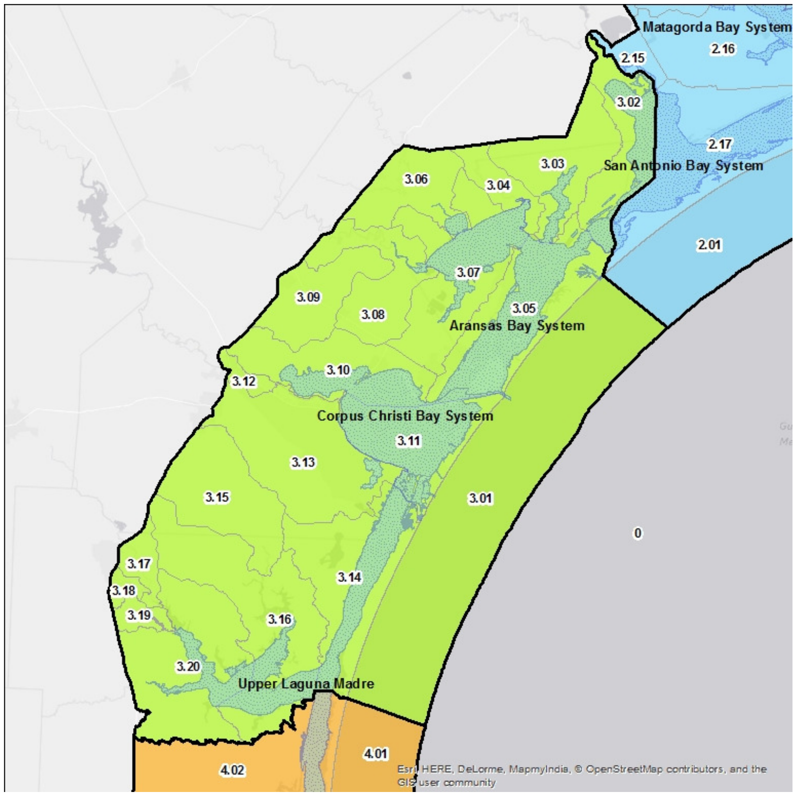

Figure 3-7: Region 3 Subregions

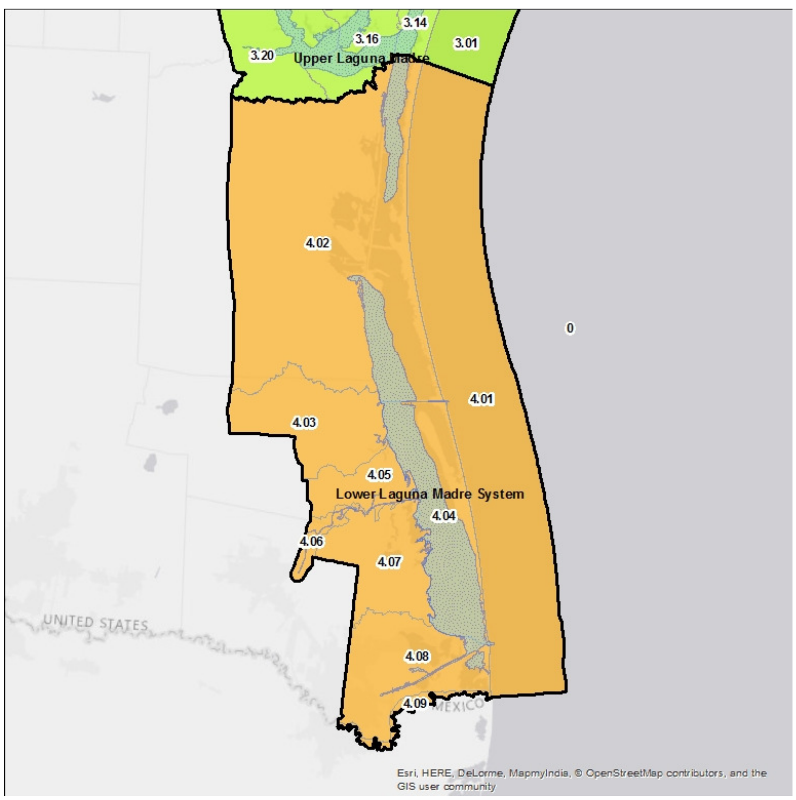

Figure 3-8: Region 4 Subregions

SECTION 4. Analyzing Existing Data and Information

Building upon the GLO's 2012 Coastal Planning study, the Planning Team gathered updated documents, community plans, project databases, studies and datasets. This information was used to develop an initial project database that identified coastal projects, identified coastal areas with high levels of concern, and provided a basis for project evaluation and selection.

A. Literature Review

Literature review efforts included gathering and analyzing reports, documents, databases and other materials of potential relevance to coastal resiliency, restoration and development. This included past and ongoing federal, state, and local coastal studies, various planning documents (e.g., erosion and emergency response plans, national coastal plans and reports) and project submission databases (e.g., Texas RESTORE Act). A comprehensive collection of materials had been compiled and reviewed by the GLO and HRI in 2012 and, consequently, this more recent effort focused on materials published or updated since that time.

Of the more than 100 documents reviewed, 37 contained specific proposed projects that were added to the project database for subsequent evaluation (see **Appendix A**). Documents that did not contain specific projects were also included in the database for future reference purposes and to inform the technical content of the Plan.

B. Project List Development

The literature review yielded a list of projects that built upon and expanded those identified during the 2012 planning effort. This included both funded and completed projects and, as such, offered an historical perspective on coastal protection efforts as well as insights into today's challenges and opportunities along the coast.

The preliminary project list included more than 1,200 projects (both completed and proposed) along the Texas coast. Approximately 25 percent were listed as "completed" or "duplicate" were and subsequently eliminated from further consideration. This resulted in over 900 projects that were screened through several processes, as discussed in detail in subsequent sections and shown in Figure 4-1.

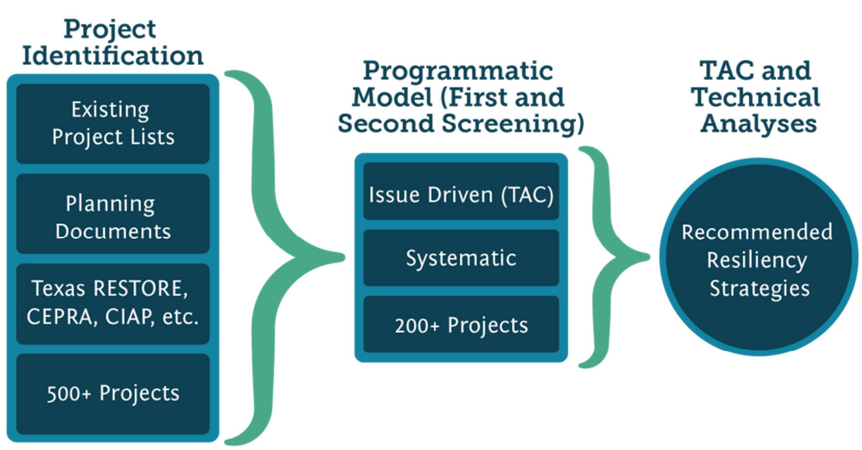

Figure 4-1: Project Identification and Screenings Process

SECTION 5. PROJECT SCREENINGS

Following development of the initial project list, a two-step screening process was used to facilitate further refinement of the types of projects under consideration. The 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. A second screening was then conducted using a more detailed process, which required further project definition and characterization of coastal Issues of Concern at a subregional level. Using the detailed project definitions and IOC evaluations, a programmatic model was developed to evaluate projects based on project types and the subregional ranking for the IOCs.

A. INITIAL SCREENING

Following the literature review, the Planning Team compiled a preliminary project database of approximately 900 projects. The initial screening filtered the list to yield projects consistent with 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 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 Plan.

Using the above-noted criteria, the list of candidate projects was reduced to approximately 500. These were subsequently subjected to a second screening process, as described later in this section. The full list of projects that remained under consideration after the first 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 5-1 (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; 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 Acquisition.

Table 5-1: Initial Distribution of Conceptual Project Types by Region

Region	Projects After Initial Screening	Nature Based Features	Nonstructural Measures	Structural Measures
Region 1	365	175	57	179
Region 2	117	71	28	35
Region 3	118	46	24	52
Region 4	59	26	22	18
Coastwide	33	14	18	3

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 (Table 5-2).

Table 5-2: Project Types

Conceptual Project Types	Project Types	Project Subtypes
Non-Structural	Land Acquisitions	Acquisitions
		Conservation Easements
		Fee Simple
	Public Access and Improvements	ADA Accessibility
		Walkovers
		Piers, Boat Ramps
	Studies, Policies, and Programs	Erosion Response Plans
		Structure Raising
		Setbacks
		Studies
		Sediment Management
Structural	Shoreline Stabilization	Seawall
		Bulkhead
		Revetment
		Breakwater
		Misc. Wave Break
		Jetty
		Groin
	Flood Risk Reduction	Levees
		Flood Wall
		Storm Surge Barrier
		Road Elevation
	Structure/Debris Removal	Structures on Public's Easement
		Abandoned Oil and Gas Wells
		Abandoned Boats
		Dock Pilings
		Post Storm Cleanup
		Plastics, Glass, Rubber, Metal
		Obstacles
Nature-Based	Habitat Creation and Restoration	Marsh
		Oyster Reef
		Wetlands/Forested Wetlands
		Barrier Islands
		Coastal Prairies
		Rookery Islands
	Wildlife	Fisheries
		Birds
		Oysters
		Sea turtles
		Invasive species
	Environmental	Fresh Water Inflow
		Hydrologic Restoration
	Beach Nourishment	Bay
		Gulf
	Dune Restoration	Dune

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 5-3.

Table 5-3 Initial Distribution of Project Types by Region

Region	Nature-Based				
	Habitat Creation & Restoration	Wildlife	Environmental	Beach Nourishment	Dune Restoration
1	97	7	23	40	33
2	43	20	21	15	6
3	25	5	7	10	1
4	10	2	6	7	6
Coastwide	6	7	0	1	0

Region	Structural			Non-Structural		
	Shoreline Stabilization	Flood Risk Reduction	Structure/ Debris Removal	Studies, Policies, & Programs	Public Access & Improvements	Land Acquisition
1	88	86	2	12	2	43
2	31	3	1	11	2	18
3	44	2	1	12	0	12
4	15	1	2	5	5	12
Coastwide	1	0	2	11	0	6

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 6). This allowed many TAC members to provide valuable insights, such as additional project details, potential challenges and knowledge of funding status. 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.

C. Coastal Issues of Concern

Coastal Issues of Concern were identified at the onset of the planning process to characterize Pressures along the coast, provide a framework for documenting input from various TAC members and stakeholders, and provide a basis for the selection of candidate projects responsive to that input. Understanding the implications of IOCs to specific projects better informed the Planning Team in its project screening efforts (Table 5-4).

Table 5-4: 2017 IOC Descriptions

2017 IOC	Associated Coastal Pressures	Example Considerations
Altered, Degraded or Lost Habitat	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Depletion of Freshwater Inflows •Sediment Deficits •Industry Activity •Infrastructure and Development	•Seagrass •Mangroves •Estuarine and Freshwater Wetlands •Bottomland Hardwood Forests •Coastal Prairies
Gulf Beach Erosion and Dune Degradation	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Sediment Deficits •Infrastructure and Development	•Subsidence •Sediment Deficit •Impacts from Development •Storm Impacts •Erosion •Sea Level Rise
Bay Shoreline Erosion	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Sediment Deficits •Industry Activity •Infrastructure and Development	•Subsidence •Sediment Deficit •Impacts from Development •Storm Impacts •Erosion •Sea Level Rise
Existing and Future Coastal Storm Surge Damage Coastal Flood Damage	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Infrastructure and Development	•Sea Level Rise •Coastal Storms •Impacts from Development
Coastal Flood Damage	•Relative Sea Level Rise •Sediment Deficits •Infrastructure and Development	•Rainfall •Riverine Flooding •Nuisance Flooding •Impacts from Development
Impacts on Water Quality and Quantity	•Tropical Storms, Hurricanes and Extreme Weather Events •Depletion of Freshwater Inflows •Industry Activity •Infrastructure and Development	•Freshwater Inflows •Nutrients •Water Pollution (Chemical) •Sediment •Saltwater Intrusion •Non-point Source Pollution •Hydrologic Connectivity •Harmful Algal Blooms •Oil Spills
Impacts on Coastal Resources	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Depletion of Freshwater Inflows •Sediment Deficits •Industry Activity •Infrastructure and Development	•Oysters •Turtles •Birds •Fish •Crabs •Endangered Species
Abandoned or Derelict Vessels, Structures or Debris	•Tropical Storms, Hurricanes and Extreme Weather Events •Relative Sea Level Rise •Industry Activity •Infrastructure and Development	•Obstructions to Public's Easement •Abandoned Oil and/or Gas Wells •Abandoned Boats •Dock Pilings •Post Storm Cleanup

I. 2012 Coastal Planning Study Issues of Concern

In 2012, a list of 16 IOCs along the Texas coast was identified by the GLO, working with HRI and the previous TAC. These issues ranged from compromised ecosystem functions (e.g., coastal erosion, habitat loss), to physical and temporal issues (e.g., flooding, storm surge), to socio-economic implications (e.g., impacts to tourism, disaster recovery). In 2012, several scoping meetings were held along the coast to help prioritize IOCs on a regional basis. IOCs were characterized at regional and subregional levels, and the TAC evaluated each subregion's unique needs for coastal preservation, protection and enhancement. The process resulted in a set of statistics that gave each IOC a corresponding level of concern for a particular subregion. This IOC data from 2012 served as the baseline data to inform the Plan.

II. Identification & Prioritization of Coastal Concerns

The list of 16 IOCs generated in 2012, along with TAC evaluation results, were reviewed extensively by the GLO and the Planning Team to facilitate development of the coast's current Issues of Concern. Of the original 2012 IOCs, the Planning Team determined that several could be consolidated to streamline future IOC assessments. Other IOCs were not included in the Plan development process because they did not directly relate to concepts of coastal resiliency, or were being addressed outside of the purview of this Plan. Some of the IOCs that were not included in the Plan are being addressed as part of other technical assessments described in further detail in this report or through ongoing GLO programs.

Following this review process, the previously-identified 16 IOCs were condensed into eight and subsequently presented to the TAC for reevaluation and prioritization on a subregional level (2017 designations) and per project basis. Table 5-5 illustrates how the 2012 IOC categories carried over to the condensed list.

III. Issues of Concern Assessment

Once the eight IOCs were identified, the 2012 IOC data were applied to the new subregions, where there was overlap, to develop an IOC baseline from which to begin evaluations. Where there was no overlap, 2012 data was not provided.

HRI developed an online survey using the Qualtrics software program; it was subsequently introduced to the TAC via a WebEx webinar. The TAC was asked to complete the survey by assigning a level of concern for all potential IOCs within each of the 68 subregions that they were familiar with. TAC members were also given the option to agree with or revise the previously identified IOC levels of concern for subregions that had been evaluated in 2012. For subregions that did not have 2012 data, the TAC was asked to assign a level of concern for each IOC rather than agree or revise the value.

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

The IOC levels of concern are as follows:

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

Table 5-5: 2012 & 2017 IOC Comparison

2012 IOC	2017 IOC
Wetlands and Habitat Loss	Altered, Degraded or Lost Habitat
Gulf Beach Erosion	Gulf Beach Erosion and Dune Degradation
Bay Shoreline Erosion	Bay Shoreline Erosion
Flooding and Storm Surge	Existing and Future Coastal Storm Surge Damage
	Coastal Flood Damage
Water Quality and Quantity	Impacts on Water Quality and Quantity
Impacts to Fish and Wildlife	Impacts on Coastal Resources
Impacts to Marine Resources	
Marine Debris	Abandoned or Derelict Vessels, Structures or Debris
Invasive Species	*These IOCs are currently being studied or addressed as part of the Technical Assessments described in further detail in this report or through ongoing GLO coastal planning efforts or studies. 2012 data for these IOCs were not applied.*
Tourism and Local Economy	
Navigation, Commercial and Recreational	
Land Subsidence	
Community Resiliency	
Public Health and Safety	
Public Access: Gulf and Bay	
Lack of Information and Data	

To facilitate the evaluation process, the TAC was provided with maps and figures depicting historical shoreline change rates; location of armored shorelines; storm surge inundation estimates; spatial distributions of major marine, estuarine, palustrine, and upland environments; spatial distributions of habitats, including oyster reefs and seagrass beds; change in wetland coverage and developed and undeveloped uplands; and data describing ocean-related economics for each region (an example is presented in **Appendix B**). An information packet also provided supplemental information on the IOC survey, underlying data for the maps and figures, and information on the overall planning effort (see **Appendix B**). The TAC was also asked to provide any additional information to support the assessment of IOCs in each subregion, such as additional datasets or any specific knowledge of issues not reflected in the data.

An average of 21 assessment results were collected for each subregion, based on the online TAC assessments. In general, TAC results indicated the highest levels of concern for most of the IOCs in Region 1, the lowest levels of concern in Region 4 (with the southernmost subregions of Region 4 serving as an exception), and moderate levels of concern in Regions 2 and 3. The Abandoned or Derelict Vessels, Structures and Debris (ADVSD) IOC ranked lowest across all subregions, while the highest IOCs were Altered, Degraded or Lost Habitat (ADLH) in Regions 2, 3 and 4, and Gulf Beach Erosion and Dune Degradation (GBEDD) in Region 1. Subregions further inland typically had lower levels of concern than subregions closer to the coast, likely the result of less direct interaction with the coastline and associated bay systems.

Prioritization of IOCs was accomplished by using the TAC's assessment results, compiled at the subregional level. To ensure that the IOCs were evaluated in a proportional manner along the entire coast (i.e., regardless of subregion size), IOC prioritization results received from the TAC were validated by weighting the IOC values by each subregional area with respect to the coastwide study area. This comparison showed a negligible difference between the original statistics computed directly from the TAC values and the weighted values. As a result, the unweighted IOC values received from the TAC were used to avoid any unnecessary modifications to the results.

The overall average IOC 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 5-6. As previously noted, values are as follows: 0 - not at all concerned, 1 - slightly concerned, 2 - moderately concerned, 3 - very concerned, and 4 - extremely concerned.

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:** Impacts on Coastal Resource; and
- **IWQQ:** Impacts on Water Quality and Quantity.

Table 5-6: 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 B** and the regional and coastwide averages for each IOC are presented in Table 5-7. ADLH 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 GBEDD (which is limited to one Gulf-facing subregion per region).

Table 5-7: 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 5-1. **Appendix B** includes maps for individual IOCs based on regional level statistics.

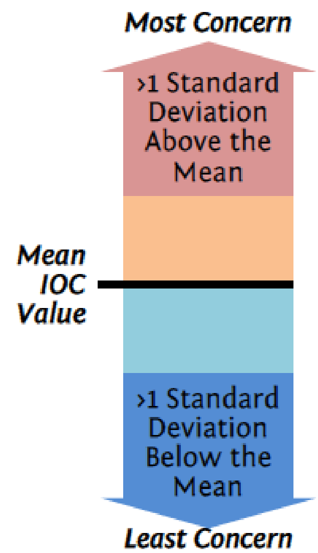

Figure 5-1: IOC Levels of Concern

IV. 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.

Region 1

ADLH 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.

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.

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.

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.

D. Second Screening

Projects that passed initial screening were further characterized based on project types, and their benefits were assessed by relating them to the prioritized IOCs in each subregion. A programmatic model was developed and applied during the second screening to qualitatively and quantitatively establish relationships between the benefits provided by prospective projects to coastal IOCs.

To qualitatively establish relationships, a matrix of IOC versus project subtype (Table 5-8) was used. Project benefits were approximated by four categories:

- Major- Projects that are anticipated to directly address the IOC in a positive manner;
- Minor- Projects that are anticipated to indirectly address the IOC in a positive manner;
- None- Projects that are not anticipated to address the IOC; and
- Negative- Projects that are anticipated to directly or indirectly address the IOC in a negative manner. (Note: No further classification of projects in this category was developed, as such projects were not prioritized or considered for inclusion in the Plan.)

To provide additional detail on project definition and give a better quantification of project benefits, a project's attributes can include multiple project types. For example, a project that proposes marsh creation with breakwaters will aggregate benefits from both the marsh and breakwater subtypes within the habitat creation and shoreline stabilization project types. This allows more complex projects to reflect a wider range of potential benefits. In order to accommodate programmatic model processes for a project, however, the database allows attribute population for only one project subtype entry within a project type. In so doing, the model avoids "double counting" whereby a project would accumulate more benefits than it actually realizes.

Table 5-8: Programmatic Model Matrix

Project Types	Project Subtypes	ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
Shoreline Stabilization	Seawall	Negative	Negative	Major	Major	Major	None	Negative	None
	Bulkhead	Negative	Negative	Major	Major	Major	None	Negative	None
	Revetment	None	None	Major	Minor	Minor	None	None	None
	Breakwater	Minor	Minor	Major	Minor	Minor	None	Minor	None
	Misc. Wave Break	Minor	Minor	Major	Minor	Minor	None	Minor	None
	Jetty	None	Negative	None	None	None	None	None	None
	Groin	Minor	Major	Major	None	None	None	Minor	None
Flood Risk Reduction	Levee	Negative	None	Minor	Major	Major	Negative	Negative	None
	Flood Wall	Negative	None	Minor	Major	Major	Negative	Negative	None
	Storm Surge Barrier	Negative	None	Minor	Major	Major	Negative	Negative	None
	Road Elevation	Negative	None	Minor	Major	Major	Negative	Negative	None
Structure/Debris Removal	Structure on Public Easement	None	None	None	None	None	None	None	Major
	Abandoned Oil and/or Gas Well	Major	None	None	None	None	Major	Major	Major
	Abandoned Boat	Minor	None	None	None	None	Minor	Minor	Major
	Dock Pilings	Minor	None	None	None	None	Minor	Minor	Major
	Post-Storm Cleanup	Major	None	None	None	None	Major	Major	Major
	Plastics, Glass, Rubber, Metal	Minor	None	None	None	None	Minor	Minor	Major
	Obstacles	None	None	None	None	None	None	None	Major
Habitat Creation & Restoration	Marsh	Major	None	Major	Minor	Minor	Major	Major	None
	Oyster Reef	Major	None	Major	Minor	Minor	Major	Major	None

Project Types	Project Subtypes	ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
	Wetlands/Forested Wetlands	Major	None	Minor	Minor	Minor	Major	Major	None
	Coastal Prairies	Major	None	None	Minor	Minor	Major	Major	None
	Rookery Islands	Major	None	Minor	Minor	None	None	Major	None
	Barrier Islands	Major	Major	Major	Major	None	None	Major	None
Wildlife	Fisheries	Major	None	None	None	None	Minor	Major	None
	Birds	Major	None	None	None	None	None	Major	None
	Oysters	Major	None	None	None	None	Major	Major	None
	Sea Turtles	Major	None	None	None	None	None	Major	None
	Invasive Species	Major	None	None	None	None	None	Major	None
Studies, Policies and Programs	Erosion Response Plans	None	Major	None	Minor	Minor	None	None	None
	Structure Raising	None	None	None	Major	Major	None	None	None
	Setbacks	None	Major	None	Major	Major	None	None	None
	Studies	Minor	Minor	Minor	Minor	Minor	Minor	Minor	None
	Sediment Management	Major	Major	Major	Minor	None	Minor	Major	None
Public Access & Improvements	ADA Accessibility	None	None	None	None	None	None	None	None
	Walkovers	None	Minor	None	None	None	None	None	None
	Piers, Boat Ramps	None	None	None	None	None	None	None	Minor
Land Acquisition	Acquisitions	Major	Minor	Minor	Minor	Minor	Minor	Major	None
	Conservation Easements	Major	Minor	Minor	Minor	Minor	Minor	Major	None
	Fee Simple	Major	Minor	Minor	Minor	Minor	Minor	Major	None

Project Types	**Project Subtypes**	**ADLH**	**GBEDD**	**BSE**	**EFCSSD**	**CFD**	**IWQQ**	**ICR**	**ADVSD**
Environmental	Fresh Water Inflow	Major	None	None	None	None	Major	Major	None
	Hydrologic Restoration	Major	None	None	None	Major	Major	Major	None
Beach Nourishment	Bay	Minor	None	Major	Minor	None	None	Minor	None
	Gulf	Minor	Major	None	Minor	None	None	Minor	None
Dune Restoration	Dune	Minor	Major	None	Major	None	None	Minor	None

Projects were spatially related to a specific subregion, attributed with their project subtypes, and prioritized by IOCs based on their subregional location. Multipliers were assigned to a) each project subtype to represent their relative ability to address specific IOCs, and b) to prioritize each IOC. The purpose of the multipliers is to provide greater numerical differentiation between the final project benefit totals and to differentiate between otherwise numerically small ranges (in the case of IOC scores, between 0 and 4). The multipliers used are shown in Table 5-9.

Table 5-9: Project Subtype and Issue of Concern Multipliers

Project Subtype		Issues of Concern	
Benefit Classification	Multiplier[1]	Prioritized IOC Score (x)	Multiplier[2]
Major	1	x > 2.90	1.00
Minor	0.33	2.28 < x ≤ 2.90	0.62
None	0	1.65 < x ≤2.28	0.38
Negative	-0.33	0 < x ≤ 1.65	0.24

[1]Project subtype multipliers were determined by evaluating typical benefits realized by project subtypes, using professional judgement to classify corresponding major or minor benefits.

[2]IOC multipliers capture 100% of benefits of the IOCs of most concern, 62% of the benefits of IOCs of moderately high concern, 38% of the benefits of IOCs of moderately low concern, and 24% of the benefits of least concern, based on the golden ratio.

The cutoffs used to determine prioritized IOC score ranges include:

- One standard deviation below the coastwide IOC average without ADVSD, rounded (1.65);
- The coastwide IOC average without ADVSD (2.28); and
- One standard deviation above the coastwide IOC average without ADVSD, rounded (2.90).

The project subtype multipliers emphasize, or raise the value of, projects expected to generate major benefits, while giving marginal emphasis for minor benefits. Likewise, the multipliers related to the four IOC thresholds emphasize, or give more importance to, the top two IOC thresholds. Based on this criteria, a project that is classified with a subtype expected to directly address an IOC in a positive manner will receive a multiplier of 1, whereas a project that is expected to indirectly address an IOC in a positive manner will receive a multiplier of 0.33, and so on. Similarly, a prioritized IOC score with a value exceeding 2.90 will receive a multiplier of 1, whereas an IOC score that falls between 2.28 and 2.90 will receive a multiplier of 0.62. The computed benefits for each project type were then summed to generate total values for each individual project.

I. Running the Programmatic Model

Each project received a set of multipliers associated with its unique project subtype and subregional IOCs, per the programmatic matrix (see Table 5-8). The project's final programmatic model result is the summation of the products of the two multipliers for each IOC and project subtype across all IOCs (an example is given in Table 5-10). Based on the model developed, a project will achieve a larger numerical value if the project has major positive impacts on major issues of concern as reflected in their multiplier values. Thus, the programmatic model will systematically produce an estimate of the relative likelihood of a particular project to positively address the most significant issues of concern along the entire Texas coast.

For example, if Project A proposes the installation of breakwaters in a subregion experiencing ADLH with a prioritized IOC score of 2.85, it will be assigned a subtype multiplier of 0.33 for having an indirect positive impact on ADLH and an IOC multiplier of 0.62. This process is repeated for all IOCs in the subregion until a project subtype multiplier is determined for each IOC. If the construction of breakwaters was the only project subtype proposed, Project A would receive a total value of 1.17.

If Project B is proposed in the same subregion, and proposes to create marsh in addition to breakwaters, it would receive an additional set of multipliers based on the impact the marsh would be expected to have on the subregion's IOCs. In this case, Project B's overall value would increase by 3.26 from the value computed for Project A, earning a total overall value of 4.43.

Table 5-10: Sample Run of Programmatic Model

Issue of Concern		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	
Subregion IOC Score[1]		3.05	0	2.23	2.00	2.00	3.40	2.71	1.29	
Subregion IOC Multiplier[2]		1.00	0	0.38	0.38	0.38	1.00	0.62	0.16	
Project Subtype Multiplier[2]	Breakwater	0.33	0.33	1	0.33	0.33	0	0.33	0	
	Marsh	1	0	1	0.33	0.33	1	1	0	
Project A										**SUM**
Product of IOC & Breakwater Multipliers		0.33	0	0.38	0.13	0.13	0	0.20	0	1.17
									TOTAL	**1.17**
Project B										**SUM**
Product of IOC & Breakwater Multipliers		0.33	0	0.38	0.13	0.13	0	0.20	0	1.17
Product of IOC & Marsh Multipliers		1.00	0	0.38	0.13	0.13	1	0.62	0	3.26
									TOTAL	**4.43**

[1] **TAC Assessment Results**
[2] **Table 5-9**

This process of evaluating individual projects was continued until all project subtypes were accounted for and all project impacts on subregional IOCs were calculated. At the conclusion of these calculations, each project received a value, with the highest values representing projects expected to have the greatest positive net effect on addressing IOCs of a particular subregion.

Using the process described above, programmatic model values were computed for each of the proposed projects under evaluation. The results of the process are documented in the Project Evaluation Tables at the end of this Report.

II. Utilizing Programmatic Model Results

Programmatic model values for each of the proposed projects were assessed to identify projects remaining under consideration for inclusion in the Plan. During assessment of programmatic model values, the following observations were noted for Region 1 projects:

a) The number of projects considered for Region 1 substantially exceeded the number of projects considered in the other Regions (over half of the total projects evaluated were from Region 1). The high number of proposed projects likely reflects the higher densities of population, industrial facilities and coastal development in this region than in the other three regions.
b) IOC values recorded for Region 1 were higher than those of other regions for each of the respective IOCs, with the exception of BSE (statistically less significant than Region 2) and AVDSD (not statistically different from other regions). Higher IOC values led to higher IOC multipliers regionwide, resulting in more Region 1 projects receiving higher programmatic model valuations. The presence of high IOC values throughout the region does, however, suggest that the region has substantial need for resiliency projects.

Given the distinct characteristics of Region 1 relative to other regions and, in the interest of preventing an over-emphasis on Region 1 projects, model results for that region were evaluated separately from those of the other regions. In general, any Region 1 project with a value higher than that of the average value of all other Region 1 projects was considered for inclusion in the Plan. Projects in any other region were considered for inclusion in the Plan if they were given a value higher than the average value for the remaining regions. All potential projects were then evaluated by the TAC and Planning Team as a final list of project to include in the Plan was determined.

III. Programmatic Model Assumptions

The programmatic model makes several key assumptions:

1. Projects are of sufficient scale to address IOCs within their respective subregions in combination with existing and other potential projects. Project-level differences in the abilities of projects to address IOCs by scale are not taken into consideration during this portion of work and will be evaluated further during the project strategies analysis.
2. Projects are at appropriate locations to address IOCs within their respective subregions. Project-level differences in the abilities of projects to address IOCs by precise location are not taken into consideration in this portion of work and will be considered under specific study area evaluation.
3. Projects are assumed to be cost-effective. Cost-effectiveness will be taken into consideration, in detail, during the project prioritization process.

SECTION 6. TECHNICAL ADVISORY COMMITTEE ANALYSIS

A key component of the entire Plan development process was the continued involvement of the TAC. This involvement began in earnest in the IOC phase, and was carried forward from that point on, most notably 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 Plan.

A. TAC PROJECT SCREENING

Following the final collection of projects for each region, TAC members were invited to participate in regional project screening meetings held in July 2016 in Texas City (Region 1), Victoria (Region 2), Corpus Christi (Region 3), and Port Isabel (Region 4). Each participating TAC member was provided with a workbook containing evaluation sheets for each of the candidate projects in their respective regions (see **Appendix B**).

An interactive live polling system was utilized during the regional meetings, with the results of TAC member input on project attributes displayed on a screen. This encouraged interaction among TAC members and facilitated a thorough discussion of the various projects and their contributions to coastal resiliency.

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 (excluding Region 3); and 3) whether it should be considered a priority on a yes/no basis. TAC members also provided input regarding the likely economic, community and environmental consequences if the projects were not pursued. TAC member input and project evaluations were recorded in their workbooks and subsequently reviewed by the Planning Team.

B. 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. Sixty-one "gap" projects were subsequently received from TAC members via Gap Analysis forms (see **Appendix B**). While the majority of projects submitted were new additions to the list of candidates, others had been previously submitted yet had scored below average (usually due to lack of detail) when input to the programmatic model. In the latter instance, the Gap Analysis forms provided a means for the Planning Team to re-evaluate such projects. All 61 newly proposed projects were combined into a single workbook distributed online to the TAC for the same type of analysis conducted at the regional meetings. The programmatic model was applied to these projects to ensure that they were afforded the same level of analysis as those previously identified.

SECTION 7. TECHNICAL ASSESSMENTS

Upon completion of the project identification and definition efforts, the Planning Team conducted technical analyses to provide key insights into projects and to groups projects into Resiliency Strategies (see SECTION 8). This allowed the Planning Team to further understand and document all project dimensions and their project merits in addressing coastal resiliency. These assessments included:

- Cost Assessment;
- Economic and Benefits Assessment;
- Physical and Risk Assessment;
- Feasibility and Constructability Assessment;
- Environmental Assessment; and
- Sediment Management.

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. COST ASSESSMENT

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.

All cost estimates were developed at a planning level based on available information and stated assumptions. The estimates included the following cost items:

- **Estimated Quantities:** 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.
- **Contingencies:** A 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.
- **Planning/Engineering and Design Fee:** It was assumed that these fees would be approximately five 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 Management and Inspection Fees:** These fees reflect the cost of professional services rendered during construction to monitor contractor compliance with contract requirements, as well as schedules and costs. It was estimated as five percent of the construction cost.
- **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 as five percent of the construction cost.
- **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 five percent of the construction cost.
- **Clearing and Grubbing:** Clearing involves the removing and disposing of all unwanted surface materials (e.g., grass, weeds, trees) prior to construction. Grubbing involves removal of all underground materials (e.g., stumps, buried debris). This was estimated to be 0.5 percent of the construction cost.
- **Land Acquisitions:** Standard unit prices for land acquisition and conservation were determined by reviewing values in multiple regions (primarily the Gulf Coast-Brazos Bottom and South Texas regions). Based on a high level comparison and engineering judgement, average values of $1.55 per square yard and $0.62 per square yard were assumed for acquisition and conservation, respectively. The Texas A&M University Real Estate Center collects Texas land price data for seven regions of the state (Texas A&M University, 2016). This data was consulted in identifying values.

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

B. Economic and Benefits Assessment

An economic and benefits assessment was developed to characterize the coast's economic environment and facilitate a high-level evaluation of candidate projects. The Plan does not define projects with sufficient specificity to quantify each project's individual economic performance. Rather, a regional economic approach was adopted to determine local and regional economic vulnerabilities and the extent to which they would be positively impacted by recommended projects.

The economic and benefits assessment began with a characterization of coastal economies that rely on the amenities and opportunities afforded by natural coastal environments. The assessment evaluates and quantifies the benefits resulting from these ecological resources, where possible, while also recognizing that some ecosystem services elude quantification given the current state of science and the complexities of modeling required to estimate values.

I. Long-Term Economic Impacts Analysis

For benefit streams that can be quantified, an evaluation framework was employed to assist in project comparison by adopting analytical constants for projects for which monetized benefits were computed. Projects were assumed to accrue benefits over a 50-year period, with some requiring operation and maintenance and others requiring renourishment or monitoring. A five percent markup on construction costs was estimated and included in the project cost to represent operations and maintenance expenses. Also, benefits and costs were compared at relatively equal price levels.

One example of a benefit calculation is the computation of the value of land lost to erosion. Historic erosion rates were projected over a 50-year period as a blanket assumption, and the area susceptible to erosion was noted by the creation of a polygon in ESRI ArcGIS. For every project for which this assessment was made, the erosion polygon was overlaid with respective county appraisal district property parcels. From the parcel data, the current market values of intersecting parcels were captured and assigned to the area inside each polygon. An estimate of the market value of the land lost to erosion was then computed based on the average value per acre of the parcels impacted. These values were reported for each project receiving an erosion estimate.

All projects were evaluated based on their contribution to local and regional economies, through short-term construction impacts (i.e., employment, income, revenue generated during construction) and expected long-term operational impacts. The method for assessing long-term impacts was based on expected project outputs to local and regional economies, whether by monetized benefit or by support for existing industrial sectors. The full results of the long-term economic impacts analysis are presented in **Appendix D**.

Ecosystem Services Analysis

Ecosystem services are generally defined as the benefits provided by the environment that support, sustain and enrich human life (Yoskowitz et al., 2010). Some ecosystem services are non-quantifiable based on current science and data, but are generally acknowledged to benefit the health and welfare of the public. Based on available data, ecosystem services were evaluated to better understand the economic significance of habitat as well as associated coastal restoration and protection efforts. Ecosystems analyzed included oyster reefs, beaches and dunes, rookery islands and coastal wetlands (i.e., marshes, mangroves, coastal prairies, hardwood bottomland forest wetlands). The analyses demonstrated the ecological and, where possible, economic impacts provided by various project types. Refer to **Appendix D** for complete results.

II. Short-Term Economic Impacts Analysis

Short-term impacts were calculated using proprietary IMPLAN, or Impact Analysis for Planning, software that traces project spending through the economy in a given time period, and estimates the associated cumulative monetary effects of the project. The analysis focused on five projects that represent different Resiliency Strategies. The representative projects types selected and analyzed include GIWW island restoration, beach nourishment and dune restoration, marsh restoration and shoreline protection, oyster reef restoration and rookery island restoration. The results of the analysis are summarized in **Appendix D**.

C. Physical and Risk Assessment

Physical and risk elements were assessed through a desktop methodology to determine how projects, following construction, are expected to perform and interact in the coastal system. The evaluation entailed reviewing projects by type and extent, and utilizing planning level expertise from coastal modeling experience to estimate project performance and results. The assessment process considered project impacts on physical characteristics along the coast (e.g., hydrodynamics, hydrology, water quality, sediment transport). Also considered were project impacts on risk-based concerns including wave effects, coastal flooding and coastal storm surge.

In order to evaluate these situations, projects were examined at the Resiliency Strategy level (or, in some instances, at a regional level or by specific physical system). The assessments determined how individual projects would function within the system, as well as within groupings of projects, and, consequently, facilitate an understanding of how individual projects have a positive or negative influence on other projects within the system. In sum, the physical and risk assessment process determined the extent to which each candidate project addressed identified coastal vulnerabilities, as well as its relative effectiveness in doing so.

For each Resiliency Strategy, the following questions or items were addressed:

1. What is the physical vulnerability under assessment (e.g., shoreline erosion)?
2. What are the coastal risks resulting from this vulnerability (e.g., coastal flooding)?
3. What are the physical mechanisms within the system that drive this vulnerability (e.g., vessel wakes)?
4. Categorize and/or group the projects that are identified to address this vulnerability, if applicable.
5. How does the project or group of projects mitigate the vulnerability?
6. Is the project or group of projects effective at mitigating or eliminating the vulnerability (with respect to the physical system)? Is an individual project within a group of projects more or less efficient than others at achieving this effectiveness?
7. Does the project or group of projects address the causation of the physics driving the vulnerability, or does it serve to mitigate the effects?
8. How is the risk assessment (due to physical attributes) affected by the project or group of projects?
9. Are there limitations (economically, resource limitations, etc.) to the effectiveness of the project or group of projects? Verify that any limitations are captured in the feasibility and constructability assessments.
10. Does the project or group of projects have beneficial or adverse physical effects on other projects, physical systems or strategies?
11. Does the project or group of projects have physical interactions with other projects or other groups of projects in the area?
12. Does the project or grouping have a temporal component to the effectiveness of the physical mechanism (i.e., does the project performance change over time with respect to the physical assessment)?
13. If a group of projects works “together” to address the physical mechanisms, is the sequencing of implementation important to the system effectiveness?
14. What other projects or groups of projects, if any, have an influence on this vulnerability or the effectiveness of the project or group meant to address it? How?
15. Are there projects or groups of projects that could potentially be more beneficial in addressing the vulnerabilities or reducing risk than those previously identified?
16. How may future predictions for weather patterns or sea level alter the physics and risk assessment related to the project or system?

The results of the physical and risk assessments are provided by region in **Appendix E**.

D. Feasibility and Constructability Assessments

While most project characteristics defined in this process are broad and approximated largely by project types, some considerations are too specific to be captured at the project type level. Therefore, feasibility and constructability assessments were completed at the project-specific level to account for unique situations. These assessments recognize factors that may restrict or otherwise compromise constructability (e.g., site access, material availability) and feasibility (e.g., permitting issues, public attitudes, lack of benefits). The outcome is the identification of projects that may be effective in addressing coastal resiliency needs, yet have significant impediments for implementation. This assessment benefitted from TAC feedback on project feasibility.

I. Feasibility Assessment

Project feasibility was analyzed by examining economic, environmental and constructability issues, and by utilizing both project construction cost estimates and prior knowledge of similar coastal projects. The process outcome was based on a priority ranking scale, used by both the Planning Team and the TAC, as follows: 1 - extremely low feasibility, 2 - low feasibility, 3 - moderate feasibility, 4 - high feasibility and 5 - extremely high feasibility.

- **Estimated Total Project Construction Costs:** Estimated total project costs were derived from project cost estimate sheets. The total project costs supporting the feasibility analysis are based on total construction costs inclusive of contingency, engineering and design feeds (E&D), construction management (CM) costs, and operation and maintenance (O&M) estimates. This is an important criterion in project evaluation, as it substantiates the construction schedule and availability of contracting resources.
- **Funding:** Without the appropriate and necessary amount of funding, a project can no longer be classified as feasible. The ability to select less costly alternatives or to secure additional sponsors or funding will increase feasibility.
- **Scheduling:** Realistic scheduling prior to project start-up is a critical element of the cost estimation process. Contract risk may render a project infeasible if the timeframe afforded in the project schedule appears to be unreasonable.
- **Post Construction Site Maintenance and Monitoring:** Some construction projects may require ongoing maintenance and monitoring. These recurring costs are not included in the initial construction phase, but can be substantial and will affect budgeting and funding availability for other projects.
- **Ability to Complete the Project:** The ability to complete a project is dependent upon multiple factors that include cost estimates, cost/benefit analysis and constructability.
- **Public Support and Community Outreach:** Public opinion can be a significant determinant of project feasibility. Meaningful stakeholder engagement keeps the community actively involved in (and informed of) the decision making process. In so doing, it can highlight project modifications that maximize community support.
- **Multi-Agency Coordination and Support:** Depending on project location, multiple agencies may have a role, responsibility and/or interest in a project. As with the preceding item, maintaining an open and inclusive process that encourages meaningful input into project design and construction will help maximize support from these agencies.
- **Environmental Vulnerability:** This is an important determinant of project feasibility, given that project design, construction, operation and maintenance must comply with myriad environmental laws and regulations designed to protect affected areas. Even if project outcomes are focused solely on ecological restoration and protection, it is critically important that the benefits of project construction outweigh the risks.
- **Wildlife Studies, Policies & Programs:** As with the preceding item, all project design, construction, operation and maintenance activities must comply with relevant wildlife laws, policies and regulations.
- **Coastal Benefits:** Project feasibility is a function of the extent to which a given project offers coastal benefits in the form of restoration, protection and enhanced resiliency.

Projects with negative or marginal benefits will be deemed infeasible in favor of those determined to be highly beneficial.

- **Environmental Mitigation:** The extent to which adverse environmental impacts can be mitigated or avoided during construction and operation is an important determinant of feasibility.
- **Long-Term Sustainability:** The ability of a project to yield benefits over an extended period will factor favorably into the feasibility assessment.
- **Alternatives Consideration:** A thorough and objective examination of all project alternatives (including the "no action" alternative) is an important means of assessing and optimizing project feasibility.
- **Benefit-to-Cost Ratio:** A benefit-cost analysis is a requisite step in the feasibility assessment process, as it will determine whether the benefits of a given project outweigh its costs over the anticipated life of the project.
- **Overall Coastal Resiliency:** This is the primary determinant of project feasibility. If the project does not make a positive and sustainable contribution to coastal resiliency, irrespective of other parameters, it will be deemed infeasible.

II. Constructability Assessment

Each project was screened for constructability issues that could potentially influence costs and the scheduled delivery of the completed project. A constructability review worksheet (i.e., checklist) was developed and applied to each proposed project (see **Appendix F**). Considerations in development of the constructability review checklists are provided below.

- **Estimated Total Project Construction Costs:** Estimated total project costs were taken directly from project cost estimates sheets. The total project costs used in support of the constructability review will include only the actual construction costs, inclusive of contingency. This is an important criterion in the evaluation of the projects overall constructability rating in that it will be used to substantiate the construction schedule and the availability of contracting resources.
- **Special Agreements or Permits:** Special permits or agreements may be required for a given project, such as the need for a cost sharing agreement with a local municipality co-sponsoring the project. If such an agreement or permit is required, it may contain stipulations affecting constructability.
- **Availability of Contractor Resources Skilled and Experienced in This Type of Work:** The contractor selection process must include such considerations as capacity, cost, experience and past performance (e.g., meeting schedules) associated with similar projects. The availability of highly qualified contractors - and their ability to meet Scope of Work requirements - will be a primary determinant of project constructability.
- **Estimated Project Schedule in Calendar Days:** The proposed project schedule, typically using a calendar day format, is a useful tool in determining project feasibility, as it has important consequences for overall project cost and disruptions during construction.
- **Averaged Contractor Progress Per Day (Cost Divided by Scheduled Days):** Similar to the item above, estimated progress per day has implications for overall project cost and, consequently, project constructability.
- **Contractor Access to the Site During Bidding:** This is an important step, as Contractor access will facilitate a firm understanding of site conditions, constraints and related factors.

Lacking access during the bidding process can compromise the accuracy of planning and construction projects and, consequently, raise questions of constructability.

- **Sufficient Detail in Plans, Specs and Pay Items:** As the project moves from conceptual and planning phases into the detailed design phase, a review of contract documents will help ensure that project elements are adequately identified and specified as the project enters the construction phase.
- **Special Performance, Payment or Maintenance Bonds Required:** A determination as to whether any special bonding requirements are necessary for the project must be undertaken early in the planning process, as the outcome may affect constructability.
- **Liquidated Damages and/or Incentives-Disincentives Required:** Projects generally have a time sensitive/critical delivery schedule driven by funding, project needs or seasonal considerations. For these projects, imposing liquidated damages for contractor delays and/or the use of incentives and disincentives should be considered.
- **Special Provisions Required (e.g., weather, licensing):** Each project must be evaluated to determine if special provisions need to be developed in conjunction with preparation of final design plans and specifications. These may include, for example, special storm protection measures required during construction, or compliance with U.S. Coast Guard permitting requirements for temporary navigation signals/markers.
- **Lump Sum vs. Cost-Plus Contract:** Constructability may also be affected by the type of project contract; the costs/benefits of alternative contracts need to be carefully evaluated.
- **Disadvantaged, Small, or Minority Business Enterprise Involvement:** Constructability may depend upon ability to comply with any client requirements for use of local, disadvantaged, minority and/or small businesses. Availability of qualified firms is another consideration.
- **Right of Way:** Right of way considerations are an important element in determining constructability, as they can affect both access to, and use of the project site. It is important to have all available right of way clearly documented in construction plans and specifications.
- **Sufficient Access to the Site for Equipment:** The availability of access roads (temporary or permanent) and waterways for site access and mobilization/demobilization of equipment and personnel must be evaluated.
- **Adequate Staging Area:** A determination of the adequacy of staging areas for project construction/operations, based on best industry practices, must be considered in the constructability review.
- **Field Office Requirement:** Some projects require semi-permanent field offices for use by contractor and owner representatives; availability of land (and access to it) for project duration must be considered.
- **Community Outreach:** This is an important element in the constructability review process, as community interests and concern must be taken into account as planning for construction moves forward.
- **No Public Access to the Site During Construction Activities:** The project location must be properly secured, with adequate signage, to prevent/discourage public access to the construction site.
- **Utility/Pipeline Conflicts Identified and Addressed:** The presence of utilities and/or pipelines on the project site can have a significant impact on project cost, schedule and,

ultimately, constructability. It is imperative that all utilities and pipelines be investigated and field located prior to construction.

- **Specified Materials Readily Available:** Careful planning to avoid delays due to the availability of any special project materials is essential in maintaining schedule, budget and, ultimately, constructability. Specifying the lead time for accessing construction materials is an important element in the planning process.
- **Special Project Schedule Constraints/Coordination During Peak Recreation Periods:** Any restricted work schedules or constraints (labor availability, seasonality, weather, conflicting site usage) must be identified and addressed during the planning stage in the interest of anticipating/avoiding constructability issues.
- **Marine, Vehicular, Bicycle and/or Pedestrian Traffic Control:** Disruptions to pre-construction traffic flow and patterns must be anticipated/addressed in the planning process to avoid negative impacts on project construction, schedule, budget and, ultimately, constructability.
- **Season Options:** Seasonal restrictions (e.g., environmental "windows" for wildlife nesting and fish spawning) must be anticipated and addressed in the planning process as a component of the constructability assessment.
- **Contractor Maintenance Period:** The entire life cycle of the project, including post-construction maintenance and monitoring, must be examined during the constructability assessment
- **Substantial Completion Punch List and Walk Though:** The constructability assessment must include any implications associated with owner requirements for a substantial completion walk-through by the design engineer and the contractor.
- **Warranty Period Punch List and Walk Through:** A constructability determination will be impacted by any requirement that the contractor warrantee the project site for a designated period post-construction.
- **Contractor Retention:** Contractors bidding any given project require clarity with respect to retainage and the release schedule for retainage items.

The results of the feasibility and constructability assessments are provided in **Appendix F.**

E. Environmental Assessment

A thorough understanding of the environmental impacts (both positive and negative) of project activity, from construction through operation and maintenance, is an important consideration in assessing the prospective desirability of any given project. While project types and subtypes establish general environmental traits (e.g., types of habitat creation or protection), the environmental assessment process targets specific elements for evaluation, such as benefits to endangered species or proximity to environmentally sensitive areas. In addition to this project-specific assessment, a second critical element is evaluation of project resiliency related to future changes in site conditions resulting from relative sea level rise and other impacts associated with future projections of changing weather patterns. This portion of the evaluation focused primarily on different project types and subtypes and their ability to withstand or adapt to such changes. Results were summarized in a qualitative manner.

I. Environmental Benefits or Concerns

In order to evaluate the projects for environmental benefits or concerns including the Clean Water Act, Endangered Species Act and Migratory Bird Treaty Act. A desktop risk analysis of each prescreened proposed project was conducted, with a risk level assigned to each of those projects. In so doing, the various legislative requirements outlined by these Acts were taken into account.

The 238 projects that passed the second screening and TAC gap projects were analyzed in light of benefits and constraints related to special status species and their habitat, and the presence of wetlands and waterways. AECOM analyzed these projects by using online data from multiple sources such as the USGS National Hydrography Dataset (NHD), Texas Parks and Wildlife Department (TPWD) Texas Natural Diversity Database (TXNDD), and the U.S. Fish and Wildlife Service Information, Planning and Consultation program data and National Wetland Inventory (NWI). Features considered included both benefits (e.g., improved endangered species habitat), and constraints (e.g., proximity to Superfund sites). An analysis of these environmental features, the location of the project, and the presence of nearby projects were factored into a ranking system that rated the overall environmental benefit of each project.

Each database was reviewed for its relative potential impact on special status environmental features. The NWI database was reviewed for the presence of nationally recognized and digitized wetlands, and each project was evaluated to determine benefits or detriments to known wetlands at each project site and adjacent areas. Streams and other hydrological features are described in the NHD database; each project was evaluated to verify any proposed impacts to known features at the project site. TPWD's database tracks observed occurrences of protected species; data from each coastal county is used to document the presence of such species at various locations. Each species has its own potential range, which is shown and described within the TXNDD database. Additional sources of information included in the environmental assessment process were based on Planning Team knowledge of known habitat types and protection areas.

A value was assigned to each of these databases within an environmental risk framework to provide an overall risk value. The values representing low risk and high benefits are assigned high values (3 to 4); projects with high risk, from significant negative impacts to known environmental conditions; and low benefits are assessed low values (0 to 1) within the risk analysis range. The resulting database assessed each prescreened project with a range of values (0 to 4) that reflect each project's potential risk for negatively impacting protected species and water features. The results of the analysis are provided in **Appendix G**.

II. Relative Sea Level Rise

Relative sea level rise, which is defined as the impact of land losses due to both subsidence and sea level rise, is anticipated to have lasting effects on our coastline. In 2014, the National Climate Assessment concluded that changing weather patterns are increasing across the United States, impacting an array of coastal lifelines, from water supply and energy infrastructure, to evacuation routes (Moser, et al. 2014). Coastal areas are seeing increases in street flooding, precipitation amounts and frequencies from historical patterns, frequency and intensity of storms, and global mean sea levels. Rates of relative sea level are higher along the upper Texas coast because these coastal land areas are also subsiding due to ground water pumping and sediment compaction (Kasmarek, Johnson and Ramage, 2014). As a result, water supply, energy infrastructure, and evacuation routes are vulnerable to higher sea levels, storm surges, inland flooding and erosion.

In addition to impacts from storms and other natural hazards, the vulnerability of coastal areas to relative sea level rise has prompted the development and implementation of coastal plans. Planning efforts, however, are challenged by the fact that the rate and extent of sea level rise are not easily predicted. In the following narrative, different project types and subtypes are presented with an explanation as to how they may respond to sea level rise and weather change factors under a moderate scenario. [1] As defined by the Intergovernmental Panel on Climate Change, this scenario correlates with the National Oceanic and Atmospheric Association's Lowest and Intermediate-Low Global sea level rise Scenarios of 0.2 and 0.5 meters (0.65 and 1.65 feet) by 2100 (Parris et al., 2012).

In Texas, many power plants, oil and gas refineries, storage tanks, and transmission lines are located in the coastal floodplain; adaptive measures must be taken to address storm-related flooding, erosion, and inundation in these vulnerable areas. Otherwise, oil supplies to the rest of the nation could be disrupted during storm events (Moser et al., 2014). The National Climate Assessment predicts that damage to assets (20 percent of which are in the oil and gas industry) along the Gulf coast could be between $8.3 and $13.2 billion by 2050. However, investing in preemptive adaptive measures could avert losses in the future (Moser et al., 2014).

A discussion of the potential impacts of relative sea level rise to project type and subtype benefits is provided below.

Land Acquisitions

- **Acquisitions:** It is unlikely that relative sea level rise will have significant adverse effects on coastal land acquisition practices. While flooding of acquired land resulting from sea level rise and increased severe weather events is possible, it is anticipated that detrimental effects will be mitigated by acquiring lands and precluding development. Additionally, the acquisition of coastal lands would allow them to act as natural barriers to relative sea level rise.
- **Conservation Easements:** Conservation easements acquired for restoration purposes would be restored to their natural state and largely are void of structures or construction (Aaronson and Manuel, 2008). Establishing conservation easements to restore lands as wetlands, dunes, and other natural barriers would protect the lands further inland from the coast from the potential impacts of relative sea level rise and changing precipitation patterns, such as more frequent flooding events.
- **Fee Simple:** Fee simple property ownership gives the owner absolute discretion to limit new development, suggesting that fee simple properties have great potential to be used to achieve conservation goals (Washington State RCO, 2009). Fee simple properties will likely be void of structures or construction, making it unlikely that they would be impacted by future damages associated with relative sea level rise and weather pattern changes (e.g., flood damages).

Public Access and Improvements

- **ADA Accessibility:** Evidence suggests that future weather pattern changes may include increasing intensity and frequency of extreme weather events (i.e., storms, hurricanes). Flood conditions resulting from storm surges, for example, may compromise the ability of the disabled to access ADA facilities. Adding ADA structures and improving those already in

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[1] This moderate scenario was based off of the Intergovernmental Panel on Climate Change scenarios and is a combination of the A1B and B2 scenarios, with a likely temperature change of 1.4 to 4.4°C, and likely sea level rise between 0.20 to 0.48 meters (in 2090-2099 relative to 1980-1999); (IPCC, 2007).

place would help mitigate the effects of flooding and high intensity storms, and would ensure that the disabled may continue to utilize these areas.

- **Walkovers:** The installation of beach and dune walkovers would reduce the degradation of sand dunes that provide a natural barrier to wind and waves (GLO, 1991). Preserving dunes will ultimately aid in the prevention of eroding coastlines brought about by both man-made structures and changing weather patterns (GLO, 1991).
- **Piers, Boat Ramps:** Rising sea levels will ultimately inundate some shoreline structures, and intense storm surges have the potential to damage piers and boat ramps. These structures will either have to be raised or constructed further inland as a result of rising water levels, and may have to be rebuilt in the event of intense storm systems.

Studies, Policies and Programs

- **Erosion Response Plans:** As storm frequency and intensity increase as a result of expected changes in weather patterns, coastal erosion is likely to increase as well. Preparing methods to combat erosion caused by relative sea level rise and other nature-based or human-based pressures will aid in the preservation of coastal shores (GLO, 2014).
- **Structure Raising:** Elevating structures (e.g., roads, bridges, buildings) to adapt to relative sea level rise and storm surge events is an effective method for flood prevention when wholesale removal of structures is not an option (Brebbia and Enzo, 2009).
- **Setbacks:** Coastal setback requirements establish buffer spaces in which permanent construction is not allowed; they are defined by a set distance from the shoreline's highest water mark and allow for the protection of land beyond the coastal setback area (Sanò et al., 2011). This practice has the potential to protect structures from the adverse impacts of storm surge and relative sea level rise. Additionally, buffers allow for natural coastal erosion processes to occur without human actions (e.g., development of hardened structures, sandbags).
- **Sediment Management:** Sediment accretion along the Texas coast has declined over time, in part due to relative sea level rise, and other effects on hydrology and flow events (Feifel, 2010). This has the potential to adversely impact aquatic habitats, water resources and shoreline infrastructure. Improved sediment management practices allow for the preservation, restoration and conservation of coastal areas, while reducing erosion (Feifel, 2010).

Shoreline Stabilization

- **Seawall:** The construction of seawalls aids in the prevention of erosion resulting from elevated sea levels and intense storms (USACE, 2013). These structures may be utilized to prevent flooding and storm surge within lands susceptible to relative sea level rise. However, seawalls in areas that preclude landward migration (e.g., barrier islands) can lead to the loss of beach habitat; in those instances, "soft" barriers (e.g., beach nourishment) may better adapt to the effects of relative sea level rise (McCarthy et al., 2001).
- **Bulkhead:** Bulkheads are a potential tool to combat rising sea levels, as they can prevent encroachment and aid in the prevention of erosion of the lands they are associated with (Dunagan, 2016). However, similar to seawalls, bulkheads are hardened structures that can have adverse environmental impacts on coastal and near-shore areas. (McCarthy et al., 2001).
- **Revetment:** A revetment, or sloped seawall, allows wave energy to dissipate instead of reflecting it outward. Construction of revetments may reduce flooding and wave

overtopping, as well as stabilize the shoreline located behind the structure. Utilization of this structure has the potential to reduce flooding and storm surge impacts resulting from the effects of changing weather patterns (USACE, 2013). However, coastal vulnerabilities may increase through the use of revetments and other hardened structures. These include encouraging development (which increases maintenance and upgrades as necessary), impacting natural erosion processes, and having associated adverse environmental impacts on the coastal and nearshore areas. Also, natural shoreline erosion typically deposits eroded sediment on adjacent coastlines; hardened structures prevent this process, stopping sediment accretion while also inducing additional erosion (TNA, 2016).

- **Breakwater:** Breakwaters function by reducing wave impacts and dissipating wave energy on coastal shorelines (USACE, 2013). In response to relative sea level rise and storm surge vulnerabilities, breakwaters may assist in preventing coastal erosion. The reduction of wave impacts resulting from the installation of breakwaters allows sediment to settle and may ultimately result in the growth and recovery of coastal shorelines. Similar to the previous hardened structures discussed, the addition of breakwaters can alter natural erosion processes and increase vulnerabilities elsewhere along the shoreline. However, the addition of breakwaters where there is increased boat traffic (e.g., along the Gulf Intracoastal Waterway) may have benefits in protecting coastal habitats from boat wakes.
- **Misc. Wave Break:** Wave breaks protect docks, piers, and other coastal structures by reducing wave energy (Groening, 2004). They may be utilized to aid in the protection of coastal structures along the Gulf coast during high intensity storm events.
- **Jetty:** Jetties are often utilized to limit siltation in inlets and navigation channels, thereby maintaining sufficient depths. Prospective adverse impacts are similar to those of other hardened structures, and also have the potential to result in down-drift erosion (ECAP, 2015).
- **Groin:** Groins are typically utilized to boost accretion and improve eroded beaches, although there is some evidence that construction activity of groins can contribute to sand deficit and increasing erosion rates (USACE, 2013). Consequently, groins will be evaluated on a case-by-case basis as an alternative to combat the effects of relative sea level rise.

Flood Risk Reduction

- **Levees:** Levees reduce flooding, prevent overflow, and allow for wave attenuation and/or dissipation (USACE, 2013). Some communities may need to elevate levees in response to storm surges and increased flooding events resulting from relative sea level rise. However, many existing levee systems are currently vulnerable to extreme weather events and relative sea level rise, so levee maintenance and upgrades are necessary (USGAO, 2015).
- **Flood Wall:** Flood walls prevent inundation, protect structures from hydrostatic loads, and may deflect flood debris away from buildings (FEMA, 2013). In the event of storm surge and related flood events, flood walls assist communities in containing rising waters and protecting structures.
- **Storm Surge Barrier:** These physical barriers inhibit storm surges from traveling upstream, preventing the rise of waters upstream and minimizing flooding (USACE, 2013). These barriers may become necessary with the increased frequency and intensity of extreme weather events.
- **Road Elevation:** Heavy rains from high intensity storm events are likely to result in the increased flooding of roads. As a result, constructing roads at higher elevations and with proper drainage would help communities adapt to the predicted increase in high intensity storm events.

Structure/Debris Removal

- **Structures on Public Easements:** The removal of structures on public easements allows for the unimpeded flow of pedestrian traffic – an important safety consideration in extreme weather events requiring evacuation. Additionally, the removal of such structures would allow easements to act as natural barriers in the event of storm surges and other extreme weather events.
- **Abandoned Oil and/or Gas Wells:** If improperly plugged, oil and gas seepage from abandoned wells can pollute groundwater and contaminate soil, rivers and lakes (ISHN, 2015). Abandoned natural gas wells occasionally continue to emit gas which may accumulate inside of a building, posing explosion risks (ISHN, 2015). Proper plugging of abandoned oil and/or gas wells may lower the amount of methane released into the environment, will lower the risk of injury to the public, and reduce pollution and contamination to soils, rivers and lakes. Additionally, proper removal of abandoned offshore rigs prevents them from coming unattached during storm events and posing hazards to nearby vessels or drifting ashore.
- **Abandoned Boats:** During extreme weather events, abandoned vessels can become hazards by breaking free from their moorings. Their removal will reduce some of the risk posed by the extreme weather events.
- **Dock Pilings:** Abandoned dock pilings are hazards for boaters and also impede public access along the shoreline (Waterways, 2006). Rising sea levels have the potential to conceal abandoned dock pilings, causing damage to vessels and injury to boaters. The removal of derelict dock pilings may reduce some of the potential damage associated with this hazard.
- **Post Storm Cleanup:** High intensity storms often leave debris in their wake, resulting in impeded roadways, walkways and drainage systems that may result in a heightened risk of injury to the public. Post storm cleanup allows for the safe passage of vehicles on the roadways, restores drainage capabilities, and improves the overall safety of the general public.
- **Plastics, Glass, Rubber, and Metal:** Plastics, glass, rubber and metal debris can impede roadways and affect drainage, thereby resulting in health risks to the general public. The removal of such debris will mitigate some of the risks resulting from extreme weather events.
- **Obstacles:** Similar to issues associated with debris, various obstacles (e.g., duck blinds) can impede the flow of water during extreme weather events, as well as limit movement of the general public, including during evacuation periods. Removal of obstacles prior to and after storm surges and other extreme weather events is an important action in enhancing public safety.

Habitat Creation and Restoration

- **Estuarine Wetlands:** As saltwater encroaches on estuarine wetland habitat due to relative sea level rise, some salinity-sensitive plant species will be displaced by others better adapted to higher salinities, ultimately decreasing the diversity of the marsh. Weakened plant communities will struggle to recolonize and the lower number of plant species will result in higher erosion rates. More frequent or extreme storm surges due to changing weather patterns and relative sea level rise will worsen this effect by eroding away portions of the wetlands.

Additionally, estuarine wetlands have a very specific water depth tolerance. When water depth increases, a wetland is likely to be converted to open water and lose all functionality. In order for wetland habitat to be preserved in spite of relative sea level rise, it will either have to migrate inland or be artificially created or replaced (Jacob and Showalter, 2007). Creating and restoring existing estuarine wetland communities will slow or reverse degradation trends and also lead to reduced wetland and coastline erosion (Needham, Brown, and Carter, 2012).

- **Oyster Reef:** Oyster reefs typically require salinity ranges from 10-28 parts per thousand for optimal growth (SMS, 2008). More frequent or extreme storm surges can introduce stressors that include altered salinity levels, the addition of contaminants, and sedimentation that covers oyster beds in silt, (Rice, 2016). Extended periods of unstable salinity levels inhibit oyster growth and reproduction, and increases susceptibility to disease. By promoting oyster reef growth, a vertical accretion rate equal to the rate of relative sea level rise may be maintained, allowing oyster populations to exist within their ideal depths (Ridge et al., 2015). Therefore, oyster reefs may tolerate relative sea level rise if they are able to exist above their maximum depth range. Additionally, oyster reefs act as a natural wave break during storm surges, lowering the intensity of waves reaching the shoreline.
- **Freshwater Wetlands:** Relative sea level rise can raise salinity levels within freshwater emergent and freshwater forested wetlands. Rising sea levels contribute to higher salt content in the soils of freshwater wetlands, resulting in the loss of vegetation with low salt tolerance (Needham, Brown and Carter, 2012). Freshwater wetlands may possibly become estuarine wetlands as a result of rising sea level and may possibly disappear completely (Needham, Brown, and Carter, 2012). Projects that result in the closing of channels that allow salt water to flow into freshwater wetlands, replanting vegetation, and protecting transitional estuarine habitat may allow for the eventual inland migration and preservation of freshwater wetlands, thereby making these projects more resilient to relative sea level rise (NWF, 2016).
- **Barrier Islands:** Barrier islands protect mainland bodies from the brunt of storm surges and erosion. Rising sea levels have the potential to reshape barrier islands and, in some instances, eliminate them altogether. Barrier island rollover has the potential to occur with increased wave energy resulting from storm events that produce washovers, remove sand from the beach face and deposit it into the marsh behind the dunes. The dunes and beach retreat toward the mainland and the marsh behind is covered. The buried marsh eventually becomes exposed on the beach face as the island continues to retrograde (Project Oceania, 2016).

  With the loss of barrier islands, it is likely that salinity intrusion will increase along with the deterioration of wetlands (Needham, Brown, and Carter, 2012). Additionally, the loss of barrier islands would alter bay-side habitats (via increased wave action and salinity) and increase erosion and flooding along mainland shorelines. The creation and restoration of barrier islands may ultimately reduce or prevent salinity intrusion, wetland deterioration and erosion along mainland shorelines. Additionally, restoration of barrier islands to their natural state would allow for barrier island rollover, and therefore, continued protection of the shorelines.
- **Coastal Prairies:** Much of the Gulf Coast Prairie has been converted from open land to cattle grazing land or industrial development. Relative sea level rise impacts are also expected to have conversion impacts as emergent and submergent lands within coastal prairies become

open water. Restoring coastal prairies will likely reduce the possibility that emergent and submergent habitats will be converted to open water (USGS, 2015).

- **Rookery Islands:** These islands are dynamic, constantly reshaped by the flow of water and deposition of bay shell fragments (Smith et al., 2014). Rising sea levels and storm surges can affect these flood prone islands by inundating them with water and promoting erosion (Smith et al., 2014). This is likely to result in loss of coastal breeding bird habitat and flooding of bird nests. Restoring rookery islands will allow for the retention of ideal coastal breeding bird habitat and may aid in the preservation of coastal breeding bird populations.

Wildlife

- **Fisheries:** The early life stages of many fish species rely on estuaries and oyster reefs to develop and grow. Habitat alterations resulting from relative sea level rise can lead to significant changes in aquatic habitat and the presence of different fish species – both of commercial and recreation value.
- **Birds**: Rookery habitat alterations due to relative sea level rise have the potential for adverse impacts, including flooding of coastal bird nesting areas. This may ultimately lead to changes in the composition, health and numbers of various shorebird species.
- **Oysters**: (See Oyster Reef)
- **Sea Turtles:** Rising sea levels can adversely impact sea turtle nesting beaches, as they are typically used every nesting season (STC, 2015). If these beaches erode away or become inundated due to rising sea levels, the reduction or complete elimination of suitable nesting habitat will adversely affect the viability of sea turtle populations. Higher temperatures resulting from projected changes to weather patterns have the potential to affect the development of sea turtle eggs as well. Temperatures affect the gender outcome of the eggs, and higher temperatures are likely to result in significantly biased sex ratios, ultimately aiding in the decline of the sea turtle population (STC, 2015).
- **Invasive Species:** Terrestrial and aquatic invasive species are often more adaptable to changing environmental conditions than their native counterparts. For example, rising temperatures brought about by changing weather patterns are likely to provide invasive plant species with a greater opportunity to outcompete native plants. Such invasive plant species have already demonstrated a trend of blooming earlier in response to early growing season brought about by changes in weather patterns. In contrast, native species have demonstrated no such adaptation (Nijhuis, 2013).

Environmental

- **Freshwater Inflows:** The timing and volume of fresh water delivery, as well as its sediment load, to coastal ecosystems is controlled by the hydrologic cycle and, therefore, is susceptible to relative sea level rise impacts. Changes to the earth's hydrologic cycle have the potential to drastically affect atmospheric water vapor concentrations, precipitation patterns, and stream flow and runoff patterns. Climate models have consistently predicted that increased risk of floods and drought will result from alteration to this cycle (Graham et al., 2010). Though there is uncertainty regarding future rainfall and runoff patterns, an increase in extreme rainfall events could lead to an increase in the chemical and sediment load to the coastline (Scavia et al., 2002).
- **Hydrologic Restoration:** Continuous interactions between upland, riparian, aquatic, and marine ecosystems are necessary for the exchanges of energy, nutrients and species. Reestablishing natural hydrology and connectivity between these habitats will restore their

extent, resiliency, functionality, and sustainability. This will ultimately aid in the preservation of these ecosystems and allow them to adapt with relative sea level rise (NOAA, 2016).

Beach Nourishment

- **Gulf and Bay:** The continual deposit of sand (via beach nourishment) on vulnerable coastal areas can be an effective tool in coastal preservation in the event of relative sea level rise and storm surge events. Though difficult to predict in some areas, it is unlikely that rising sea levels will overwhelm coastal beach nourishment projects (ASBPA, 2006). Additionally, the use of “soft” structures (e.g., beach nourishment) as opposed to “hard” structures (e.g., seawalls), maintains natural erosion processes and allows barrier islands to move or migrate as they adapt to relative sea level rise (McCarthy et al., 2001; TNA, 2016).

Dune Restoration

- **Dune:** Dunes are highly dynamic and provide a natural barrier to wind and waves. They aid in the prevention of erosion and promote shoreline expansion (GLO, 1991). Increasing the stability of existing dunes, while establishing new dunes, will help prevention eroding coastline due to human development and relative sea level rise impacts. Additionally, dunes can protect landward development from flooding and other damages due to extreme weather events.

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.

SECTION 8. RESILIENCY STRATEGY DEVELOPMENT

A. SYNTHESIZING THE TECHNICAL ASSESSMENTS

Plan development efforts – including TAC input, literature review and 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 Resiliency Strategies, each representing a category of actions that can be taken 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, resulting Pressures and IOCs along the coast.

The Resiliency Strategies were developed and proposed in order to provide focal areas for the Texas General Land Office to target as it works to restore, enhance and protect 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, 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 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 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 developing the list of eight Resiliency Strategies, it was recognized that these are priority concerns at this time; other Resiliency Strategies can also play a role in coastal protection and restoration and may warrant inclusion in future iterations of the Plan. Close coordination with ongoing study efforts and initiatives in Texas will be instrumental in this effort.

B. PROJECT PRIORITIZATION

Following formulation of the eight Resiliency Strategies, prioritized projects were identified for each Resiliency Strategy based on results of the TAC and technical assessments. The proposed projects analyzed during the assessments were sorted into tiers within each of the eight Resiliency

Strategies, based on the assessment results, to yield manageable and actionable sets of projects for immediate consideration.

The first tier of projects is included in the Texas Coastal Resiliency Master Plan. Projects were identified as Tier 1 if they received high TAC approval ratings (typically exceeding 80 percent), a high feasibility assessment, and were anticipated positive impacts in addressing IOCs. Projects were identified as Tier 2 if they received moderate (i.e., 60-80 percent) TAC approval, a moderate feasibility assessment, and were anticipated to have moderate positive impacts in addressing IOCs. Tier 2 projects were not included in the 2017 Plan but will continue to be evaluated for prospective incorporation in future iterations of the Plan. Projects were identified as Tier 3 if they either required additional research and development, or were already captured under another, larger project.

The projects were prioritized individually by summarizing the results of each project's results for the various components of the assessments. The typical project results criteria are shown in Table 8-1, and show the assessment result targets that were used to associate each prospective project with a tier or other result. A summary of the project assessment categories is given in Table 8-2. These categories correspond to the assessment results summarized, by project, in the Project Evaluation Tables provided at the end of this Report.

A detailed discussion of recommended Resiliency Strategies, including the projects which comprise these strategies, can be found in the Plan. Additional project-specific data and technical assessment data are provided in appendices to this Report.

Table 8-1: Typical Project Result Criteria

Project Result	Typical Result Criteria			Next Steps
Tier 1	Initial Screening	P		Tier 1 projects are aligned with the Resiliency Strategies put forth by the Plan. These projects are proposed candidates to be considered to most effectively target coastal resiliency.
	Programmatic Model	P	🟢	
	Y/N Priority	> 80%	🟢	
	Feasibility	≥ 2.5	🟢	
Tier 2	Initial Screening	P		Highly evaluated projects in Tier 2 will continue to be considered in the future; particularly as Tier 1 projects are completed.
	Programmatic Model	P	🟢	
	Y/N Priority	60% to 80%	🟡	
	Feasibility	2.2 to 2.5	🟡	
Tier 3	Initial Screening	P		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.
	Programmatic Model	P	🟢	
	Y/N Priority	< 60%	🔴	
	Feasibility	< 2.2	🔴	
Not TAC Reviewed	Initial Screening	P		Projects that failed the programmatic model were not taken to the Technical Advisory Committee for review, unless otherwise noted.
	Programmatic Model	F	🔴	
Not Scored with Programmatic Model	Initial Screening	F		Projects that did not pass initial screening were not attributed or evaluated using the programmatic model or subsequent TAC analyses.
Duplicate	Initial Screening	D		Duplicate projects were removed from consideration.
Complete or In-Progress	Initial Screening	O		Planning efforts will continue to catalogue completed projects as they apply to Resiliency Strategies.

Table 8-2: Project Assessment Summary

	Evaluation Method	Result	Description	Criteria	
Project Information	**Region**	0 to 4	Region (R)	0	Coastwide projects
				1	Orange, Jefferson, Chambers, Harris, Galveston, Brazoria
				2	Matagorda, Jackson, Victoria, Calhoun
				3	Aransas, Refugio, San Patricio, Nueces, Kleberg
				4	Kenedy, Willacy, Cameron
Planning Team Assessments	**Initial Screening**	D	Duplicate	Project is duplicated by another under consideration.	
		F	Fail	Project does not meet intents of resiliency and/or project description is not sufficient for further evaluation.	
		O	Ongoing	Project is ongoing, funded, or complete.	
		P	Pass	Project meets intents of resiliency and project description is sufficiently described for further evaluation.	
			Exceptions Noted	Special considerations are noted in the Notes & Exceptions column to explain project criteria that do not agree with Table 8-1.	
	Programmatic Model	P	Pass	Region 1	≥ 2.76
				Regions 0, 2, 3, 4	≥ 2.29
		F	Fail	Region 1	< 2.76
				Regions 0, 2, 3, 4	< 2.29
	Feasibility	0 to 75	Level of feasibility of executing the project	High	≥ 52
				Medium-High	39 - 52
				Medium-Low	33 - 38
				Low	≤ 32
	Environmental	0 to 4	Level of risk that project will impact known environmental conditions	Low Risk	3 - 4
				Moderate Risk	2
				High Risk	0 - 1
Technical Advisory Committee Assessments	**Y/N Priority**	%	Percentage of TAC that agree that this project is a priority for coastal resiliency (on a Yes/No basis)	High	≥ 80%
				Medium	60% to 79%
				Low	< 60%
	Feasibility*	0 to 4	Level of feasibility of executing the project	High	≥ 2.8
				Medium-High	2.5 – 2.8
				Medium-Low	2.2 – 2.5
				Low	≤ 2.2
	Gap**	G	Project submitted by TAC as part of project gap analysis	All gap projects were submitted back to the collective TAC for review, regardless of whether the project met the criteria for passing the programmatic model or initial screening.	
	Notes & Exceptions	Explanation of any exceptions to the above criteria.			

*Feasibility was not assessed by the TAC for projects in Region 3.

**Gap projects generally received fewer TAC evaluations, so there is less certainty of these scores.

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PROJECT EVALUATION TABLES

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
2	R0-1	Tier 1	0	Abandoned and Derelict Structure and Vessel Removal Program	P	0.85	0.67	- -	-	- -	3.5	GLO involvement in the project is ongoing.
1187	R0-2	Tier 1	0	Sediment Management Plan	P	2.56	1.00	2.75	-	58	4.0	-
2311	R0-3	Tier 1	0	Beach Monitoring and Maintenance Program	P	2.11	0.82	-	-	54	4.0	GLO involvement in the project is ongoing.
2	R0-4	Tier 1	0	Abandoned and Derelict Petroleum Production Structure Removal Program	P	0.85	0.67	- -	-	- -	3.5	GLO involvement in the project is ongoing.
252	R1-1	Tier 1	1	Bolivar Peninsula Beach & Dune Restoration	P	4.40	1.00	2.53	-	49	4.0	-
315	R1-2	Tier 1	1	Follets Island Nourishment and Erosion Control	P	3.62	0.79	2.18	-	34	3.5	Low feasibility likely due to Gulf-facing structures and is under assessment.
320	R1-3	Tier 1	1	Old River Cove Barrier Island Restoration	P	4.45	1.00	2.50	-	36	3.0	-
337	R1-4	Tier 1	1	Old River Cove Marsh Restoration	P	3.15	1.00	2.69	-	31	4.0	-
29	R1-5	Tier 1	1	Anahuac National Wildlife Refuge Living Shoreline	P	4.82	0.93	2.73	-	38	3.5	-
30	R1-6	Tier 1	1	Willow Lake Shoreline Stabilization	P	8.20	1.00	2.64	-	47	4.0	-
35	R1-7	Tier 1	1	McFaddin National Wildlife Refuge Shoreline Restoration	P	4.60	0.84	3.05	-	30	3.5	-
380	R1-8	Tier 1	1	Gordy Marsh Restoration & Shoreline Protection	P	4.82	0.93	2.71	-	28	4.0	-
21	R1-9	Tier 1	1	Galveston Bay Rookery Island Restoration	P	4.47	0.89	2.74	-	40	4.0	-
240	R1-10	Tier 1	1	Coastal Heritage Preserve – Phase 4	P	2.81	0.94	2.94	-	43	4.0	-
241	R1-11	Tier 1	1	Sweetwater Preserve Expansion	P	2.81	0.88	2.79	-	48	4.0	-
344	R1-12	Tier 1	1	Pierce Marsh Living Shoreline	P	6.09	0.94	2.84	-	29	3.5	-
346	R1-13	Tier 1	1	IH-45 Causeway Marsh Restoration	P	6.09	1.00	2.74	-	42	3.5	-
607	R1-14	Tier 1	1	Moses Lakes Wetlands Restoration – Phase 3	P	6.09	0.88	3.00	-	42	3.0	-
834	R1-15	Tier 1	1	Salt Bayou Siphons	P	3.23	0.92	3.00	-	34	4.0	-
797	R1-16	Tier 1	1	Dickinson Bay Rookery Island Restoration	P	4.51	0.89	2.95	-	45	4.0	-
9	R1-17	Tier 1	1	Brazoria National Wildlife Refuge GIWW Shoreline Protection	P	4.54	1.00	2.55	-	39	3.0	Project does not achieve passing criteria for programmatic model.
11	R1-18	Tier 1	1	Follets Island Marsh Restoration	P	3.39	0.80	2.40	-	36	4.0	-
322	R1-19	Tier 1	1	North Pleasure Island Barrier Island Restoration	P	4.45	0.86	2.71	-	35	2.5	-
457	R1-20	Tier 1	1	Sabine-Neches Waterway Barrier Island Habitat Restoration	P	3.77	0.92	2.79	-	33	3.5	-
9025	R1-21	Tier 1	1	Bessie Heights Marsh Restoration	P	2.49	1.00	2.63	G	40	4.0	All gap projects were reviewed by the TAC.
9026	R1-22	Tier 1	1	Galveston Island West of Seawall to 8 Mile Road Beach Nourishment	P	3.62	0.82	2.38	G	31	4.0	-
9046	R1-23	Tier 1	1	Follets Island Conservation Initiative	P	2.56	0.88	3.33	G	44	4.0	All gap projects were reviewed by the TAC.
9047	R1-24	Tier 1	1	Sabine Ranch Habitat Protection	P	2.94	0.91	3.00	G	47	4.0	-
19	R1-25	Tier 1	1	Galveston Bay Oyster Reef Planning & Restoration	P	3.89	0.88	3.23	-	54	4.0	-
414	R1-25	Tier 1	1	Galveston Bay Oyster Reef Planning & Restoration	P	3.89	0.82	2.86	-	43	4.0	-
794	R1-25	Tier 1	1	Galveston Bay Oyster Reef Planning & Restoration	P	3.89	0.87	2.92	-	46	4.0	-
4	R2-1	Tier 1	2	Brazos River to Cedar Lake Creek GIWW Stabilization	P	4.51	0.87	2.47	-	39	4.0	Project is duplicated by other(s) under consideration
51	R2-2	Tier 1	2	Boggy Cut GIWW Stabilization	P	6.78	0.87	2.50	-	29	3.0	-
52	R2-3	Tier 1	2	Chester's Island Restoration	P	1.27	1.00	3.00	-	38	3.0	GLO involvement in the project is ongoing.
600	R2-4	Tier 1	2	Half Moon Oyster Reef Restoration – Phase 3	P	3.18	1.00	2.93	-	43	4.0	-
922	R2-5	Tier 1	2	Chinquapin Oyster Reef Restoration	P	3.18	1.00	2.59	-	40	4.0	-
430	R2-6	Tier 1	2	Redfish Lake Living Shoreline	P	4.66	0.85	2.07	-	42	4.0	-
418	R2-7	Tier 1	2	Sargent Beach & Dune Restoration	P	2.71	0.94	2.65	-	35	4.0	-
423	R2-8	Tier 1	2	Matagorda Bay System Hydrologic Restoration Study	P	2.62	0.93	2.07	-	36	4.0	Project feasibility will be reviewed during Phase 2.
9027	R2-10	Tier 1	2	San Antonio Bay Rookery Island Restoration	P	1.95	1.00	2.85	G	35	4.0	All gap projects were reviewed by the TAC.
9028	R2-11	Tier 1	2	Schicke Point Living Shoreline	P	4.66	0.90	2.82	G	42	4.0	-
9050	R2-12	Tier 1	2	Sargent Ranch Addition to San Bernard National Wildlife Refuge	P	2.28	0.91	2.91	G	33	4.0	All gap projects were reviewed by the TAC.
70	R3-1	Tier 1	3	Goose Island State Park Living Shoreline	P	3.10	0.88	-	-	51	4.0	-
72	R3-2	Tier 1	3	Long Reef Rookery Island Shoreline Stabilization	P	3.51	0.83	-	-	52	4.0	-
75	R3-3	Tier 1	3	Nueces River Delta Shoreline Stabilization	P	2.38	0.93	-	-	40	4.0	-
86	R3-4	Tier 1	3	Mustang Island State Park Acquisition	P	2.35	1.00	-	-	47	4.0	-
678	R3-5	Tier 1	3	Indian Point Shoreline Protection	P	1.40	0.86	-	-	50	3.0	GLO involvement in the project is ongoing.
696	R3-6	Tier 1	3	Shamrock Island Restoration – Phase 2	P	3.51	0.97	-	-	44	4.0	-
605	R3-7	Tier 1	3	Guadalupe River Delta Estuary Restoration	P	4.02	0.97	-	-	38	4.0	-
437	R3-8	Tier 1	3	Fulton Beach Road Living Shoreline	P	4.43	0.97	-	-	42	3.5	-
829	R3-9	Tier 1	3	Corpus Christi & Nueces Bays Oyster Reef Restoration	P	5.34	0.88	-	-	46	4.0	-
809	R3-10	Tier 1	3	Coastal Bend Gulf Barrier Island Conservation	P	2.35	0.90	-	-	47	4.0	-
443	R3-11	Tier 1	3	Nueces County Hydrologic Restoration Study	P	2.62	0.78	-	-	48	4.0	Project is critically important as it relates to other proposed projects.
9001	R3-12	Tier 1	3	Portland Living Shoreline	P	4.51	0.83	2.64	G	39	4.0	-
9003	R3-13	Tier 1	3	Shell Point Ranch Wetlands Protection	P	1.74	0.90	2.83	G	33	4.0	All gap projects were reviewed by the TAC.
9006	R3-14	Tier 1	3	Dagger Island Living Shoreline	P	4.43	0.93	2.53	G	39	4.0	-
9008	R3-15	Tier 1	3	Flour Bluff Living Shoreline	P	3.29	1.00	2.38	G	33	3.5	-
9014	R3-16	Tier 1	3	Causeway Island Rookery Habitat Protection	P	3.35	1.00	2.83	G	46	4.0	-
145	R4-1	Tier 1	4	City of South Padre Island Gulf Shoreline Restoration	P	3.48	0.79	3.10	-	38	4.0	GLO involvement in the project is ongoing.
96	R4-2	Tier 1	4	Bahia Grande Hydrologic Restoration	P	3.00	0.95	2.89	-	40	4.0	-
822	R4-3	Tier 1	4	Paso Corvinas Wetlands & Hydrologic Restorations	P	4.40	1.00	2.96	-	44	4.0	-
452	R4-4	Tier 1	4	Bird Island & Heron Island Restoration	P	4.01	0.90	2.52	-	48	4.0	-
9042	R4-5	Tier 1	4	Bahia Grande Living Shoreline	P	5.20	0.91	2.64	G	43	4.0	-
9053	R4-6	Tier 1	4	Laguna Heights Wetlands Acquisition	P	2.74	0.85	2.90	G	43	4.0	-
1	-	Tier 2	0	Storm-Resistant Data Collection & Monitoring Stations	P	-	0.93	-	-	- -	- -	Only reviewed by TAC in R3; GLO involvement in the project is ongoing.
645	-	Tier 2	0	Long-Term Recovery of Gulf Shorebirds and Waterbirds	P	3.46	0.77	3.00	-	51	3.0	-

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869	-	Tier 2	0	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	P	3.46	0.75	2.43	-	45	3.0	-
107	-	Tier 2	0	Construction of Artificial Reefs in Texas Nearshore Waters of the Gulf of Mexico	P	3.92	0.67	3.00	-	- -	- -	-
9057	-	Tier 2	0	Wetland Restoration, Water Quality Improvement, and Flood Risk Reduction	P	4.46	0.81	2.59	G	45	- -	Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
9015	-	Tier 2	0	Coastal Zoning and Flood Study	P	1.47	0.77	2.71	G	48	- -	All gap projects were reviewed by the TAC.
9058	-	Tier 2	0	Dune and Wetland Protection and Public Access	P	1.07	0.75	2.67	G	42	- -	All gap projects were reviewed by the TAC.
9020	-	Tier 2	0	Alternative Solutions for Beach Erosion	P	0.76	0.75	2.33	G	48	- -	All gap projects were reviewed by the TAC.
9010	-	Tier 2	0	Tidal Datums and Inundation Frequency Markers	P	1.19	0.71	2.89	G	42	- -	All gap projects were reviewed by the TAC.
44	-	Tier 2	1	Trinity - San Jacinto Estuary Fresh Water Inflows	P	3.00	0.93	2.15	-	41	3.0	Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
180	-	Tier 2	1	Deer Island and Jigsaw Island Restoration	P	4.47	0.82	2.44	-	39	3.5	Project intent is sufficiently captured in R1-9.
341	-	Tier 2	1	Marsh Restoration, Long Point Marsh, Galveston County	P	5.83	0.80	2.38	-	30	4.0	Project well received, but was ultimately moved to Tier 2 due to other marsh restoration needs in the region.
641	-	Tier 2	1	Oyster Reef Restoration in Upper Galveston Bay	P	4.02	0.80	2.93	-	43	4.0	Project intent is sufficiently captured in R1-25.
360	-	Tier 2	1	West Bay Water Quality Protection Project	P	6.05	0.79	2.75	-	49	3.0	-
716	-	Tier 2	1	Galveston Bay Bird Nesting Islands Restoration	P	3.89	0.79	2.47	-	40	4.0	-
458	-	Tier 2	1	Marsh Restoration, Jefferson County	P	3.77	0.79	2.42	-	36	4.0	-
318	-	Tier 2	1	Groin at State Highway 332	P	3.63	0.75	2.67	-	44	3.5	-
713	-	Tier 2	1	Middleton Wetlands Creation	P	2.85	0.75	2.67	-	47	4.0	-
28	-	Tier 2	1	East Bay and GIWW Marsh Restoration and Protection	P	5.83	0.73	2.31	-	41	3.0	-
25	-	Tier 2	1	Burnet Bay Marsh Restoration	P	4.66	0.73	2.64	-	44	3.0	-
873	-	Tier 2	1	Anahuac National Wildlife Refuge Wetlands Creation	P	2.85	0.73	2.67	-	44	4.0	-
261	-	Tier 2	1	East End Lagoon Nature Park & Preserve	P	2.81	0.73	3.00	-	52	4.0	-
637	-	Tier 2	1	Port Freeport Regional Sediment Management-Habitat Restoration Initiative	P	2.77	0.73	2.50	-	58	3.0	-
842	-	Tier 2	1	West Bay Estuarine Habitat Restoration and Protection Project	P	6.09	0.71	2.81	-	37	4.0	-
310	-	Tier 2	1	Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel	P	4.40	0.71	2.88	-	35	3.0	-
616	-	Tier 2	1	Alligator Point Island Restoration	P	3.58	0.71	2.73	-	43	3.5	-
865	-	Tier 2	1	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	P	3.77	0.69	3.14	-	49	3.5	-
855	-	Tier 2	1	Sabine Lake Oyster Reef Restoration and Enhancement	P	3.15	0.69	2.79	-	43	4.0	-
764	-	Tier 2	1	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	P	2.94	0.69	2.62	-	37	4.0	-
417	-	Tier 2	1	GIWW Island Restoration, Orange County	P	3.00	0.67	2.93	-	43	3.0	-
793	-	Tier 2	1	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	P	7.04	0.65	2.83	-	48	4.0	-
717	-	Tier 2	1	South Deer Island Acquisition and Restoration	P	5.09	0.65	1.63	-	33	4.0	-
769	-	Tier 2	1	San Jacinto North Shore Restoration	P	4.72	0.64	2.46	-	45	2.5	-
340	-	Tier 2	1	Marsh Restoration, Pepper Grove Cove, Galveston County	P	5.83	0.62	2.71	-	- -	- -	-
801	-	Tier 2	1	West Galveston Bay Marsh Restoration – Chocolate Bay	P	3.77	0.60	2.13	-	31	3.5	-
232	-	Tier 2	1	Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation	P	2.81	0.59	2.19	-	52	4.0	The willingness of the landowner to sell is uncertain.
132	-	Tier 2	1	Village of Surfside Beach Nourishment and Dune Restoration	P	4.40	0.53	2.35	-	- -	- -	-
112	-	Tier 2	1	Treasure Island Nourishment Project	P	1.48	0.50	2.00	-	43	3.5	GLO involvement in the project is ongoing.
309	-	Tier 2	1	Dune Restoration and Beach Nourishment, Surfside to Brazos River	P	4.40	0.47	2.47	-	49	3.0	-
9019	-	Tier 2	1	Rose City Marsh Restoration	P	2.34	0.86	3.14	G	45	- -	Project well received, but was ultimately moved to Tier 2 since there is another large marsh restoration directly adjacent to this project.
9018	-	Tier 2	1	Hydrologic Restoration of Upper Cow Bayou	P	5.20	0.80	1.83	G	45	- -	Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
9024	-	Tier 2	1	Maintain Freshwater Inflows to Trinity River Delta	P	5.88	0.71	2.17	G	48	- -	-
9022	-	Tier 2	1	Jones Bay Oyster Restoration	P	5.62	0.70	2.55	G	40	- -	-
9016	-	Tier 2	1	Swan Lake Marsh Restoration	P	3.89	0.63	2.89	G	33	- -	-
853	R2-4/5	Tier 2	2	Texas Mid-Coast Oyster Restoration and Enhancement	P	3.18	1.00	2.40	-	40	4.0	Project intent is sufficiently captured in R2-4 and R2-5.
62	-	Tier 2	2	Welder Flats Wildlife Management Area	P	4.51	0.92	2.33	-	48	4.0	Project well received, but was ultimately moved to Tier 2 due to other living shoreline opportunities in the region.
56	-	Tier 2	2	Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition	P	4.20	0.92	2.33	-	40	4.0	The willingness of the landowner to sell is uncertain.
777	-	Tier 2	2	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	P	3.00	0.92	2.06	-	41	3.0	Project feasibility will be reviewed during Phase 2.
138	-	Tier 2	2	Bay Shoreline from Magnolia Beach to Port O'Connor	P	2.31	0.77	2.19	-	44	3.5	-
136	-	Tier 2	2	Dune/Beach Restoration from Sargent Beach to the Colorado River	P	2.71	0.73	1.71	-	44	3.5	-
9048	-	Tier 2	2	Baer Ranch Addition to San Bernard NWR	P	1.58	0.90	2.67	G	37	4.0	All gap projects were reviewed by the TAC. The willingness of the landowner to sell is uncertain.
9030	-	Tier 2	2	Matagorda Peninsula and East Matagorda Bay State Scientific Area	P	3.47	0.80	2.09	G	33	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
9049	-	Tier 2	2	Lake Austin Shoreline Addition to Big Boggy NWR	P	1.89	0.71	3.00	G	37	- -	All gap projects were reviewed by the TAC.
680	-	Tier 2	3	Nueces Delta Marsh Plan and Restoration Project – Phase II	P	4.97	0.90	-	-	47	4.0	Project intent is sufficiently captured in R3-3 and R3-11.
91	-	Tier 2	3	Coastal Bend Conservation Easements	P	4.76	0.86	-	-	35	4.0	Project well received, but is highly conceptual in nature, and the intent of this project is captured through other proposed projects.
705	-	Tier 2	3	Packery Channel Nature Park Enhancement and Wildlife Rehabilitation Center	P	4.39	0.82	-	-	47	4.0	Project as described does not meet Plan purview or is not a priority for resiliency.
806	-	Tier 2	3	Restoration of Rookery Islands in Upper Laguna Madre	P	2.40	0.82	-	-	41	3.0	Project well received, but is highly conceptual in nature, and the intent of this project is captured through other proposed projects.
142	-	Tier 2	3	Mustang Island Bay Shoreline Protection and Marsh Restoration	P	4.66	0.72	-	-	32	4.0	-
844	-	Tier 2	3	Rookery Island Creation in Coastal Bend	P	2.97	0.70	-	-	41	4.0	Project intent is achieved by other(s) under consideration.
779	-	Tier 2	3	Copano Bay Oyster Reef Restoration	P	3.78	0.60	-	-	44	3.5	-

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9032	-	Tier 2	3	Aransas NWR San Antonio Bay Shoreline Protection	P	1.40	0.85	2.58	G	44	- -	All gap projects were reviewed by the TAC. TAC comments received indicate further evaluation is necessary.
9002	-	Tier 2	3	Lower Nueces River Freshwater Inflows	P	3.43	0.78	2.42	G	41	- -	-
9004	-	Tier 2	3	Lamar Beach Road Protection	P	3.29	0.77	2.62	G	41	- -	-
9045	-	Tier 2	3	Packery Channel Nature Park Habitat Restoration - Phase II	P	7.55	0.75	2.46	G	39	- -	-
9031	-	Tier 2	3	Traylor Cut (Mission Lake - Guadalupe River)	P	3.81	0.75	2.54	G	48	- -	-
9011	-	Tier 2	3	Hydrologic Study of the Freshwater Inflows to the Upper Laguna Madre	P	2.53	0.67	2.67	G	41	- -	-
811	-	Tier 2	4	Zarate Tract - Laguna Atascosa National Wildlife Refuge	P	2.74	0.79	3.00	-	37	4.0	-
827	-	Tier 2	4	South Padre Island American Land Conservancy Tract	P	2.74	0.76	2.57	-	37	4.0	-
658	-	Tier 2	4	Bahia Grande Living Shoreline and Public Access Project	P	5.25	0.74	2.50	-	42	2.5	-
9041	-	Tier 2	4	Harlingen Ship Channel Living Shoreline	P	4.51	0.91	2.70	G	38	- -	This project was well received by the TAC, hower Phase 1 efforts will focus R4 efforts on the Bahia Grande and beach nourishment needs given the levels of concern for these areas.
9054	-	Tier 2	4	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	P	2.74	0.82	2.70	G	37	- -	Project moved to Tier 2 due to incorporation of similar project concepts under R4-3 and R4-6.
9052	-	Tier 2	4	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	P	1.82	0.82	3.00	G	41	- -	All gap projects were reviewed by the TAC. Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
9036	-	Tier 2	4	Laguna Madre Land Acquisition Endowment Initiative	P	2.74	0.75	2.83	G	37	- -	-
9060	-	Tier 2	4	Beach Re-Nourishment at Padre Island National Seashore	P	1.53	0.73	2.50	G	42	4.0	All gap projects were reviewed by the TAC.
9038	-	Tier 2	4	Cameron County Land Acquistion Program	P	4.17	0.69	2.42	G	51	- -	-
9051	-	Tier 2	4	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	P	2.28	0.69	2.46	G	33	3.5	All gap projects were reviewed by the TAC.
9055	-	Tier 2	4	Bahia Grande Watershed Corridor Protection	P	2.74	0.67	2.60	G	- -	- -	-
9021	-	Tier 3	0	Create & Restore Habitat for Neotroplcal Migrant Songbirds	P	3.46	0.57	2.67	G	- -	- -	-
9044	-	Tier 3	0	Public Transportation Enhancement Program	P	0.20	0.54	2.50	G	- -	- -	All gap projects were reviewed by the TAC.
650	-	Tier 3	1	Bolivar Peninsula Habitat Acquisition, Restoration, and Enhancement	P	3.07	0.76	2.44	-	- -	- -	Project intent is achieved by other(s) under consideration.
45	-	Tier 3	1	Galveston Bay Debris Removal	P	2.85	0.71	2.79	-	- -	3.0	Project intent is sufficiently captured in R0-1.
305	-	Tier 3	1	Dune Restoration and Beach Nourishment, High Island to Galveston East Jetty	P	4.40	0.69	2.24	-	- -	- -	Project intent is achieved by other(s) under consideration.
41	-	Tier 3	1	Texas Chenier Plain Refuge Complex	P	3.07	0.67	1.94	-	- -	4.0	-
20	-	Tier 3	1	Clear Creek Watershed Conservation	P	3.32	0.64	2.62	-	- -	- -	Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
330	-	Tier 3	1	GIWW Barrier Island Restoration, West Bay, Brazoria County	P	5.15	0.63	2.44	-	- -	- -	-
177	-	Tier 3	1	GIWW Barrier Island Restoration	P	3.62	0.60	2.30	-	- -	- -	Project intent is achieved by other(s) under consideration.
24	-	Tier 3	1	San Jacinto Battlefield Marsh Restoration	P	7.08	0.58	2.50	-	- -	2.5	-
304	-	Tier 3	1	Dune Restoration and Beach Nourishment, Sabine Pass to High Island	P	4.40	0.57	2.50	-	- -	- -	-
409	-	Tier 3	1	Bolivar Marsh Restoration, Galveston County	P	3.89	0.57	2.23	-	- -	- -	-
324	-	Tier 3	1	GIWW Barrier Island Restoration, Bolivar Peninsula, Galveston County	P	3.62	0.57	2.17	-	- -	- -	-
308	-	Tier 3	1	Dune Restoration and Beach Nourishment, San Luis Pass to Surfside	P	4.40	0.53	2.63	-	- -	- -	-
343	-	Tier 3	1	Marsh Restoration, Texas Point National Wildlife Refuge	P	3.77	0.53	2.10	-	- -	- -	-
220	-	Tier 3	1	Armand Prairie Land Acquisition	P	3.32	0.53	2.64	-	- -	- -	-
181	-	Tier 3	1	West Galveston Bay Living Shoreline	P	5.84	0.50	2.30	-	- -	- -	-
327	-	Tier 3	1	GIWW Barrier Island Restoration, West Bay 1, Galveston County	P	5.15	0.50	2.23	-	- -	- -	-
311	-	Tier 3	1	Erosion Control Structures, Sabine Pass to High Island	P	3.62	0.50	1.56	-	- -	- -	-
127	-	Tier 3	1	Bolivar Peninsula Bay Shoreline Wetland Restoration	P	3.48	0.50	2.09	-	- -	- -	-
765	-	Tier 3	1	Acquisition of Intermediate Marsh Adjacent to the J.D. Murphree WMA	P	2.94	0.47	2.69	-	- -	- -	-
307	-	Tier 3	1	Dune Restoration and Beach Nourishment, West Galveston Island	P	4.40	0.46	2.33	-	- -	- -	-
1179	-	Tier 3	1	Texas Point National Wildlife Refuge Marsh Restoration	P	3.77	0.46	2.75	-	- -	- -	-
618	-	Tier 3	1	Jigsaw Island Restoration	P	4.47	0.44	2.29	-	- -	4.0	-
133	-	Tier 3	1	Gulf Shoreline from Quintana Beach to FM 1495	P	4.40	0.43	2.60	-	- -	- -	-
731	-	Tier 3	1	Prescribed Burning in Texas Point National Wildlife Refuge	P	3.77	0.43	3.18	-	- -	- -	-
870	-	Tier 3	1	Brazoria National Wildlife Refuge Habitat Improvement	P	6.62	0.42	2.45	-	- -	- -	-
14	-	Tier 3	1	Greens Lake Marsh Restoration	P	3.89	0.42	2.81	-	- -	- -	-
173	-	Tier 3	1	Placement Areas 62 & 63 Dredged Material Placement and Marsh Restoration	P	3.77	0.42	1.73	-	- -	- -	-
732	-	Tier 3	1	Prescribed Burning in McFaddin National Wildlife Refuge	P	3.77	0.40	3.17	-	- -	- -	-
131	-	Tier 3	1	Galveston Bay Shoreline (Dickinson Bay to Virginia Point)	P	3.89	0.38	1.92	-	- -	- -	-
342	-	Tier 3	1	Marsh Restoration South of Keith Lake	P	3.77	0.38	1.80	-	- -	- -	-
10	-	Tier 3	1	Christmas Bay Marsh Restoration	P	3.39	0.36	2.58	-	- -	- -	-
733	-	Tier 3	1	Prescribed Burning in Anahuac National Wildlife Refuge	P	3.26	0.36	2.91	-	- -	- -	-
397	-	Tier 3	1	GIWW Island Restoration, Brazoria County	P	2.97	0.36	2.36	-	- -	- -	-
413	-	Tier 3	1	GIWW Island Restoration, Galveston County	P	3.48	0.33	2.09	-	- -	- -	-
36	-	Tier 3	1	Sea Rim State Park Dune Restoration and Protection	P	2.86	0.33	2.94	-	- -	- -	-
622	-	Tier 3	1	Seabrook Habitat Island Restoration	P	4.66	0.29	1.92	-	- -	- -	-
15	-	Tier 3	1	Chocolate Bay Habitat Restoration and Protection	P	4.82	0.27	1.77	-	- -	- -	-
328	-	Tier 3	1	GIWW Barrier Island Restoration, West Bay 2, Galveston County	P	5.28	0.24	2.50	-	- -	- -	-
27	-	Tier 3	1	East Bay North Shoreline (Smith Point to Anahuac NWR)	P	4.82	0.21	1.56	-	- -	- -	-
314	-	Tier 3	1	Erosion Control Structures, West Galveston Island to San Luis Pass	P	3.62	0.17	1.50	-	- -	- -	-
734	-	Tier 3	1	Hydrological Restoration of Coastal Marsh (Robinson Bayou to Smith Point)	P	3.62	0.14	1.91	-	- -	- -	-
1052	-	Tier 3	1	West Galveston Island Repair and Beach Nourishment	P	1.86	0.06	1.80	-	- -	- -	GLO involvement in the project is ongoing.
355	-	Tier 3	1	Marsh and Bayou Restoration, Sweetwater Preserve, Galveston County	O	3.89	0.38	2.25	-	- -	- -	Project is funded, ongoing, or complete.

		Project Information			Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
9056	-	Tier 3	1	Restoration of the San Bernard River Deltaic Process	P	2.50	0.57	2.30	G	- -	- -	All gap projects were reviewed by the TAC.
9061	-	Tier 3	1	Galveston Island Bayside Flood Protection Feasibility Study	P	1.73	0.43	1.75	G	- -	- -	All gap projects were reviewed by the TAC.
638	-	Tier 3	2	Magnolia Beach and Marshes Habitat Protection and Restoration - Phase I	P	4.00	0.62	1.80	-	- -	- -	-
849	-	Tier 3	2	Myrtle Foester Whitmire Unit Wetland Enhancement Project	P	2.31	0.58	2.30	-	- -	- -	-
871	-	Tier 3	2	Texas Mid-Coast Wetland Initiative	P	4.31	0.47	2.14	-	- -	- -	-
862	-	Tier 3	2	Habitat Enhancement for Mottled Ducks at Mad Island WMA	P	3.10	0.31	2.35	-	- -	- -	-
1188	-	Tier 3	2	Port Alto Living Shoreline	P	4.00	0.29	1.94	-	- -	- -	-
896	-	Tier 3	2	San Antonio Bay Oyster Reef Restoration and Enhancement	P	3.10	0.17	1.58	-	- -	- -	-
917	-	Tier 3	2	Matagorda Beach/Dune Restoration	P	2.71	0.13	1.94	-	- -	- -	-
196	-	Tier 3	2	Matagorda Peninsula Groin System	P	2.33	0.06	1.80	-	- -	- -	-
914	-	Tier 3	2	Palacios Marsh Restoration	P	2.72	0.00	1.53	-	- -	- -	-
9035	-	Tier 3	2	Matagorda Bay Estuary System Freshwater Inflows from Tributary Streams	P	2.23	0.67	1.50	G	- -	- -	All gap projects were reviewed by the TAC.
9034	-	Tier 3	2	Matagorda Bay Freshwater Inflows from the Colorado River	P	2.23	0.40	1.71	G	- -	- -	All gap projects were reviewed by the TAC.
9029	-	Tier 3	2	Guadalupe Bay - Victoria Barge Canal Cuts	P	3.08	0.00	2.67	G	- -	- -	-
76	-	Tier 3	3	Oso Bay Marsh Habitat Creation	P	3.87	0.59	-	-	- -	- -	-
718	-	Tier 3	3	East Copano Bay Shoreline Stabilization and Habitat Protection	P	4.07	0.52	-	-	- -	- -	-
841	-	Tier 3	3	Nueces Bay Living Shoreline	P	4.51	0.46	-	-	- -	- -	-
448	-	Tier 3	3	Copano Bay Shoreline Stabilization	P	4.07	0.42	-	-	- -	- -	-
936	-	Tier 3	3	Mustang Island State Park Freshwater Wetland Habitat Enhancement - Phase II	P	5.00	0.24	-	-	- -	- -	-
439	-	Tier 3	3	North Padre Island Dune and Beach Restoration	P	2.40	0.04	-	-	- -	- -	-
9013	-	Tier 3	3	Nueces Bay Productivity Enhancement through Wastewater Delivery	P	2.23	0.78	2.25	G	- -	- -	All gap projects were reviewed by the TAC.
9007	-	Tier 3	3	Live Oak Woodland Pothole Wetland Habitat Protection, Live Oak Peninsula	P	2.28	0.64	2.60	G	- -	- -	All gap projects were reviewed by the TAC.
9009	-	Tier 3	3	Flour Bluff / Laguna Shores Road Abandoned Structures Removal	P	0.24	0.60	3.00	G	- -	- -	All gap projects were reviewed by the TAC.
9059	-	Tier 3	3	Little Bay Restoration Initiative	P	6.02	0.55	2.33	G	- -	- -	-
9033	-	Tier 3	3	San Antonio Bay Freshwater Inflows	P	2.23	0.55	1.83	G	- -	- -	All gap projects were reviewed by the TAC.
9000	-	Tier 3	3	Managing Freshwater Inflows from Hill Country to Coast	P	2.23	0.54	2.21	G	- -	- -	All gap projects were reviewed by the TAC.
9005	-	Tier 3	3	Bayshore Pocket Beach Stabilization	P	2.75	0.44	2.40	G	- -	- -	-
9012	-	Tier 3	3	Monitoring Water Quality on North Padre Island	P	0.91	0.29	3.00	G	- -	- -	All gap projects were reviewed by the TAC.
98	-	Tier 3	4	Adolph Thomae Jr. County Park - Phase 3	P	0.85	0.59	3.00	-	- -	- -	GLO involvement in the project is ongoing.
837	-	Tier 3	4	Creation of Los Fresnos Nature Park	P	6.30	0.53	3.32	-	- -	- -	-
652	-	Tier 3	4	Port Isabel Ecological Restoration Program	P	5.81	0.47	2.13	-	- -	- -	-
1106	-	Tier 3	4	Cameron County Living Coastline	P	3.32	0.45	1.89	-	- -	- -	-
1094	-	Tier 3	4	Boca Chica Beach Coastal Conservation & Enhancement Project	P	3.48	0.27	1.77	-	- -	- -	-
9037	-	Tier 3	4	Boca Chica Dune and Tidal-Flat Cable Fence Protection	P	1.08	0.58	3.14	G	- -	- -	All gap projects were reviewed by the TAC.
9040	-	Tier 3	4	South Padre Island Tidal Flats Protection	P	0.08	0.46	2.93	G	- -	- -	All gap projects were reviewed by the TAC.
9039	-	Tier 3	4	Native Plant Propagation for Restoration & Resiliency	P	2.34	0.45	2.64	G	- -	- -	-
9043	-	Tier 3	4	Lower Laguna Madre Pole and Troll Area	P	0.08	0.45	2.75	G	- -	- -	All gap projects were reviewed by the TAC.
828	-	Not TAC Reviewed	0	Artificial Reef Development in Nearshore Texas State Waters of the Gulf of Mexico	P	3.92	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
727	-	Not TAC Reviewed	0	Channel Marker Reef Ball Micro-Habitats	P	2.48	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
710	-	Not TAC Reviewed	0	Coastal Texas Protected Lands Wetlands Development	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
110	-	Not TAC Reviewed	0	Texas Coastal Wildlife Habitat Acquistion	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
165	-	Not TAC Reviewed	0	Texas Coastal Lands Protection	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
879	-	Not TAC Reviewed	0	Coastal Land and Marsh Protection	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
889	-	Not TAC Reviewed	0	Texas Chenier Plain Refuge Complex	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
239	-	Not TAC Reviewed	0	Sea Turtle Early Restoration Project	P	1.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
629	-	Not TAC Reviewed	0	Non-native and Invasive Vegetation Control on Wildlife Management Areas	P	1.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
101	-	Not TAC Reviewed	0	Region Wide Seagrass Monitoring	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
632	-	Not TAC Reviewed	0	Restoring structurally complex nursery habitat to enhance early life survival, genetic diversity, and recruitment of reef fish populations	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
715	-	Not TAC Reviewed	0	Texas Colonial Waterbird Rookery Management	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
723	-	Not TAC Reviewed	0	Coastal Ecosystem health: American Oystercatcher as an indicator of exposure and effects of pollutants on breeding birds on the Gulf Coast	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
724	-	Not TAC Reviewed	0	Conservation and evaluation of limiting factors for American Oystercatchers along the Gulf Coast	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
805	-	Not TAC Reviewed	0	Species protection Research Project-Protecting Texas Shorebird Habitats: Using Piping Plover as an Indicator Species	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
122	-	Not TAC Reviewed	0	GIWW PA Revetments	P	0.63	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
861	-	Not TAC Reviewed	0	Blue Crab Trap Removal	P	0.24	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
905	-	Not TAC Reviewed	1	Mid-Bay Storm Surge Protection	P	4.00	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
1125	-	Not TAC Reviewed	1	Expand and protect current bayou environment.	P	4.00	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
1067	-	Not TAC Reviewed	1	Brazoria County 2011 Mitigation Action No 4	P	2.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
13	-	Not TAC Reviewed	1	McAllis Point Phase 2 Land Acquisition	P	2.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
749	-	Not TAC Reviewed	1	Galveston Island State Park Inholding Acquisition	P	2.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
772	-	Not TAC Reviewed	1	Galveston Island State Park Mitigation Property In-Holding Parcel Purchase	P	2.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
791	-	Not TAC Reviewed	1	Galveston Bay Watershed Wetland and Habitat Protection	P	2.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
265	-	Not TAC Reviewed	1	Galveston Bay Freshwater Inflows	P	2.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
356	-	Not TAC Reviewed	1	Salt Water Control Structure, Keith Lake Fish Pass, Jefferson County	P	2.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
743	-	Not TAC Reviewed	1	Star Lake Water Control Structure Replacement	P	2.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
745	-	Not TAC Reviewed	1	Wild Cow Bayou Structure Replacement	P	2.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
833	-	Not TAC Reviewed	1	Keith Lake Fish Pass	P	2.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
8	-	Not TAC Reviewed	1	Folletts Island Conservation Initiative	P	2.56	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
610	-	Not TAC Reviewed	1	Brazoria NWR Habitat Acquisition	P	2.56	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
941	-	Not TAC Reviewed	1	Jamaica Beach (Post-Ike Dune Project)	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
114	-	Not TAC Reviewed	1	City of Freeport Sand Dunes	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
374	-	Not TAC Reviewed	1	Gilchrist Beach Nourishment	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
864	-	Not TAC Reviewed	1	Upper Texas Beach Dune Restoration Project	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
885	-	Not TAC Reviewed	1	Folletts Island CR-257 Dune System Restoration	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1053	-	Not TAC Reviewed	1	Jamaica Beach - Dune Restoration	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1054	-	Not TAC Reviewed	1	WGI 7.3 Mile Dune Restoration	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1060	-	Not TAC Reviewed	1	Quintana Community Dune Restoration Project	P	2.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
31	-	Not TAC Reviewed	1	Upper Sabine Neches Waterway	P	2.49	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
336	-	Not TAC Reviewed	1	Marsh Restoration, Bessie Heights East , Orange County	P	2.49	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
338	-	Not TAC Reviewed	1	Marsh Restoration, Rose City East, Orange County	P	2.49	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
863	-	Not TAC Reviewed	1	Beneficial use of dredged material: marsh restoration in Nelda Stark Unit, Lower Neches WMA	P	2.49	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
762	-	Not TAC Reviewed	1	Acquire 985 acres of emergent brackish to intermediate tidal coastal marsh adjacent to the Lower Neches Wildlife Management Area	P	2.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1046	-	Not TAC Reviewed	1	TI (Past Action)-1	P	2.47	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
237	-	Not TAC Reviewed	1	San Luis Pass Land Acquisition	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
609	-	Not TAC Reviewed	1	Gordy Marsh Land Acquisition Project	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
706	-	Not TAC Reviewed	1	Protect Coastal Marshlands on Boliver Partnership	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
737	-	Not TAC Reviewed	1	Property purchase for the use of water rights	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
804	-	Not TAC Reviewed	1	Cade Ranch	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
890	-	Not TAC Reviewed	1	Trinity River National Wildlife Refuge	P	2.43	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
225	-	Not TAC Reviewed	1	Cotton Bayou Phase 2	P	2.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
669	-	Not TAC Reviewed	1	Buffalo Bayou Land Acquisition and Restoration	P	2.35	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1055	-	Not TAC Reviewed	1	Kemah Seawall	P	2.34	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1120	-	Not TAC Reviewed	1	Construct Shoreline Protection Project Along Clear Creek	P	2.32	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
357	-	Not TAC Reviewed	1	Inverted Siphons Under GIWW, Jefferson County	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
152	-	Not TAC Reviewed	1	Sustainable Marsh Management	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
400	-	Not TAC Reviewed	1	B10 - Oyster Reef creation throughout Brazoria, Brazoria County	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
711	-	Not TAC Reviewed	1	Brazoria National Wildlife Refuge Water Supply	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
736	-	Not TAC Reviewed	1	Purchase of water rights [Elms Bayou]	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
670	-	Not TAC Reviewed	1	Mouth of the San Bernard River Restoration Project	P	2.17	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
325	-	Not TAC Reviewed	1	GIWW Breakwaters, West Bay, Galveston County	P	2.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
671	-	Not TAC Reviewed	1	Creating and Restoring Galveston Bay Area Colonial Waterbird Rookery Island Habitat	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
739	-	Not TAC Reviewed	1	Wading Bird Rookery Creation	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1135	-	Not TAC Reviewed	1	Little Cedar Bayou Shoreline Protection Study	P	1.98	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
323	-	Not TAC Reviewed	1	GIWW Breakwaters, Bolivar Peninsula, Galveston County.	P	1.94	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
331	-	Not TAC Reviewed	1	Shoreline Protection, East Bay, Chambers County	P	1.94	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
412	-	Not TAC Reviewed	1	G12 - GIWW Breakwaters, Galveston County	P	1.94	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
720	-	Not TAC Reviewed	1	Abshier Wildlife Management Area Shoreline Protection and Marsh Restoration	P	1.94	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
760	-	Not TAC Reviewed	1	Acquire 210 acres of former brine reservoir that are currently open water	P	1.92	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
763	-	Not TAC Reviewed	1	Acquire 285 acres of tidal fresh to brackish marsh adjacent to Old River Unit of Lower Neches WMA	P	1.92	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
883	-	Not TAC Reviewed	1	Orange County Texas Wetlands	P	1.92	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
109	-	Not TAC Reviewed	1	Folletts Island Feeder Beach	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
302	-	Not TAC Reviewed	1	Beneficial Use (BU) of Dredged Material for Shoreline Nourishment at Texas Point, Jefferson County	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
306	-	Not TAC Reviewed	1	Beach Nourishment, East Galveston Island Seawall, Galveston County	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
316	-	Not TAC Reviewed	1	Closing of Rollover Pass, Galveston County	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
375	-	Not TAC Reviewed	1	Caplen Beach (Bolivar Peninsula) Nourishment	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
832	-	Not TAC Reviewed	1	Upper Texas Coast Beach Ridge Restoration	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1049	-	Not TAC Reviewed	1	Rollover Pass Beach Nourishment with BUDM	P	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
893	-	Not TAC Reviewed	1	Lower Sabine River Corridor	P	1.85	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1130	-	Not TAC Reviewed	1	Jefferson County GIWW Hardening	P	1.81	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
321	-	Not TAC Reviewed	1	GIWW Breakwaters, Neches River to High Island, Jefferson County	P	1.81	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
456	-	Not TAC Reviewed	1	J3 - GIWW Breakwaters, Jefferson County	P	1.81	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
42	-	Not TAC Reviewed	1	J.D. Murphree Wildlife Management Area	P	1.81	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
406	-	Not TAC Reviewed	1	G6 - Structures at end of seawall to maintain beach nourishment, Galveston County	P	1.77	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
194	-	Not TAC Reviewed	1	TBCD No. 13 Mayhaw Bayou	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
253	-	Not TAC Reviewed	1	Bolivar Peninsula Salt Marsh Protection and Restoration	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
394	-	Not TAC Reviewed	1	B4 - ER Quintana South Jetty 2 mi to CR 1495, Brazoria County	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
886	-	Not TAC Reviewed	1	Near Shore Breakwater at Surfside's Beach Drive	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1069	-	Not TAC Reviewed	1	Surfside Nearshore Breakwater Project	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
786	-	Not TAC Reviewed	1	Galveston Bay Wetland Trend Analysis for Restoration Prioritization	P	1.73	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
899	-	Not TAC Reviewed	1	Lone Star Coastal National Recreation Area	P	1.73	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
329	-	Not TAC Reviewed	1	GIWW Breakwaters, Brazoria County	P	1.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
332	-	Not TAC Reviewed	1	Shoreline Protection, Bastrop Bay, Brazoria County	P	1.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
396	-	Not TAC Reviewed	1	B6 - ER GIWW Breakwaters, Brazoria County	P	1.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
415	-	Not TAC Reviewed	1	C1 - Bay Shoreline Restoration, Chambers County	P	1.68	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
300	-	Not TAC Reviewed	1	Chenier Ridge Restoration, Jefferson County	P	1.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
333	-	Not TAC Reviewed	1	Sweetwater Nature Preserve Shoreline Protection	P	1.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1040	-	Not TAC Reviewed	1	Galv. Co.-2	P	1.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1058	-	Not TAC Reviewed	1	Shore Stabilization	P	1.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1168	-	Not TAC Reviewed	1	Riprap Revetment Repair	P	1.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
46	-	Not TAC Reviewed	1	Upper Texas Coast - Kemp's Ridley Sea Turtle Restoration	P	1.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
39	-	Not TAC Reviewed	1	Bolivar Ferry Landing/Little Beach Nourishment	P	1.61	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
32	-	Not TAC Reviewed	1	Port Arthur	P	1.60	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
286	-	Not TAC Reviewed	1	Galveston Ring Levee, Galveston County:	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
291	-	Not TAC Reviewed	1	Local Surge Protection, UTMB, Galveston County	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
366	-	Not TAC Reviewed	1	CR#2 - Texas City Levee Modifications and Extensions North (SH-146) and West, Galveston Ring Levee	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
403	-	Not TAC Reviewed	1	G3 - Raising Road (SH 146) for Low Level Surge Risk Reduction/ northwest barrier PA barrier, Galveston County	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
903	-	Not TAC Reviewed	1	Raised Texas City Dike	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
910	-	Not TAC Reviewed	1	Lower-Bay Gate	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1056	-	Not TAC Reviewed	1	Texas City Levee	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1057	-	Not TAC Reviewed	1	Levee Construction and Study	P	1.59	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1142	-	Not TAC Reviewed	1	Mesquite Point, Shoreline Protection	P	1.46	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
319	-	Not TAC Reviewed	1	GIWW Breakwater at Old River Cove, Orange County	P	1.45	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
416	-	Not TAC Reviewed	1	O1 - GIWW Breakwaters, Orange County	P	1.45	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
111	-	Not TAC Reviewed	1	Bluewater Highway (CR 257)	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
298	-	Not TAC Reviewed	1	Raise CR-257, Brazoria County	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
365	-	Not TAC Reviewed	1	CR#1 - High Island to San Luis Pass Coastal Spine	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
901	-	Not TAC Reviewed	1	Galveston Seawall	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
907	-	Not TAC Reviewed	1	Galveston FM-3005	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
909	-	Not TAC Reviewed	1	Raising Jetty	P	1.42	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
5	-	Not TAC Reviewed	1	Justin Hurst Wildlife Management Area	P	1.41	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
767	-	Not TAC Reviewed	1	Coastal Prairie and Marsh Acquisitions	P	1.41	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
275	-	Not TAC Reviewed	1	Surge Gate and Barrier at Hartman Bridge, Harris County	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
287	-	Not TAC Reviewed	1	Local Surge Protection, Houston Ship Channel North, Harris County	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
288	-	Not TAC Reviewed	1	Local Surge Protection, Houston Ship Channel South, Harris County	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
289	-	Not TAC Reviewed	1	Local Surge Protection, Baytown, Harris County	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
293	-	Not TAC Reviewed	1	Raise State Highway 146, Galveston and Harris Counties	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
898	-	Not TAC Reviewed	1	Centennial Gate	P	1.39	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
868	-	Not TAC Reviewed	1	Improve Freshwater Management Capabilities on Wildlife Management Areas	P	1.38	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1071	-	Not TAC Reviewed	1	Bulkhead Construction	P	1.37	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
193	-	Not TAC Reviewed	1	TBCD No. 10 East Bay Watershed Drainage Improvements	P	1.34	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
290	-	Not TAC Reviewed	1	Local Surge Protection, NASA, Harris County	P	1.34	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
297	-	Not TAC Reviewed	1	Raise State Highway 87 from High Island to Port Bolivar, Galveston County	P	1.34	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
912	-	Not TAC Reviewed	1	Upper-Bay Gate	P	1.34	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1133	-	Not TAC Reviewed	1	Lake Anahuac Levee	P	1.32	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1119	-	Not TAC Reviewed	1	Construct revetment at shoreline of Galveston Bay.	P	1.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1111	-	Not TAC Reviewed	1	Treasure Island MUD Long Term Strategy	P	1.15	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
215	-	Not TAC Reviewed	1	Freeport and Vicinity CSRM Oyster Creek Levee Raise (1-foot)	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
217	-	Not TAC Reviewed	1	Freeport and Vicinity CSRM Freeport Dock Floodwall Raise (1-foot)	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
279	-	Not TAC Reviewed	1	Freeport and Vicinity Hurricane Flood Protection, Brazoria County, Texas	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
367	-	Not TAC Reviewed	1	SR#1 - Freeport Hurricane Flood Protection System Modernization and Extension North toward Angleton	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
368	-	Not TAC Reviewed	1	SR#2 - Freeport Hurricane Flood Protection System Modernization and Extension North toward Angleton- Jones Creek Levee, Jones Creek Terminal Ring Levee, and Chocolate Bayou Ring Levee	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1117	-	Not TAC Reviewed	1	City of Beaumont Action Item 20	P	1.05	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1162	-	Not TAC Reviewed	1	Port Neches Shoreline Stabilization	P	1.05	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1031	-	Not TAC Reviewed	1	Water/Wastewater - Orange County WWTP Regionalization	P	1.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
281	-	Not TAC Reviewed	1	County Wide-Protection System on Sabine River and East Bank of Neches River, Orange County	P	1.01	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1033	-	Not TAC Reviewed	1	Bridge City Proposed Levee	P	1.01	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
210	-	Not TAC Reviewed	1	Port Arthur and Vicinity CSRM 8-10 ft I-Wall Raise (1-foot)	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
212	-	Not TAC Reviewed	1	Port Arthur and Vicinity CSRM I-Wall Raise Near Valero (1-foot)	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.

		Project Information			Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
213	-	Not TAC Reviewed	1	Port Arthur and Vicinity CSRM I-Wall Raise Near Tank Farm (1-foot)	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
277	-	Not TAC Reviewed	1	Port Arthur and Vicinity, Texas Hurricane Flood Protection, Jefferson County, Texas	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
296	-	Not TAC Reviewed	1	Raise State Highway 87 from Sabine Pass to High Island, Jefferson and Chambers Counties	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1159	-	Not TAC Reviewed	1	Port Arthur Highway 69 Widening	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1160	-	Not TAC Reviewed	1	Port Arthur Highway 82 Repair	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1161	-	Not TAC Reviewed	1	Port Arthur Highway 87 Repair	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
211	-	Not TAC Reviewed	1	Port Arthur and Vicinity CSRM Closure Structure Raise (1-foot)	P	0.96	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
125	-	Not TAC Reviewed	1	Pleasure Island Shoreline Stabilization	P	0.91	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
704	-	Not TAC Reviewed	1	Sabine River West Shoreline Armoring	P	0.91	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1032	-	Not TAC Reviewed	1	Port of Orange Ship Channel Stabilization	P	0.91	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
887	-	Not TAC Reviewed	1	Surfside Beach Drive Revetment Extension	P	0.90	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
207	-	Not TAC Reviewed	1	Orange-Jefferson CSRM Orange 3 New Levee (11-foot)	P	0.78	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
283	-	Not TAC Reviewed	1	County-Wide Protection System with Neches River Closure and Port Arthur Levee Tie-In, Orange County and Part of Jefferson County	P	0.78	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
284	-	Not TAC Reviewed	1	Sabine River Crossing, Orange County and Calcasieu Parish	P	0.78	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1030	-	Not TAC Reviewed	1	Orange Levee Debris	P	0.78	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
245	-	Not TAC Reviewed	1	Justin Hurst WMA Shoreline Protection	P	0.77	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
208	-	Not TAC Reviewed	1	Orange-Jefferson CSRM Beaumont A New Levee (12-foot)	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
209	-	Not TAC Reviewed	1	Orange-Jefferson CSRM Jefferson Main New Levee (11-foot)	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
282	-	Not TAC Reviewed	1	County-Wide Protection System on the East and West Bank of the Neches River, Orange County and part of Jefferson County	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1134	-	Not TAC Reviewed	1	Levee System Design and Construction	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
191	-	Not TAC Reviewed	1	TBCD No. 8 Elm Bayou Drainage Improvements	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
192	-	Not TAC Reviewed	1	TBCD No. 9 Onion Bayou Crossing Improvements	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
190	-	Not TAC Reviewed	1	TBCD No. 7 Jenkins Weir Floodgates	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
334	-	Not TAC Reviewed	1	Island Restoration, Vingt-et-un, Chambers County	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
391	-	Not TAC Reviewed	1	B1 - CSRM Levee at Chocolate Bayou, Brazoria County	P	0.70	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
285	-	Not TAC Reviewed	1	Orange County Industrial Complex Protection System, Orange County	P	0.54	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1124	-	Not TAC Reviewed	1	El Jardin Recreational Pier Damage Repair	P	0.13	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
60	-	Not TAC Reviewed	2	Seadrift / Port O'Connor Ridge Wetlands- Arapaho Holdings	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
61	-	Not TAC Reviewed	2	Northern Seadrift / Port O'Connor Ridge Wetlands	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
611	-	Not TAC Reviewed	2	Columbia Bottomlands - Cedar Lake Creek Tract	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
759	-	Not TAC Reviewed	2	Acquire 20,000 acres of coastal prairie-depressional wetland complex in Calhoun County, Texas	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
768	-	Not TAC Reviewed	2	Land acquisition at Nannie M. Stringfellow WMA in Brazoria County	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
197	-	Not TAC Reviewed	2	Sargent Beach Phase 1	P	2.25	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
422	-	Not TAC Reviewed	2	M5a - Hydrologic modification - East Matagorda Bay, Matagorda County	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
686	-	Not TAC Reviewed	2	Matagorda Bay Freshwater Inflows from Tributary Streams	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
687	-	Not TAC Reviewed	2	Matagorda Bay Freshwater Inflows from the Colorado River	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
688	-	Not TAC Reviewed	2	San Antonio Bay Freshwater Inflows	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1183	-	Not TAC Reviewed	2	Big Boggy Hydrology	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1184	-	Not TAC Reviewed	2	Little Boggy Hydrology	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1186	-	Not TAC Reviewed	2	Mad Island WMA / Clive Runnels Marsh Hydrology	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1190	-	Not TAC Reviewed	2	Siphon Across GIWW to East Matagorda Bay	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
382	-	Not TAC Reviewed	2	Port Alto Beach Sediment Management, Calhoun County	P	2.18	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
785	-	Not TAC Reviewed	2	Indianola/Magnolia Beach Restoration Phase II	P	2.18	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1189	-	Not TAC Reviewed	2	Mid-Coast Rookery Island	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
63	-	Not TAC Reviewed	2	Big Bird Island	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
69	-	Not TAC Reviewed	2	San Antonio Bay - Rookery Islands	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
73	-	Not TAC Reviewed	2	Second Chain of Islands Rookery	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
668	-	Not TAC Reviewed	2	San Antonio Bay Rookery Island Project	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
55	-	Not TAC Reviewed	2	Matagorda Bay - J-Hook and Powderhorn Ranch	P	1.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
642	-	Not TAC Reviewed	2	Bolling Ranch Acquisition	P	1.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
661	-	Not TAC Reviewed	2	West Powderhorn Ranch Acquisition	P	1.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
721	-	Not TAC Reviewed	2	Baer Ranch East Matagorda Bay Conservation Initiative	P	1.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1137	-	Not TAC Reviewed	2	Matagorda County (Past Action)-9	P	1.76	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
735	-	Not TAC Reviewed	2	Acquisition of East Matagorda Pensinsula	P	1.73	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
755	-	Not TAC Reviewed	2	Matagorda Peninsula Phase II Acquisition	P	1.73	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
712	-	Not TAC Reviewed	2	Texas Mid Coast Complex Invasive Species Control	P	1.62	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1192	-	Not TAC Reviewed	2	Southwest Corner Cut	P	1.52	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
205	-	Not TAC Reviewed	2	Port of Palacios: Bulkhead Improvements - 12th Street Shrimp Docks	P	1.52	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
431	-	Not TAC Reviewed	2	CA5 - Keller Bay, Calhoun County	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1158	-	Not TAC Reviewed	2	Point Comfort Shoreline Stabilization	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
426	-	Not TAC Reviewed	2	M8 - GIWW mainland protection Breakwaters, Matagorda County	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
644	-	Not TAC Reviewed	2	Mad Island Shoreline Protection and Ecosystem Restoration Phase II	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
800	-	Not TAC Reviewed	2	Mad Island WMA Shoreline Protection	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.

		Project Information			Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
1116	-	Not TAC Reviewed	2	Carancahua Bay Shoreline Stabilization	P	1.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
66	-	Not TAC Reviewed	2	Guadalupe River, Hog Bayou (Calhoun County)	P	1.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
58	-	Not TAC Reviewed	2	Port O'Connor- King Fisher Beach	P	1.15	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
135	-	Not TAC Reviewed	2	San Bernard River Re-Opening	P	1.15	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1157	-	Not TAC Reviewed	2	Point Comfort Derelict Barge Removal	P	1.10	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
65	-	Not TAC Reviewed	2	Work Plan for Adaptive Management	P	1.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
781	-	Not TAC Reviewed	2	Pass Cavallo Restoration and Matagorda Ship Channel Stabilization	P	1.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1113	-	Not TAC Reviewed	2	Beach Watch - Matagorda County	P	1.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1143	-	Not TAC Reviewed	2	Mitchell's Cut Management Plan, Phase I - Baseline Field Investigations	P	1.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1177	-	Not TAC Reviewed	2	Shoreline Restoration and Reinforcement	P	1.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1174	-	Not TAC Reviewed	2	Seadrift-8	P	0.85	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1175	-	Not TAC Reviewed	2	Seadrift-9	P	0.85	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1138	-	Not TAC Reviewed	2	Matagorda Levees and Other Flood Protection Structures	P	0.32	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1149	-	Not TAC Reviewed	2	Palacios Pavilion Pier Renovation and Expansion	P	0.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
59	-	Not TAC Reviewed	2	Magnolia Beach	P	0.00	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1139	-	Not TAC Reviewed	2	Matagorda Inlet Jetty Repairs	P	-0.20	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
438	-	Not TAC Reviewed	3	A3 - Cedar Bayou between St. Joseph and Matagorda Island, Aransas County	P	2.97	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
676	-	Not TAC Reviewed	3	Nueces Delta Tidal Flats/Marsh/Upland Acquisition and Restoration	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
758	-	Not TAC Reviewed	3	Acquire 1,000 acres of tidal marsh adjoining the Guadalupe River and the Guadalupe Delta Wildlife Management Area in Refugio County	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
888	-	Not TAC Reviewed	3	Conservation Easement Acquisition in the Guadalupe Delta, Gulf Intracoastal Waterway, San Antonio Bay Area - Calhoun, Refugio and Matagorda Counties Texas.	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
67	-	Not TAC Reviewed	3	Guadalupe Estuary	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
843	-	Not TAC Reviewed	3	Rookery Island Rehabilitation - Coastal Bend	P	2.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
446	-	Not TAC Reviewed	3	R1 - Aransas River Delta Marsh Restoration, Refugio County	P	2.01	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
699	-	Not TAC Reviewed	3	Egery Flats Marsh Restoration	P	2.01	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
700	-	Not TAC Reviewed	3	Nueces Bay Rookery Island Restoration	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
88	-	Not TAC Reviewed	3	North Padre Island	P	1.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
756	-	Not TAC Reviewed	3	Lamar Peninsula Conservation Initiative	P	1.74	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
857	-	Not TAC Reviewed	3	Big Tree Ranch Acquisition (Part of Goose Island SP conservation)	P	1.74	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
677	-	Not TAC Reviewed	3	Mission River Whooping Crane Habitat Acquisition and Restoration	P	1.64	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
140	-	Not TAC Reviewed	3	Corpus Christi Ship Channel	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
184	-	Not TAC Reviewed	3	AR-04 Live Oak Peninsula Shoreline Stabilization Strategic Plan	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
807	-	Not TAC Reviewed	3	Dagger Island Restoration Project	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
845	-	Not TAC Reviewed	3	Upper Laguna Madre Rookery Island Erosion Protection	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1087	-	Not TAC Reviewed	3	Gulf Intracoastal Waterway Shoreline Stabilization	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1145	-	Not TAC Reviewed	3	NU-49 Prevent Erosion of Sunfish Island	P	1.48	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
679	-	Not TAC Reviewed	3	Nueces Delta Shoreline Erosion Protection and Restoration Project	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
808	-	Not TAC Reviewed	3	Nueces River Delta Wetland Protection	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
840	-	Not TAC Reviewed	3	Nueces Bay Marsh Restoration Protection	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
441	-	Not TAC Reviewed	3	N3 - Nueces Delta Shore protection, Nueces County	P	1.40	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1146	-	Not TAC Reviewed	3	NU-50 Prevent Erosion at Cole Park	P	1.20	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
90	-	Not TAC Reviewed	3	Region 3 GSABBAC	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
856	-	Not TAC Reviewed	3	Goose Island State Park Habitat Conservation	P	1.19	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1075	-	Not TAC Reviewed	3	Key Allegro, Shoreline Protection	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1144	-	Not TAC Reviewed	3	NU-41 Upgrade Bulkheading along Corpus Christi Ship Channel	P	1.08	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
444	-	Not TAC Reviewed	3	N6 - Dune System/ Expanded survey and monitoring of barrier island shoreline, Nueces County	P	1.07	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1082	-	Not TAC Reviewed	3	Shoreline Protection	P	1.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1083	-	Not TAC Reviewed	3	Shoreline Protection	P	1.02	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
143	-	Not TAC Reviewed	3	North Padre Island Seawall Beach Restoration	P	0.99	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1141	-	Not TAC Reviewed	3	McGee Beach, Beach Nourishment	P	0.99	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
858	-	Not TAC Reviewed	3	Goose Island Shoreline Protection	P	0.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1078	-	Not TAC Reviewed	3	Shoreline Protection	P	0.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1079	-	Not TAC Reviewed	3	Shoreline Protection	P	0.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1170	-	Not TAC Reviewed	3	Rural Bays - Mission Bay, Shoreline Protection	P	0.94	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1126	-	Not TAC Reviewed	3	Improve Flood Protection Levee	P	0.75	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
185	-	Not TAC Reviewed	3	KL-11 Shoreline Stabilization at Riviera Park on Baffin Bay	P	0.64	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1080	-	Not TAC Reviewed	3	Shoreline Protection	P	0.63	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1081	-	Not TAC Reviewed	3	Shoreline Protection	P	0.63	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1084	-	Not TAC Reviewed	3	Shoreline Protection	P	0.63	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
189	-	Not TAC Reviewed	3	SP-30 Install Sea Gates/Rail Gates in Aransas Pass	P	0.54	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
103	-	Not TAC Reviewed	4	Port Isabel - Derry Park	P	5.25	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
120	-	Not TAC Reviewed	4	Cameron County HMAP Action #10	P	4.19	- -	- -	-	- -	- -	Listed as low priority for county.
599	-	Not TAC Reviewed	4	Comprehensive Dune Restoration and Public Access Project	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
601	-	Not TAC Reviewed	4	Jones Parcel Conservation, Laguna Atascosa National Wildlife Refuge (LANWR)	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.

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803	-	Not TAC Reviewed	4	Allison Parcel Conservation, Laguna Atascosa National Wildlife Refuge (LANWR)	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
825	-	Not TAC Reviewed	4	Walker Tract (3,545 acres) Laguna Atascosa National Wildlife Refuge	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
891	-	Not TAC Reviewed	4	Laguna Atascosa National Wildlife Refuge	P	2.28	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
100	-	Not TAC Reviewed	4	Arroyo Colorado	P	2.23	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
838	-	Not TAC Reviewed	4	Habitat Restoration: Replacement of Crossing #2 Structure	P	2.09	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
453	-	Not TAC Reviewed	4	CM4 - Three Islands Restoration, Cameron County	P	1.95	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
602	-	Not TAC Reviewed	4	Boswell Tract Acquisition	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
660	-	Not TAC Reviewed	4	South Texas Coastal Corridor	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
775	-	Not TAC Reviewed	4	South Texas Coastal Habitat Protection, Restoration and Demonstration	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
810	-	Not TAC Reviewed	4	Land Acquisition and Management for Shorebirds in South Texas	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
824	-	Not TAC Reviewed	4	Harlingen Shrimp Farm Tract (803 acres) Acquisition	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
839	-	Not TAC Reviewed	4	Jenkins Tract (890 acres) Acquisition, Laguna Atascosa National Wildlife Refuge	P	1.82	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
823	-	Not TAC Reviewed	4	Protection of Colonial Bird-Nesting Islands at the Bahia Grande Unit of Laguna Atascosa	P	1.61	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1098	-	Not TAC Reviewed	4	SPI CEMS Beach Stabilization	P	1.56	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
195	-	Not TAC Reviewed	4	Rio Grande Border HMAP: CAM-98	P	1.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
1095	-	Not TAC Reviewed	4	South Padre Island, Beach Nourishment w/ BUDM	P	1.53	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
118	-	Not TAC Reviewed	4	Cameron County HMAP Action #6	P	1.41	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
121	-	Not TAC Reviewed	4	Cameron County HMAP Action #18	P	1.15	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
104	-	Not TAC Reviewed	4	Padre Island National Seashore	P	1.00	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
174	-	Not TAC Reviewed	4	PA220	P	0.79	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
455	-	Not TAC Reviewed	4	W1 - Mansfield Island Restoration, Willacy County	P	0.79	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
119	-	Not TAC Reviewed	4	Cameron County HMAP Action #8	P	0.69	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
106	-	Not TAC Reviewed	4	Laguna Madre- Bird Island Restoration Plan	P	0.66	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
664	-	Not TAC Reviewed	4	Padre Island National Seashore Beach Access Improvement	P	0.33	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
47	-	Not Scored with Programmatic Model	0	Region Wide CMSP	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
251	-	Not Scored with Programmatic Model	0	Assist Proposed Lonestar Coastal National Recreation Area	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
778	-	Not Scored with Programmatic Model	0	Coral reef conservation and resilience in Texas	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
144	-	Not Scored with Programmatic Model	0	GIWW New Fleeting Areas	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
651	-	Not Scored with Programmatic Model	0	Development of A Riparian Buffer Tool	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1166	-	Not Scored with Programmatic Model	0	Riparian Habitat Restoration Initiative	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1167	-	Not Scored with Programmatic Model	0	Riparian Habitat Restoration Initiative	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
178	-	Not Scored with Programmatic Model	0	WGB RSM #11 GIWW BUDM Alternatives	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
256	-	Not Scored with Programmatic Model	0	Coastal Exchange Program	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
280	-	Not Scored with Programmatic Model	0	Novel Sensor System for the Early Detection and Monitoring of Offshore Oil Spills	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
295	-	Not Scored with Programmatic Model	0	Pilot Study of Floating Treatment Wetlands as Addition to Stormwater BMP Repetoire	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
604	-	Not Scored with Programmatic Model	0	Ecology and Conservation of the Common Bottlenose Dolphin (Tursiops truncatus) in the Bay, Sound, Estuary and Nearshore Coastal waters of Texas	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
623	-	Not Scored with Programmatic Model	0	Spill oil picking up System	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
627	-	Not Scored with Programmatic Model	0	Expand and Improve Gulf of Mexico Marine Mammal Stranding Response and Science Capacity	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
635	-	Not Scored with Programmatic Model	0	Improving Gulf fisheries.	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
647	-	Not Scored with Programmatic Model	0	Gulf of Mexico Community-based Restoration Partnership	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
663	-	Not Scored with Programmatic Model	0	Streamlining Wetland Permitting and Decision-Making: Improving Region Mitigation and Building the Capacity of Local Governments and Citizens	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
665	-	Not Scored with Programmatic Model	0	Buyout of Longliners' Use of the Gulf of Mexico During the Bluefin Tuna Spawning Season	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
672	-	Not Scored with Programmatic Model	0	Forage Fish Research and Modeling as Ecosystem Indicators	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
673	-	Not Scored with Programmatic Model	0	Paired habitat mapping and fisheries independent surveys	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
674	-	Not Scored with Programmatic Model	0	State Wide Seagrass Monitoring Program	F	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
681	-	Not Scored with Programmatic Model	0	Habitat Restoration Technology Training Center	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
683	-	Not Scored with Programmatic Model	0	Economics and The Gulf Coastal States	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
684	-	Not Scored with Programmatic Model	0	BP The Blue Print for Restoring the Gulf's Fisheries	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
695	-	Not Scored with Programmatic Model	0	Municipal Oyster Shell Recycling Pilot Program	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
719	-	Not Scored with Programmatic Model	0	Conduct tagging and tracking of large marine vertebrates in the Gulf of Mexico to monitor their status, distribution, and changes in habitat use	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
722	-	Not Scored with Programmatic Model	0	The Marinovich Proposal	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
726	-	Not Scored with Programmatic Model	0	Dock and Sea Wall Reef Ball Habitat	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
729	-	Not Scored with Programmatic Model	0	Kemp's Ridley Sea Turtle Restoration	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
730	-	Not Scored with Programmatic Model	0	10-Year enhancement for improving Gulf of Mexico Sea Turtle Stranding Network response and science capacity	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
738	-	Not Scored with Programmatic Model	0	BP Deepwater Horizon Oil Spill Restoration Evaluation and Monitoring Program	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
751	-	Not Scored with Programmatic Model	0	A Gulf-wide multi-year research project to determine best practices for minimizing barotrauma effects on red snapper following capture and release	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.

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752	-	Not Scored with Programmatic Model	0	Supplement and expand fishery-independent surveys	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
753	-	Not Scored with Programmatic Model	0	Increase amount of assessments for potentially impacted finfish species	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
771	-	Not Scored with Programmatic Model	0	GSMFC Cooperative Regional Monitoring Project	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
773	-	Not Scored with Programmatic Model	0	Gulf of Mexico Ecosystem Assessment: The Role of and Possible Oil Spill Impacts to Menhaden as a Keystone Species	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
774	-	Not Scored with Programmatic Model	0	FishSmart: Building Sustainability in the Snapper and Grouper Recreational Fisheries and Associated Industry in the Gulf of Mexico	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
782	-	Not Scored with Programmatic Model	0	Introduction and Evaluation of New Designs of Propellers and Nozzles in the Gulf Shrimp Fishery for Enhanced Efficiency and Fuel Economy	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
783	-	Not Scored with Programmatic Model	0	Development and Distribution of Gear Technology to Improve Fuel Economy and Reduce Bycatch in the Gulf Shrimp Fishery	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
784	-	Not Scored with Programmatic Model	0	Multi-Function Vessel -- Aquatic Weed Harvester, Marine Trash Skimmer, Oil/Muck Dredge	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
787	-	Not Scored with Programmatic Model	0	Quantitative Fish and habitat assessment and monitoring, using scientific acoustics	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
788	-	Not Scored with Programmatic Model	0	GULF OF MEXICO HATCHERY AND FISHERIES RESTORATION CONSORTIUM	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
789	-	Not Scored with Programmatic Model	0	5-Year Increase in Gulf of Mexico Fishery Observer Coverage for Monitoring Marine Mammals, Sea Turtles, and Bluefin Tuna	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
792	-	Not Scored with Programmatic Model	0	Pelagic Longline Fishing Vessel and Permit Buyback in the Gulf of Mexico	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
821	-	Not Scored with Programmatic Model	0	Reducing Human Impacts to Colonial Nesting Waterbirds through Education and Outreach	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
826	-	Not Scored with Programmatic Model	0	Coordinated Strategy for Sea Turtle Recovery in the Gulf	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
847	-	Not Scored with Programmatic Model	0	Giving Gulf Wetlands a Future	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
848	-	Not Scored with Programmatic Model	0	Proposed Emergency Seagrass Restoration	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
850	-	Not Scored with Programmatic Model	0	Mitigation of Polluted Waters through Filtration by Mussel Clusters	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
851	-	Not Scored with Programmatic Model	0	The Development of The Advanced Real Time GNSS and Physical Atmosphere and Ocean Observing System within the Gulf of Mexico	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
854	-	Not Scored with Programmatic Model	0	Enhancements to marine charter for-hire fishing surveys	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
859	-	Not Scored with Programmatic Model	0	Mechanically Produced Thermocline (Hurricane Barrier)	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
874	-	Not Scored with Programmatic Model	0	Deployment of New Turtle Excluder Devices in Shrimp Fisheries	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
875	-	Not Scored with Programmatic Model	0	GOM Marine Sanctuaries	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
876	-	Not Scored with Programmatic Model	0	Saving the Gulf Coast one bale at a time.	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
877	-	Not Scored with Programmatic Model	0	BioRestore®	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
878	-	Not Scored with Programmatic Model	0	Bioremediation of Estuaries and oil affected Intertidal areas	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
880	-	Not Scored with Programmatic Model	0	Habitat Mapping for Improved Stock Assessments and Developing an Integrated Habitat Restoration Approach for Marine Habitats	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
881	-	Not Scored with Programmatic Model	0	N&P pollution control, and restoring clean water	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
882	-	Not Scored with Programmatic Model	0	Increased Catch and Effort Reporting for the Gulf of Mexico's Marine Recreational Fishery Based on 1-month waves	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
928	-	Not Scored with Programmatic Model	0	Nutrient Cycling related to Sargassum Management	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
934	-	Not Scored with Programmatic Model	0	Marine Debris Management	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
935	-	Not Scored with Programmatic Model	0	Invasive Flora Identification and Control	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1043	-	Not Scored with Programmatic Model	0	CLS (Past Action)-2	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1064	-	Not Scored with Programmatic Model	0	Evacuation Route Flooding Mitigation.	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
141	-	Not Scored with Programmatic Model	1	GIWW Acquisition of Placement Areas	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
172	-	Not Scored with Programmatic Model	1	West Bay Mooring Area	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
238	-	Not Scored with Programmatic Model	1	Ike Dike - Chambers, Galveston, and Harris Counties	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
363	-	Not Scored with Programmatic Model	1	NR#1 - The Jefferson/Orange Protection System with the Neches River Navigation Gate	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
364	-	Not Scored with Programmatic Model	1	NR#2 - The Jefferson/Orange Protection System without the Neches River Navigation Gate	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
383	-	Not Scored with Programmatic Model	1	Port of Port Arthur Shoreline Protection, Jefferson County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
701	-	Not Scored with Programmatic Model	1	Vidor Area Multi-Watershed Surface Water Quality Improvement Project for the Enhancement of Freshwater Quality Reaching Gulf of Mexico	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1029	-	Not Scored with Programmatic Model	1	Pinehurst Mitigation Action Item 6	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1038	-	Not Scored with Programmatic Model	1	Galv. Co (Past Action)-5	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1047	-	Not Scored with Programmatic Model	1	TI (Past Action)-2	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1115	-	Not Scored with Programmatic Model	1	Buffalo Bayou East Sector Land Acquisition	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1163	-	Not Scored with Programmatic Model	1	Port of Port Arthur Port Authority Dock Shoreline Protection Project	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1171	-	Not Scored with Programmatic Model	1	Sabine Pass Jetty Repair	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
26	-	Not Scored with Programmatic Model	1	Trinity River National Wildlife Refuge	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
134	-	Not Scored with Programmatic Model	1	GIWW Brazos River Floodgates	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
124	-	Not Scored with Programmatic Model	1	GIWW Expand Mooring Areas	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
216	-	Not Scored with Programmatic Model	1	Freeport and Vicinity CSRM East Storm Levee Raise (1-foot)	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
218	-	Not Scored with Programmatic Model	1	Freeport and Vicinity CSRM Old River Levee Raise at Dow Thumb (1-foot)	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
219	-	Not Scored with Programmatic Model	1	Freeport and Vicinity CSRM Tide Gate I-Wall Raise (1-foot)	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
258	-	Not Scored with Programmatic Model	1	Construction of Multi-Purpose wetland for improvement of water quality and habitat	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
407	-	Not Scored with Programmatic Model	1	G7 - Galveston Bay Coastal Barrier (consider G5 as part of analysis), Galveston County	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
1181	-	Not Scored with Programmatic Model	1	Trinity River Channel	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
608	-	Not Scored with Programmatic Model	1	Headwaters to Baywaters: Protection/Restoration of Galveston Bay Tributary Riparian Corridors, Phase 1	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
613	-	Not Scored with Programmatic Model	1	Columbia Bottomlands Tract 152	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
614	-	Not Scored with Programmatic Model	1	Columbia Bottomlands Tract 122a	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
615	-	Not Scored with Programmatic Model	1	Phase 3 Katy Prairie Preserve System Acquisition Project	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
617	-	Not Scored with Programmatic Model	1	Katy Prairie Acquisition and Restoration Project - Phase 2	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
654	-	Not Scored with Programmatic Model	1	Riparian Corridor Protection for Priority Watersheds in the Houston-Galveston Region	F	-	- -	- -	-	- -	- -	Project concept will be evaluated in Phase 2 under a future Resiliency Strategy.
656	-	Not Scored with Programmatic Model	1	Katy Prairie Preserve System Acquisition Project – Phase 3	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
682	-	Not Scored with Programmatic Model	1	University of Houston Coastal Center	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
748	-	Not Scored with Programmatic Model	1	Columbia Bottomlands	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
895	-	Not Scored with Programmatic Model	1	Bird Habitat and Coastal Freshwater Wetland Restoration at Sheldon Lake State Park	F	-	- -	- -	-	- -	- -	Project is outside of coastal zone.
921	-	Not Scored with Programmatic Model	1	Debbie's Beach Phase 2	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1041	-	Not Scored with Programmatic Model	1	Galv. Co-7	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1048	-	Not Scored with Programmatic Model	1	TI (Past Action)-4	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1156	-	Not Scored with Programmatic Model	1	Pix Bayou and Liberty Channel and Dredging	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
179	-	Not Scored with Programmatic Model	1	WGB RSM #12 Jones Bay and Highland Bayou BUDM Plan	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
183	-	Not Scored with Programmatic Model	1	WGB RSM #16West Galveston Bay Dredging Discontinuation	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
198	-	Not Scored with Programmatic Model	1	Port of Beaumont: New Access Roadway and Overpass	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
201	-	Not Scored with Programmatic Model	1	Port of Galveston: Cruise Terminal 2 Expansion	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
202	-	Not Scored with Programmatic Model	1	Port of Houston: Authority Bayport Rail Spur	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
204	-	Not Scored with Programmatic Model	1	Port of Port Arthur: 4,000 Linear Foot Rail Extension and 6 Acres of Backland Improvements	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
257	-	Not Scored with Programmatic Model	1	Collaborative Ecosystem Services Studies along the Galveston Bay & Gulf System	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
386	-	Not Scored with Programmatic Model	1	Engineering Analysis of Submerged Structures, Galveston County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
388	-	Not Scored with Programmatic Model	1	Galveston Island Tourism Development Beach User Surveys	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
389	-	Not Scored with Programmatic Model	1	Galveston and Follet's Island Beach Monitoring Program, Galveston and Brazoria Counties	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
390	-	Not Scored with Programmatic Model	1	Sand Management Plan for Galveston Island, Galveston and Brazoria Counties	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
399	-	Not Scored with Programmatic Model	1	B9 - Galveston Bay Estuary Program/Harris County ER, Brazoria County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
404	-	Not Scored with Programmatic Model	1	G4 - Texas City, Texas Hurricane Flood Protection Project Reevaluation, Galveston County	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
612	-	Not Scored with Programmatic Model	1	Native Prairie Seed Nursery - Houston-Gulf Coast Region	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
633	-	Not Scored with Programmatic Model	1	Aquaponics and Aquaculture Facility along Buffalo Bayou	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
653	-	Not Scored with Programmatic Model	1	On-site Sewage Facility Remediation for Water Quality and Aquatic Habitat	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
655	-	Not Scored with Programmatic Model	1	Restoration of Houston Arboretum & Nature Center	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
702	-	Not Scored with Programmatic Model	1	Removal of Barge #237	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
703	-	Not Scored with Programmatic Model	1	Removal of Former U.S. Navy Piers	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
740	-	Not Scored with Programmatic Model	1	San Jacinto Footbridge Project	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
742	-	Not Scored with Programmatic Model	1	Restoration of Public Trust of the Natural Resources of Chambers County and the Upper Texas Coast	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
802	-	Not Scored with Programmatic Model	1	Willow Creek Forest	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1027	-	Not Scored with Programmatic Model	1	Orange County Mitigation Action 2	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1035	-	Not Scored with Programmatic Model	1	Galveston County Consolidated Drainage District (GCCDD)	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1036	-	Not Scored with Programmatic Model	1	Galv. Co (Past Action)-3	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
1042	-	Not Scored with Programmatic Model	1	Galv. Co-21	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
1045	-	Not Scored with Programmatic Model	1	Kemah	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1050	-	Not Scored with Programmatic Model	1	San Luis Pass Sediment Management Study	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
1072	-	Not Scored with Programmatic Model	1	City of Alvin 2006 Mitigation Action No 3	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
64	-	Not Scored with Programmatic Model	2	Sargent Marsh	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
92	-	Not Scored with Programmatic Model	2	Mid- Coast Project	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1150	-	Not Scored with Programmatic Model	2	Palacios-1	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1172	-	Not Scored with Programmatic Model	2	Sargent Beach Park	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1173	-	Not Scored with Programmatic Model	2	Sargent Beach Redevelopment Project	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1178	-	Not Scored with Programmatic Model	2	South Matagorda Bay Shoreline Stabilization	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
1185	-	Not Scored with Programmatic Model	2	Mitchell's Cut	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1191	-	Not Scored with Programmatic Model	2	Riparian Property Acquisition	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1140	-	Not Scored with Programmatic Model	2	Matagorda Ship Channel Improvements	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
1136	-	Not Scored with Programmatic Model	2	Matagorda County (Past Action)-8	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1165	-	Not Scored with Programmatic Model	2	Replace Flood Gates	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1182	-	Not Scored with Programmatic Model	2	Victoria Barge Canal Breach Repair	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
203	-	Not Scored with Programmatic Model	2	Port Mansfield: Dredging of the Port Mansfield Channel	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
206	-	Not Scored with Programmatic Model	2	Port of Victoria: Eight-Berth Barge Dock	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
214	-	Not Scored with Programmatic Model	2	Freeport and Vicinity CSRM Dow Barge Canal Gate Structure	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
387	-	Not Scored with Programmatic Model	2	Identifying and Evaluating Onshore Sand Sources Using Airborne and Ground Geophysics, Matagorda and Brazoria Counties	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
398	-	Not Scored with Programmatic Model	2	B8 - Raising Blue Water Highway – Treasure Island to Surfside (hurricane evacuation route?), Brazoria County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
434	-	Not Scored with Programmatic Model	2	VA1 - Guadalupe River Log Jams, Victoria County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
435	-	Not Scored with Programmatic Model	2	Red Bluff Channel Improvements, Jackson County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
369	-	Not Scored with Programmatic Model	3	North Beach Nourishment	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1118	-	Not Scored with Programmatic Model	3	Construct Education Center	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1121	-	Not Scored with Programmatic Model	3	Dredging of Marina	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1122	-	Not Scored with Programmatic Model	3	Dredging of Packery Channel	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1152	-	Not Scored with Programmatic Model	3	Periodic or Emergency Dredging	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1153	-	Not Scored with Programmatic Model	3	Periodic or Emergency Dredging	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1154	-	Not Scored with Programmatic Model	3	Periodic or Emergency Dredging	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1169	-	Not Scored with Programmatic Model	3	Rural Bay, Shoreline Protection	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1164	-	Not Scored with Programmatic Model	3	Refugio County-3 (NFIP)	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
200	-	Not Scored with Programmatic Model	3	Port of Corpus Christi: 15-acre Cargo Storage Yard Expansion, La Quinta Gateway Terminal	F	-	- -	- -	-	- -	- -	Project is undergoing review in concurrent study or plan.
445	-	Not Scored with Programmatic Model	3	N7 - Dune Management Plan in Kleberg County, Nueces County	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
603	-	Not Scored with Programmatic Model	3	Characterizing the Population Structure of Bay and Estuary Stocks of Bottlenose Dolphins (Tursiops truncatus) in South and Central Texas	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
675	-	Not Scored with Programmatic Model	3	Coastal Waterbird Management Program in the Coastal Bend	F	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
689	-	Not Scored with Programmatic Model	3	Nueces Bay Productivity Enhancement through Wastewater Delivery	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
691	-	Not Scored with Programmatic Model	3	Installation of Trash Skimmers in Corpus Christi Marina	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
693	-	Not Scored with Programmatic Model	3	Oso Wastewater Reclamation Plant Nutrient Removal	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
926	-	Not Scored with Programmatic Model	3	Barrier Island Habitat Management Plan	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
927	-	Not Scored with Programmatic Model	3	Beach Maintenance Practices	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
929	-	Not Scored with Programmatic Model	3	Bird Response to Vehicle-Free Zones on Public Beaches	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
930	-	Not Scored with Programmatic Model	3	Barrier Island Long Term Environmental Trends Evaluation	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1074	-	Not Scored with Programmatic Model	3	AR-05, Aransas County Integrated Stormwater Management Plan Mitigation Action	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1085	-	Not Scored with Programmatic Model	3	Dredging of Cedar Bayou	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1088	-	Not Scored with Programmatic Model	3	Storm Harden and Upgrade Water and Sewer Treatment Plant	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1089	-	Not Scored with Programmatic Model	3	Live Oak Peninsula Shoreline Stabilization Strategic Plan Mitigation Action	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1090	-	Not Scored with Programmatic Model	3	Aesthetic and Environmental Enhancements of Tule Creek	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1091	-	Not Scored with Programmatic Model	3	KL-13 Flooding Mitigation of County Roads, Pcts. 1 and 3	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
102	-	Not Scored with Programmatic Model	4	South Padre Island - Native Plant Center	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1092	-	Not Scored with Programmatic Model	4	Dredging of Willacy Harbor navigation channel, Port Mansfield	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1099	-	Not Scored with Programmatic Model	4	Adolph Thomae Park Erosion Control Project (formerly Boca Chica Beach)	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1108	-	Not Scored with Programmatic Model	4	Fingers Entrance Channel Dredging in Port Isabel	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1109	-	Not Scored with Programmatic Model	4	Brazos Santiago Pass/ICWW Dredging in Brownsville	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
105	-	Not Scored with Programmatic Model	4	San Martin Lake	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
159	-	Not Scored with Programmatic Model	4	Bentsen-Rio Grande Valley State Park Habitat Expansion	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
657	-	Not Scored with Programmatic Model	4	Tio Cano Lake Bed Regional Storm Water Ecological Enhancement Project	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
757	-	Not Scored with Programmatic Model	4	Bentsen-Rio Grande Valley State Park Habitat Expansion	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
639	-	Not Scored with Programmatic Model	4	Lower Rio Grande Valley Low-Impact Development (LID) Implementation and Education	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
640	-	Not Scored with Programmatic Model	4	City of Brownsville's Weather Monitoring System Project	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
725	-	Not Scored with Programmatic Model	4	Document Stranded Sea Turtles in Texas (Padre Island)	F	-	- -	- -	-	- -	- -	Project intent is achieved by other(s) under consideration.
835	-	Not Scored with Programmatic Model	4	Habitat Project/Stufy Bathymetry and Currents Profiles of LLM near Brazos Santiago	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
836	-	Not Scored with Programmatic Model	4	Andy Bowie Park Marine Response and Marine Life Center	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
931	-	Not Scored with Programmatic Model	4	Monitoring of Barrier Islands	F	-	- -	- -	-	- -	- -	Limited or insufficient data available.
1093	-	Not Scored with Programmatic Model	4	Countywide Flood Elevation Study (Willacy)	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1097	-	Not Scored with Programmatic Model	4	South Padre Island Offshore Sand Source Study - Phase 2	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
1102	-	Not Scored with Programmatic Model	4	Texas High School Coastal Monitoring Program: Port Isabel High School	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1103	-	Not Scored with Programmatic Model	4	Cameron County - Action #6	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
1104	-	Not Scored with Programmatic Model	4	Cameron County - Action #7	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
1105	-	Not Scored with Programmatic Model	4	Cameron County - Action #8	F	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
1107	-	Not Scored with Programmatic Model	4	Cameron County - Action #11	F	-	- -	- -	-	- -	- -	Project as described does not meet Plan purview or is not a priority for resiliency.
48	-	Duplicate	0	Region Wide Seagrass Monitoring	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
242	-	Duplicate	0	Texas Coastal Wildlife Habitat Acquisition	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
643	-	Duplicate	0	Artificial reefs in Texas offshore waters	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
707	-	Duplicate	0	Texas Coastal Habitat Acquisition and Conservation	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
646	-	Duplicate	0	Addressing Marine Debris to Expedite Recovery along the Gulf Coast	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
872	-	Duplicate	0	Evaluating the effectiveness of restoration projects as waterbird habitat along the Gulf Coast	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
347	-	Duplicate	1	Marsh Restoration, Greens Lake, Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
3	-	Duplicate	1	Columbia Bottomlands	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1063	-	Duplicate	1	Surfside Beach, Beach Nourishment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
130	-	Duplicate	1	Galveston Island Bay Shoreline	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
182	-	Duplicate	1	WGB RSM #15 West Galveston Bay Marsh Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
224	-	Duplicate	1	Justin Hurst WMA Land Acquisitions	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
235	-	Duplicate	1	McAllis Point Phase 2 Land Acquisition	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
264	-	Duplicate	1	Follett's Island GEMS Shoreline Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
276	-	Duplicate	1	Moses Lake Dollar Bay Shoreline Enhancement and Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
278	-	Duplicate	1	Texas City, Texas Hurricane Flood Protection, Galveston County, Texas	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
292	-	Duplicate	1	Local Surge Protection, Chocolate Bayou, Brazoria County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
301	-	Duplicate	1	Rollover Pass Closure/Fisheries Mitigation	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
303	-	Duplicate	1	San JacintoNorth Shore Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
377	-	Duplicate	1	Surfside Beach Nourishment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
392	-	Duplicate	1	B2 - ER Dune/Beach Restoration from San Luis Pass to CR 332, Brazoria County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
393	-	Duplicate	1	B3 - CSRM Beach Restoration Surfside North Jetty to CR 332, Brazoria County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
395	-	Duplicate	1	B5 - ER Bastrop Bay Shoreline Protection, Brazoria County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
402	-	Duplicate	1	G2 - CSRM Ring Levee -City of Galveston, Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
405	-	Duplicate	1	G5 - Beach/Dune Restoration – Galveston (22 mi), Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
410	-	Duplicate	1	G10 - Island Marsh Restoration, Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
411	-	Duplicate	1	G11 - West Bay Marsh Restoration, Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
459	-	Duplicate	1	J7 - Shoreline Ridge Restoration, Jefferson County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
606	-	Duplicate	1	Dickinson Bay Bird Islands & Oyster Reef Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
741	-	Duplicate	1	San Jacinto North Shoreline Repair	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
761	-	Duplicate	1	Acquire 985 acres of coastal wetlands adjacent to the Old River Unit of Lower Neches WMA	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
866	-	Duplicate	1	Justin Hurst WMA Land Acquisitions	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
894	-	Duplicate	1	Settegast Coastal Heritage Preserve	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
902	-	Duplicate	1	Texas City Levee	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
904	-	Duplicate	1	Galveston Bay Oyster Reefs	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
908	-	Duplicate	1	Galveston Levee	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
911	-	Duplicate	1	Mid-Bay Gate	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1028	-	Duplicate	1	Orange County Mitigation Action 8	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1034	-	Duplicate	1	Orange County Levee System Constructed County-wide	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1037	-	Duplicate	1	Galv. Co (Past Action)-4	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1039	-	Duplicate	1	Galv. Co (Past Action)-7	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1044	-	Duplicate	1	Galveston (Past Action)-7	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1051	-	Duplicate	1	North Deer Island, Shoreline Protection and Marsh Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1059	-	Duplicate	1	Erosion Control	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1062	-	Duplicate	1	Village of Surfside Beach - Revetment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1065	-	Duplicate	1	Brazoria County 2011 Mitigation Action No 2	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1066	-	Duplicate	1	Brazoria County 2011 Mitigation Action No 3	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1068	-	Duplicate	1	Brazoria County 2006 mitigation Action No 3	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1070	-	Duplicate	1	Revetment Extension.	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1073	-	Duplicate	1	City of Freeport 2006 Mitigation Action No 11	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1129	-	Duplicate	1	Jefferson County Final Plan March '12 Action Item 15	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
16	-	Duplicate	1	Alligator Point	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
17	-	Duplicate	1	Settegast Property	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
33	-	Duplicate	1	Sabine Lake Oyster Reefs	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
38	-	Duplicate	1	Bolivar Peninsula- Cade Ranch Conservation	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
254	-	Duplicate	1	Bolivar Penninsula Habitat Acquisition Restoration and Enhancement	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
408	-	Duplicate	1	G8 - Surge Gate and Barrier at Hartman Bridge, Galveston County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
906	-	Duplicate	1	Bolivar SH-87	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
662	-	Duplicate	1	Collaborative On-Site Ecosystem Services Studies along the Galveston Bay Margin System	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
666	-	Duplicate	1	Collaborative On-Site Ecosystem Services Studies for Cypress Creek Watershed and Lake Houston	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
746	-	Duplicate	1	Demonstrating the Utility of Ecosystems Services for Environmental Decision Making in the Galveston Bay Region	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
884	-	Duplicate	1	Science-base Restoration of an Oyster Reef in Middle Reef, East Galveston Bay	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
378	-	Duplicate	1	Green's Lake Shoreline Protection & Marsh Restoration Phase 2 Restoration Project	D	6.09	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
113	-	Duplicate	1	Surfside Beach & San Luis Pass	D	4.40	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
126	-	Duplicate	1	Bolivar Peninsula Gulf Shoreline from High Island to Magnolia Lane	D	4.40	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
129	-	Duplicate	1	West Galveston Island Gulf Shoreline	D	4.40	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
12	-	Duplicate	1	West Galveston Island Marsh Restoration and Protection	D	3.89	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
294	-	Duplicate	1	Pierce Marsh Beneficial Use Marsh Restoration	D	3.89	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
770	-	Duplicate	1	San Jacinto Santa Ana Bayou Marsh Restoration	D	3.28	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
744	-	Duplicate	1	Hydrological Restoration of the Salt Bayou Watershed using Freshwater Siphons	D	3.23	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
766	-	Duplicate	1	Acquisition of 1,280 acres of non-tidal, freshwater marsh in Jefferson County	D	2.94	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
18	-	Duplicate	1	Galveston Seawall Beach Nourishment	D	1.86	- -	- -	-	- -	- -	Project does not achieve passing criteria for programmatic model.
424	-	Duplicate	2	M6 - Oliver Point Reef/Point restoration, Matagorda County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
49	-	Duplicate	2	Dressing Point Island	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
50	-	Duplicate	2	East Matagorda Peninsula	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
53	-	Duplicate	2	Mad Island Wildlife Management Area	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
137	-	Duplicate	2	Mad Island Wildlife Management Area	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
373	-	Duplicate	2	Sargent Beach Nourishment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
419	-	Duplicate	2	M2 - Mouth of Colorado to 3-Mile Cut Beach Restoration, Matagorda County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
420	-	Duplicate	2	M3 - Matagorda Bay - Half Moon Oyster Reef Restoration, Matagorda County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
421	-	Duplicate	2	M4 - Dressing Point Island - Rookery Restoration, Matagorda County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
425	-	Duplicate	2	M7 - Sundown (Chester) Island, Matagorda County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
427	-	Duplicate	2	CA1 - Dune/Beach Restoration -Indianola Beach, Calhoun County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
428	-	Duplicate	2	CA2 - Dune/Beach Restoration - Port O'Connor King Fisher Beach, Calhoun County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
429	-	Duplicate	2	CA3 - Matagorda Island Restoration, Calhoun County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
648	-	Duplicate	2	COLONIAL WATERBIRD NESTING ISLAND RESTORATION	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
815	-	Duplicate	2	Sargent Beach Nourishment and Dune Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
913	-	Duplicate	2	Halfmoon Reef - Matagorda Bay	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
915	-	Duplicate	2	Sargent Beach/Dune Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
916	-	Duplicate	2	Gulf of Mexico Segmented Breakwaters - Sargent	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
918	-	Duplicate	2	Dressing Point Island	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
919	-	Duplicate	2	Hydrologic Modification	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
920	-	Duplicate	2	Sundown Island	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1132	-	Duplicate	2	Keller Bay Shoreline Stabilization	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1151	-	Duplicate	2	Pass Cavallo Inlet Dredging	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1193	-	Duplicate	2	GIWW Mainland Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
54	-	Duplicate	2	Half Moon Oyster Reef	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
57	-	Duplicate	2	Indianola Beach	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
636	-	Duplicate	2	Matagorda County Oyster Reef Restoration Master Plan	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
249	-	Duplicate	2	Texas Mid-Coast Wetland Initiative	D	4.31	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
432	-	Duplicate	2	CA6 - Restoration of Chester Island	D	2.84	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
937	-	Duplicate	3	Mustang Island Coastal Prairie and Wetland Restoration	P	2.77	0.63	-	-	- -	- -	Project is duplicated by other(s) under consideration
440	-	Duplicate	3	N2 - Corpus Christi Beach, Nueces County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
860	-	Duplicate	3	Cedar Bayou/Vinson Slough Hydraulic Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
74	-	Duplicate	3	Nueces Bay Rookery Islands	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
78	-	Duplicate	3	Cole Park	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
79	-	Duplicate	3	Indian Point Peninsula	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
82	-	Duplicate	3	Dagger and Random Islands	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
85	-	Duplicate	3	Shamrock Island	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
89	-	Duplicate	3	Guadalupe River Delta	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
186	-	Duplicate	3	NU-50 Prevent Erosion at Cole Park	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
187	-	Duplicate	3	NU-49 Prevent Erosion of Sunfish Island	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
381	-	Duplicate	3	Shamrock Island Habitat Protection & Enhancement Phase 2, Nueces County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
385	-	Duplicate	3	Cole Park Shoreline Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
442	-	Duplicate	3	N4 - Shamrock Island Restoration, Nueces County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration

Project Information					Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
447	-	Duplicate	3	R2 - Guadalupe River Delta Preservation and hydrologic restoration – Region 2 project, Refugio County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
449	-	Duplicate	3	SP1 - Dagger Island Redfish Bay Marsh Restoration, San Patricio County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
776	-	Duplicate	3	Restore Cedar Bayou	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
812	-	Duplicate	3	Big Tree Ranch Aquisition	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1077	-	Duplicate	3	Shoreline Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1112	-	Duplicate	3	Beach Nourishment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1127	-	Duplicate	3	Indian Point, Shoreline Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1147	-	Duplicate	3	Nueces Bay, Shoreline Protection	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1148	-	Duplicate	3	Nueces River Delta Wetlands Conservation Initiative	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1176	-	Duplicate	3	Shoreline Erosion Control in Nueces Bay	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1180	-	Duplicate	3	Traylors Cut Closing	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
0	-	Duplicate	3	Nueces River Freshwater Inflows (riverine and groundwater)	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
690	-	Duplicate	3	Construction of the Oso Bay Nature Preserve Learning Center and Wetlab	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
897	-	Duplicate	3	Expansion and Continuation of Kemp's ridley sea turtle patrols on the Upper Texas Coast, an incubation facilty and a rehabilitation and treatment facility	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
932	-	Duplicate	3	Sea Turtle Nesting and Stranding - North	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1086	-	Duplicate	3	Beach Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
87	-	Duplicate	3	Mustang Island State Park Conservation Initiative	D	4.97	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
433	-	Duplicate	3	CA7 - Guadalupe River Delta and Breakwaters (1.3 mi), Calhoun County	D	3.08	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
436	-	Duplicate	3	A1 - Copano Bay Oyster Reef Restoration, Aransas County	D	2.64	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
694	-	Duplicate	3	Oso Bay Nature Preserve Wetland Restoration	D	2.64	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
94	-	Duplicate	4	South Padre Island Beach - North Shoreline	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
99	-	Duplicate	4	Laguna Atascosa NWR- Zarate Parcel	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
451	-	Duplicate	4	CM2 - Bahia Grande Hydrologic Restoration, Cameron County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
384	-	Duplicate	4	Aldolph Thomae Jr. County Park Shoreline Restoration Phase 3, Cameron County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
450	-	Duplicate	4	CM1 - Shoreline Protection-Adolph Thomae Jr. Park, Cameron County	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1096	-	Duplicate	4	Isla Blanca Park, Beach Nourishment	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1101	-	Duplicate	4	South Padre Island Beach & Dune Restoration	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1114	-	Duplicate	4	Bird Island Shoreline Stabilization	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
1100	-	Duplicate	4	Bahia Grande Restoration, Phase III	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
933	-	Duplicate	4	Sea Turtle Nesting and Stranding - South	D	-	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
97	-	Duplicate	4	Laguna Atascosa NWR- Bahia Grande- Bird and Heron Island	D	4.01	- -	- -	-	- -	- -	Project is duplicated by other(s) under consideration
250	-	Complete or In-Progress	0	Aggregation & Degradation of Disperants and Oil by Microbial Exopolymers	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
169	-	Complete or In-Progress	0	Prioritization of Critical Marsh Conservation and Restoration Areas Based on Future Sea Level Rise Scenarios	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
925	-	Complete or In-Progress	0	Texas Farm and Ranch Lands Conservation Program	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
227	-	Complete or In-Progress	0	Evaluating the Status & Habitat Use of Sea Turtles Utilizing Texas Coastal Waters	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
228	-	Complete or In-Progress	0	Expand Texas Sea Turtle Stranding Rescue and Response Capabilities	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
229	-	Complete or In-Progress	0	Incubation, Rehabilitation and Treatment Facility	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
161	-	Complete or In-Progress	0	Evaluating Groundwater/Freshwater Inflows and Nutrient Transport to Texas Coastal Embayments, Phase II	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
162	-	Complete or In-Progress	0	Tracking Long-Term Trends in Seagrass Cover and Condition in Texas Coastal Waters	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
167	-	Complete or In-Progress	0	GIS Analysis and Modeling of Texas Rookery Island Erosion Risk Along the GIWW	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
171	-	Complete or In-Progress	0	Shell Bank: Oyster Shell Recycling, Teacher Engagement, Environmental Stewardship, and Scientific Inquiry	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
923	-	Complete or In-Progress	0	Coastal Impacts Technology Program	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
780	-	Complete or In-Progress	0	Sea Turtle Conservation in Texas	O	3.25	0.68	-	-	- -	- -	Project is funded, ongoing, or complete.
6	-	Complete or In-Progress	1	Freeport Ship Channel	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
271	-	Complete or In-Progress	1	Greens Lake Protection and Marsh Restoration: Engineering & Design	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
34	-	Complete or In-Progress	1	Keith Lake Cut	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
43	-	Complete or In-Progress	1	Dickinson Bayou	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
1123	-	Complete or In-Progress	1	East Bay, Shoreline Protection	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
1131	-	Complete or In-Progress	1	Keith Lake Cut Fish Pass Shoreline Protection and Marsh Restoration	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
156	-	Complete or In-Progress	1	Dickinson Bayou Wetland Restoration Project - Phase II Construction	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
255	-	Complete or In-Progress	1	Candy Abshier Wildlife Management Area Shoreline Protection and Marsh Restoration	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
267	-	Complete or In-Progress	1	Galveston Island State Park Marsh Restoration and Protection in Carancahua Cove - Phase II	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
268	-	Complete or In-Progress	1	Galveston Island State Park Marsh Restoration and Protection - Phase I	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
372	-	Complete or In-Progress	1	Sylvan Beach Nourishment	O	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
698	-	Complete or In-Progress	1	Oyster Lake Habitat Protection - Phase 2	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
798	-	Complete or In-Progress	1	Dickinson Bayou Marsh Restoration Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
816	-	Complete or In-Progress	1	Virginia Point Wetlands Construction and Shoreline Protection	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
938	-	Complete or In-Progress	1	Seaweed Core Dune Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
939	-	Complete or In-Progress	1	Seawolf Park	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
940	-	Complete or In-Progress	1	Seawall Beach Nourishment Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.

		Project Information			Plan Development Team Assessments		TAC Assessments			Plan Development Team Assessments		
Unique ID	2017 ID	Project Result	Region	Name	Initial Screening	Programmatic Model	Y/N	Feasibility*	Gap**	Feasibility	Environmental	Notes & Exceptions
1061	-	Complete or In-Progress	1	Surfside Shoreline Stabilization	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
1128	-	Complete or In-Progress	1	Jarboe Bayou Restoration Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
148	-	Complete or In-Progress	1	Geological Framework Study for Folletts Island	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
37	-	Complete or In-Progress	1	Rollover Pass	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
40	-	Complete or In-Progress	1	Upper Texas Gulf Coast: Sabine River through Brazoria County	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
22	-	Complete or In-Progress	1	Sylvan Beach	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
168	-	Complete or In-Progress	1	Galveston Bay Oyster Shell Recycling Program	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
243	-	Complete or In-Progress	1	Virginia Point Shoreline Protection and Estuarine Restoration	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
7	-	Complete or In-Progress	1	Quintana Beach	O	4.40	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
234	-	Complete or In-Progress	1	Marquette Acquisition Project	O	2.81	0.80	3.00	-	- -	- -	Project is funded, ongoing, or complete.
349	-	Complete or In-Progress	1	Marsh Restoration, Oxen to Mantzel Bayou, Galveston County	O	6.09	0.73	3.23	-	- -	- -	Project is funded, ongoing, or complete.
348	-	Complete or In-Progress	1	Marsh Restoration, Gangs to Oxen Bayou, Galveston County	O	6.09	0.69	3.54	-	- -	- -	Project is funded, ongoing, or complete.
351	-	Complete or In-Progress	1	Marsh Restoration, Jumbile Cove, Galveston County	O	5.84	0.63	2.18	-	- -	- -	Project is funded, ongoing, or complete.
352	-	Complete or In-Progress	1	Marsh Restoration, Bird Island to Maggies Cove, Galveston County	O	5.84	0.63	2.44	-	- -	- -	Project is funded, ongoing, or complete.
350	-	Complete or In-Progress	1	Marsh Restoration, Dana Cove, Galveston County	O	6.09	0.60	3.27	-	- -	- -	Project is funded, ongoing, or complete.
619	-	Complete or In-Progress	1	Rollover Bay Island Restoration	O	4.47	0.50	3.43	-	- -	- -	Project is funded, ongoing, or complete.
620	-	Complete or In-Progress	1	Smith Point Island Restoration	O	3.58	0.40	3.13	-	- -	- -	Project is funded, ongoing, or complete.
23	-	Complete or In-Progress	1	Dickinson Bay Habitat Restoration and Protection	O	7.13	0.38	2.43	-	- -	- -	Project is funded, ongoing, or complete.
353	-	Complete or In-Progress	1	Marsh Restoration, Snake Island Cove, Galveston County	O	5.84	0.25	2.33	-	- -	- -	Project is funded, ongoing, or complete.
176	-	Complete or In-Progress	2	Port O'Connor	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
649	-	Complete or In-Progress	2	Port Alto Beach Wetland Conservation and Restoration Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
924	-	Complete or In-Progress	2	Half Moon Reef Oyster Reef Restoration Phase 1	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
139	-	Complete or In-Progress	2	GIWW Replacement of Caney Creek Bridge	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
624	-	Complete or In-Progress	2	Falcon Point Ranch Conservation and Restoration Project	O	4.97	1.00	3.00	-	- -	- -	Project is funded, ongoing, or complete.
621	-	Complete or In-Progress	2	Dressing Point Colonial Waterbird Rookery Island Restoration & Enhancement	O	6.74	0.90	3.67	-	- -	- -	Project is funded, ongoing, or complete.
68	-	Complete or In-Progress	2	San Antonio Bay - Matagorda Island Hydrologic Restoration	O	2.62	0.63	2.80	-	- -	- -	Project is funded, ongoing, or complete.
81	-	Complete or In-Progress	3	Pelican Island - East Shore Marshes	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
93	-	Complete or In-Progress	3	Corpus Christi Beach	O	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
370	-	Complete or In-Progress	3	University Beach Nourishment	O	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
376	-	Complete or In-Progress	3	Corpus Christi Beach Nourishment	O	-	- -	- -	-	- -	- -	GLO involvement in the project is ongoing.
692	-	Complete or In-Progress	3	Renourishment of North Beach	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
83	-	Complete or In-Progress	3	Port Aransas Nature Preserve Wetlands Enhancement	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
175	-	Complete or In-Progress	3	Aransas National Wildlife Refuge	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
188	-	Complete or In-Progress	3	NU-41 City of Port Aransas Ongoing Bulkhead Maintenance and Repair	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
1076	-	Complete or In-Progress	3	Broadway St Shoreline Stabilization and Ecosystem Enhancement	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
379	-	Complete or In-Progress	3	Cedar Bayou Vinson Slough Restoration, Aransas County	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
71	-	Complete or In-Progress	3	Live Oak Peninsula- Rockport Beach	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
77	-	Complete or In-Progress	3	Shoreline Restoration and Protection; Beach Nourishment	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
80	-	Complete or In-Progress	3	McGee Beach	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
157	-	Complete or In-Progress	3	Baseline Mapping for Mangrove Monitoring in the Coastal Bend, Texas Gulf Coast	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
170	-	Complete or In-Progress	3	High-resolution Lidar Observations of Rookery Islands in the Upper Laguna Madre to Define a Monitoring Benchmark	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
1155	-	Complete or In-Progress	3	Piper Channel, Shoreline Protection and Marsh Restoration	O	4.66	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
199	-	Complete or In-Progress	4	Port of Brownsville: Oil Dock 5	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
454	-	Complete or In-Progress	4	CM5 - South Padre Island Beach and dune Restoration including Isla Blanca/Andy Bowie Park, Cameron County	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
659	-	Complete or In-Progress	4	Adolph Thomae Shoreline Restoration Project	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
95	-	Complete or In-Progress	4	Isla Blanca Park	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
163	-	Complete or In-Progress	4	South Padre Island Dune Restoration Volunteer Program	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.
151	-	Complete or In-Progress	4	Modeled Inflow Validation & Nutrient Loading Estimation in Two Subwatersheds of the Lower Laguna Madre	O	-	- -	- -	-	- -	- -	Project is funded, ongoing, or complete.

Appendices

Appendix A. 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 2012 planning efforts, as well as those reviewed during development of the project list for the 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 on in the planning process.

OBJECTID	Review_Status	Author	Document_Year	Publisher	Pages	Prepared_For	Document_ID	Document_Name
1	Previous	APPENBRINK, N.; BOLEN, G.; MANNING-BROOME, C.; DESHOTELS, M.; DUBININ, J.; FREGONESE, J.; GABBE, C.J.; KOOLE, S.; LOGIUDICE, S.; MALBROUGH, O.; MEFFERT, D.; MILAZZO, J.; PACELLO, T. and THARP, J.	2011		94		1	Best Practices Manual for Development in Coastal Louisiana
2	Previous	Calnan, T.	2010	Texas General Land Office	36		2	Global Warming/Sea-level Rise/Subsidence Bibliography
3	Previous	COASTAL COORDINATION COUNCIL	2006a	Dickinson, Texas: Galveston County Office of Emergency Management	14		3	Geotextile Tube Monitoring Program: 14th Quarterly Report
4	Previous	COASTAL COORDINATION COUNCIL	2006b	Dickinson, Texas: Galveston County Office of Emergency Management	42		4	Geotextile Tube Monitoring Program: 15th Quarterly Report
5	Previous	COASTAL COORDINATION COUNCIL	2006c	Dickinson, Texas: Galveston County Office of Emergency Management	95		5	Geotextile Tube Monitoring Program: 16th Quarterly Report
6	Previous	COASTAL COORDINATION COUNCIL	2007a	Dickinson, Texas: Galveston County Office of Emergency Management	51		6	Geotextile Tube Monitoring Program: 17th Quarterly Report
7	Previous	COASTAL COORDINATION COUNCIL	2007b	Dickinson, Texas: Galveston County Office of Emergency Management	61		7	Geotextile Tube Monitoring Program: 18th Quarterly Report
8	Previous	COASTAL COORDINATION COUNCIL	2008	Dickinson, Texas: Galveston County Office of Emergency Management	56		8	Geotextile Tube Monitoring Program: 20th Quarterly Report
9	Previous	CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE	2010	Corpus Christi, Texas: Texas A&M University-Corpus Christi	24	Texas General Land Office	9	Texas Coastal Ocean Observation Network
10	Previous	CONTRERAS, C.; WHISENHANT, A.; BRONSON, J.M. AND RADLOFF, P.L.	2011	Austin, Texas: Water Resources Branch of Texas Parks and wildlife Department	258	Texas General Land Office under GLO Contract NO. 10-049-000-3745	10	Final Report - Seagrass Response to Wastewater Inputs: Implementation of a Seagrass Monitoring Program in Two Texas Estuaries
11	Previous	COUNTY OF GALVESTON, STATE OF TEXAS	2006		109		11	Galveston County Dune Protection and Beach Access Plan
12	Previous	COUNTY OF CAMERON, STATE OF TEXAS	2010		91		12	Cameron County Dune Protection and Beach Access Plan Amendment
13	Previous	DOYLE, T.W.	2009	Wetlands, 29(1)	35-43		13	Hurricane Frequency and Landfall Distribution for Coastal Wetlands of the Gulf Coast, USA
14	Previous	DICKINSON BAYOU WATERSHED PARTNERSHIP HABITAT WORKGROUP	2008		19		14	Habitats of the Dickinson Bayou Watershed
15	Previous	DUNTON, K.H. and PULICH, W. Jr.	2007	Austin, Texas: The University of Texas at Austin, Contract No. 0627	224		15	Landscape Monitoring and Biological Indicators for Seagrass Conservation in Texas Coastal Water
16	Previous	EPA; NOAA; RHODE ISLAND SEA GRANT and INTERNATIONAL CITY/COUNTY MANAGEMENT ASSOCIATION	2009	EPA-231-K-09-001	60		16	Smart Growth for Coastal and Waterfront Communities
17	Previous	FEAGIN, R.A. and YEAGER, K.M.	2008	Austin, Texas	27	Texas General Land Office, Coastal Management Program	17	Final Report: Salt Marsh Accretion Rates on the Upper Texas Coast: Will Sea Level Rise Drown our Marshes?
18	Previous	FEAGIN, R.A.	2007	College Station, Texas: Spatial Sciences Laboratory, Department of Ecosystem Sciences & Management, Texas A&M University	17	Texas General Land Office	18	Final Report: Biological Erosion Control: Experimentation and Dissemination to Stakeholders
19	Previous	FULLER, R.; COFER-SHABICA, N.; FERDANA, Z.; WHELCHEL, A.; HEROLD, N.; SCHMID, K.; SMITH, B.; MARCY, D. and ESLINGER, D.	2011	The Nature Conservancy's Global Marine Team and NOAA National Ocean Service's Coastal Services Center	24		19	Marshes on the Move: A Managers Guide to Understanding and Using Model Results Depicting Potential Impacts of Sea Level Rise on Coastal Wetlands
20	Previous	GIBEAUT, J.C.	2007	Austin, Texas: Coastal Studies Group	41	City of Galveston	20	Galveston Island Geohazards Map
21	Previous	GIBEAUT, J.C. AND HEPNER, T.L	2007	Corpus Christi, Texas: Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi	17	Texas General Land Office	21	Town of South Padre Island Sand-Search Desktop Study
22	Previous	GIBEAUT, J.C.; BARRAZA, E. and RADOSAVLJEVIC, B.	2010	Corpus Christi, Texas: Coastal and Marine Geospatial Laboratory, Harte Research Institute, Administration Award No. NA07NOS4190144	52		22	Estuarine Wetland Habitat Transition Induced by Relative Sea-Level Rise on Mustang and North Padre Islands, Texas: Phase I
23	Previous	GULF COAST ECOSYSTEM RESTORATION TASK FORCE	2011		128		23	Gulf of Mexico Regional Ecosystem Restoration Strategy
24	Previous	HAPKE, C.J.; REID, D.; RICHMOND, B.M.; RUGGIERO, P. and LIST, J.	2006	USGS Open-File Report 2006-1219	79		24	National Assessment of Shoreline Change Part 3: Historical Shoreline Change and Associated Coastal Land Loss Along Sandy Shorelines of the California Coast
25	Previous	HDR SHINER MOSELEY AND ASSOCIATES, Inc.	2006a		19	Galveston County	25	Survey Drawings for: Geotextile Tube Monitoring at Bolivar Peninsula
26	Previous	HDR SHINER MOSELEY AND ASSOCIATES, Inc.	2006b		22	Galveston County	26	Survey Drawings for: Geotextile Tube Monitoring at Galveston Island
27	Previous	HDR SHINER MOSELEY AND ASSOCIATES, Inc.	2006c		84	Galveston County Office of Emergency Management	27	Monitoring Update for Geotextile Tube Core Dunes in Galveston County, Texas
28	Previous	HDR SHINER MOSELEY AND ASSOCIATES, Inc.	2007		84	Galveston County Office of Emergency Management	28	Monitoring Update for Geotextile Tube Core Dunes in Galveston County, Texas
29	Previous	HDR SHINER MOSELEY AND ASSOCIATES, Inc.	2008		126	Galveston County Office of Emergency Management	29	Annual report: Geotextile-Tube Core Dunes

OBJECTID	Review_Status	Author	Document_Year	Publisher	Pages	Prepared_For	Document_ID	Document_Name
30	Previous	HEILMAN, D.J.; PERRY, C.; THOMAS, R.C. and KRAUS, N.C.	2008	Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center. Coastal and Hydraulics Laboratory Engineering Technical Note: ERDC/CHL CHETN-II-51	18		30	Interaction of Shore-Parallel Geotextile Tubes and Beaches Along the Upper Texas Coast
31	Previous	HNTB and COAST & HARBOR ENGINEERING	2010		162	Texas General Land Office	31	Beach Monitoring and Maintenance Plan
32	Previous	INTERNATIONAL ECONOMIC DEVELOPMENT COUNCIL	2011	Washington, D.C.: International Economic Development Council	56		32	Developing Coastal Tourism as an Economic Driver: Strategies & Recommendations for Brazoria, Chambers, Galveston, and Matagorda Counties, Texas
33	Previous	IRISH, J.L.	2009	Galveston, Texas: Texas A&M University	208	Texas General Land Office	33	Parameterization of Hurricane Surge for the State of Texas Coastline
34	Previous	IRISH, J.L., A.E. FREY, J.D. ROSATI, F. OLIVERA, L.M. DUNKIN, J.M. KAIHATU, C.M. FERREIRA and B.L., EDGE	2010	Ocean and Coastal Management, (53)	645-657		34	Potential Implications of global warming and barrier island degradation on future hurricane inundation
35	Previous	IRISH, J.L. AND OLIVERA, F.	2011		62	Texas General Land Office	35	Quantification of Hurricane Surge Damage in Coastal Bays as a Function of Dune and Wetland Characteristics with Application to Restoration and Climate Change
36	Previous	JONES, G.; KO, J.K.; PETERSON, J. and MCINNES, A.	2009	Galveston, Texas: Department of Marine Sciences, Texas A&M University at Galveston	2		36	Using Hurricane Ike to Assess the FEMA 100/500yr Flood Line on Galveston Island
37	Previous	KRAUS, N.C.	2007	Proceedings Coastal Sediments 2007. Reston, Virginia: American Society of Civil Engineers Press.	1475-1488		37	Coastal Inlets of Texas
38	Previous	KRECIC, M.R.; HUNT, W. and LAWSON, G.P.	2009	Jacksonville, Florida: Taylor Engineering, Inc., GLO Contract No. 10-103-010	92		38	Economic Analyses for Update of the 2009 Texas Coast Wide Erosion Response Plan
39	Previous	KRECIC, M.; STITES, D., ARNOUIL, D.; HALL, J. AND HUNT, W.	2011	Jacksonville, Florida: Taylor Engineering, Inc.	159	Texas General Land Office	39	Economic and Natural Resource Benefits Study of Coastal Erosion Planning and Response Act (CEPRA) Cycle 5 and 6 Projects
40	Previous	LANDRY, A.M. Jr. and HUGHES, C.L.	2008	Galveston, Texas: Texas A&M University, Contract No. 07-005-002	36	Texas General Land Office	40	Guide to Managing Sea Turtle Nesting Habitat on the Upper Texas Coast
41	Previous	LIZARRAGA, E.	2006		10	Coastal Resources Division, Texas General Land Office	41	Study of Impervious Cover on South Padre Island, Texas
42	Previous	MATHIS, M.; HAUT, R.; MATISOFF, D. and RICHARDSON, R.	2006	Woodlands, Texas: Houston Advanced Research Center	51	Texas General Land Office Coastal Management Program under GLO Contract No. 04-021	42	The Economic Value of Water and Ecosystem Preservation Part 2: Freshwater Inflows from the Rio Grande
43	Previous	MATHIS, M.L.; CUSHION, L,; MONTAGNA, P.; BILTONEN, E. and YOSKOWITZ, D.	2007		93	Prepared for the Texas General Land Office Coastal Management Program under GLO Contract No. 05-018	43	The Economic Value of Water and Ecosystem Preservation in the Estuary and Coastal Wetlands of San Antonio Bay
44	Previous	MCKENNA, K.K.	2009		196	Prepared for the Texas General Land Office under GLO Contract No. 06-076-000	44	Texas Coastwide Erosion Response Plan, 2009 Update
45	Previous	MOFFATT & NICHOL	2010		179	U.S. Army Corps of Engineers Planning Section	45	Galveston Bay Regional Sediment Management: Programmatic Sediment Management Plan
46	Previous	NATIONAL OCEAN SERVICE (NOAA)	2011	Washington, DC: U.S. Department of Commerce	58		46	The Gulf of Mexico at a Glance: A Second Glance
47	Previous	NATIONAL PARK SERVICE GEOLOGIC RESOURCES DIVISION	2007		46		47	Geologic Resource Evaluation Scoping Summary Gulf Islands National Seashore
48	Previous	NOAA COASTAL SERVICES CENTER	2009	Charleston, South Carolina	15		48	Local Strategies for Addressing Climate Change
49	Previous	NUECES COUNTY COMMISSIONERS COURT	2010		48		49	Nueces County Beach Management Plan
50	Previous	PEACOCK, W.G.; KANG, J.E.; LIN, Y.; GROVER, H.; HUSEIN, R. and BURNS, G.R.	2009a		45	Texas General Land Office and The National Oceanic and Atmospheric Administration under GLO Contract No. 09-045-000-3362	50	Status and Trends of Coastal Hazard Exposure and Mitigation Policies for the Texas Coast: The Mitigation Policy Mosaic of Coastal Texas
51	Previous	PEACOCK, W.G.; HUSEIN, R.; BURNS, G.R.; KENNEDY, T.; KANG, J.E. and PRATER, C.	2009b	College Station, Texas: Hazard Reduction and Recovery Center, Texas A&M University	32	Texas General Land Office and NOAA under GLO Contract No. 09-045-000-3362	51	The Elite Survey Report: A Report on the Perception of State, County and Local Officials Regarding the State of Texas Mitigation Plan, Coastal Management Plan and the Promotion of Mitigation Efforts in the Texas Coastal Management Zone
52	Previous	PEACOCK, W. G.; GROVER, H.; WUNNEBURGER, D.; BRODY, S.D.; VAN ZANDT, S.; HUSEIN, R.; KIM, H.J.; NDUBISI, F.; MARTIN, J.	2011	Hazard Reduction and Recovery Center, College of Architecture: Texas A&M University	111	Texas General Land Office and the National Oceanic and Atmospheric Administration under GLO Contract No. 10-059-000-3758	52	Status and Trends of Coastal Vulnerability to Natural Hazards Project Annual Report for Phase 4

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53	Previous	PENDLETON, E.A.; BARRAS, J.A.; WILLIAMS, S.J. and TWICHELL, D.C.	2010	Reston, Virginia: U.S. Geological Survey, Open-File Report 2010-1146	30		53	Coastal Vulnerability Assessment of the Northern Gulf of Mexico to Sea Level Rise and Coastal Change
54	Previous	PERRY, R.	2008		464	State of Texas	54	Texas Coastal Impact Assistance Plan
55	Previous	PERRY, R.	2011a		509	State of Texas	55	Texas Coastal Impact Assistance Plan: Second Amendment
56	Previous	PERRY, R.	2011b		416	State of Texas	56	Texas Coastal Impact Assistance Plan: Third Amendment
57	Previous	SIPOCZ, M.	2009	Texas A&M System: Texas AgriLife Extension Service	136	National Oceanic and Atmospheric Administration	57	Final Report: Texas Coastal Stormwater Treatment Wetland Design Manual 07-005-25
58	Previous	TAYLOR ENGINEERING, INC.	2009		154	Texas General Land Office	58	Rollover Pass Closure Project Narrative Supplement to the Department of the Army Permit Application
59	Previous	TAYLOR ENGINEERING, INC.	2010a	Jacksonville, Florida: Taylor Engineering, Inc.	20	Texas General Land Office	59	Analysis of Rollover Pass Impacts to Adjacent Beaches and the Littoral System
60	Previous	TAYLOR ENGINEERING, INC.	2010b		8	Texas General Land Office	60	Rollover Pass Closure Plans
61	Previous	TAYLOR ENGINEERING, INC.	2010c	Jacksonville, Florida: Taylor Engineering, Inc.	273	Texas General Land Office	61	Draft Environmental Assessment Rollover Pass Closure Project
62	Previous	TEXAS COASTAL MANAGEMENT PROGRAM	2006	Austin, Texas: Texas General Land Office	107		62	2006 Annual Report
63	Previous	TEXAS COASTAL MANAGEMENT PROGRAM	2007	Austin, Texas: Texas General Land Office	45		63	2007 Annual Report
64	Previous	TEXAS COASTAL MANAGEMENT PROGRAM	2008	Austin, Texas: Texas General Land Office	60		64	2008 Annual Report
65	Previous	TEXAS COASTAL MANAGEMENT PROGRAM	2009	Austin, Texas: Texas General Land Office	46		65	2009 Texas Coastal Management Program Annual Report
66	Previous	TEXAS COASTAL MANAGEMENT PROGRAM	2010	Austin, Texas: Texas General Land Office	44		66	2010 Annual Report
67	Previous	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY-GALVESTON BAY ESTUARY PROGRAM	2006		19	Texas General Land Office under GLO Contract No. 05-0524	67	Coastal Prairie and Wetland Enhancement in the Galveston Bay Watershed: Final Report
68	Previous	TEXAS DEPARTMENT OF TRANSPORTATION	2008	Austin, Texas: Texas Department of Transportation	24		68	Gulf Intracoastal Waterway: Legislative Report-81st Legislature
69	Previous	TEXAS GENERAL LAND OFFICE	2007	Austin, Texas: Texas General Land Office	83		69	Coastal Erosion Planning & Response Act (CEPRA): Report to the 80th Texas Legislature
70	Previous	TEXAS GENERAL LAND OFFICE	2009	Austin, Texas: Texas General Land Office	102		70	Coastal Erosion Planning & Response Act: Report to the 81st Legislature
71	Previous	TEXAS GENERAL LAND OFFICE	2010a		39	Department of the Army Permit Application No. #SWG 2009-00833	71	Rollover Pass Closure Project Response to Request for Additional Information
72	Previous	TEXAS GENERAL LAND OFFICE	2010b		48	National Oceanic and Atmospheric Administration and the United States Department of Commerce	72	Texas Coastal and Estuarine Land Conservation Program Plan
73	Previous	TEXAS GENERAL LAND OFFICE	2011a	Austin, Texas: Texas General Land Office	40		73	Coastal Erosion Planning & Response Act: Report to the 82nd Legislature
74	Previous	TEXAS GENERAL LAND OFFICE	2011b		20		74	Texas Beach Accessibility Guide
75	Previous	TEXAS GENERAL LAND OFFICE, COASTAL RESOURCES DIVISION	2011a		12		75	Rollover Pass Erosion and Hazard-related Issues
76	Previous	TEXAS GENERAL LAND OFFICE, COASTAL RESOURCES DIVISION	2011b		11		76	Rollover Pass Recreational Amenities Plan
77	Previous	TEXAS GENERAL LAND OFFICE and THE VETERANS LAND BOARD	2006		53		77	Agency Strategic Plan: Fiscal Years 2007-2011
78	Previous	TEXAS GENERAL LAND OFFICE and THE VETERANS LAND BOARD	2010		125		78	Agency Strategic Plan: for the Fiscal Years 2011-2015
79	Previous	TEXAS WATER DEVELOPMENT BOARD	2012	Austin, Texas: Texas Water Development Board	314		79	Water for Texas 2012 State Water Plan
80	Previous	THE HARTE RESEARCH INSTITUTE FOR THE GULF OF MEXICO STUDIES (HRI)	2011		136	Texas General Land Office	80	Texas Coastal Management Program Section 309 Assessment and Strategies Report 2011-2015
81	Previous	THE PERRYMAN GROUP	2006	Waco, Texas: The Perryman Group	96		81	An Economy at Risk: Our Vulnerable Coast and its Importance to the Texas Economy
82	Previous	TREMBLAY, T.A.; VINCENT, J.S. and CALNAN, T.R.	2008		101	Coastal Bend Bays and Estuaries Program, Texas General Land Office and National Oceanic and Atmospheric Administration under CBBEP Contract No. 0722	82	Status and Trends of Inland Wetland and Aquatic Habitats in the Corpus Christi Area

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83	Previous	TREMBLAY, T.A. and CALNAN, T.R.	2009		84	Texas General Land Office and National Oceanic and Atmospheric Administration under GLO Contract No. 08-024	83	Status and Trends of Inland Wetland and Aquatic Habitats, Beaumont-Port Arthur Area
84	Previous	TREMBLAY, T.A. and CALNAN, T.R.	2010		85	Texas General Land Office and National Oceanic and Atmospheric Administration under GLO Contract No. 09-046	84	Status and Trends of Inland Wetland and Aquatic Habitats, Matagorda Bay Area
85	Previous	UNKNOWN AUTHOR	2010		192		85	A bibliography of Texas coastal Wetlands
86	Previous	WATSON, R.L.	2006	Port Aransas, Texas	40	2006 CLE Texas Coastal Law Conference	86	Coastal Law and the Geology of a Changing Shoreline
87	Previous	WHISENANT, A.; CONTRERAS, C.; BRONSON, J.M. and RADLOFF, P.L.	2010	Austin, Texas: Water Resources Branch of Texas Parks and Wildlife Department	35	Texas General Land Office Coastal Management Program under GLO Contract No. 10-049-000-3745	87	Supplemental Data Review - Seagrass Response to Wastewater Inputs: Implementation of a Seagrass Monitoring Program in Two Texas Estuaries
88	Previous	WHITE, W.A.; TREMBLAY, T.A.; WALDINGER, R.L. and CALNAN, T.R.	2006		78	Texas General Land Office and the National Oceanic and Atmospheric Administration under GLO Contract No. 05-041	88	Status and Trends of Wetland and Aquatic Habitats on Texas Barrier Islands Coastal Bend
89	Previous	WHITE, W.A.; TREMBLAY, T.A.; WALDINGER, R.L. and CALNAN, T.R.,	2007		95	Texas General Land Office and the National Oceanic and Atmospheric Administration under GLO Contract No. 06-044	89	Status and Trends of Wetlands and Aquatic Habitats on Texas Barriers: Upper Coast Strandplain-Chenier System and Southern Coast Padre Island National Seashore
90	Previous	WILDER, F.	2007	The Texas Observer	12		90	That Sinking Feeling
91	Previous	YOSKOWITZ, D.W. and GIBEAUT, J.	2011	Corpus Christi, Texas: Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi	21		91	Impact of Relative Sea Level Rise on Galveston Bay
92	Review	U.S. ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	79		92	Coastal Texas Protection and Restoration Study, Final Reconnaissance 905(b) Report
93	Review	CB&I	2016		4013	Texas General Land Office	93	Texas Coastal Resiliency Study
94	Review	THE GULF COAST COMMUNITY PROTECTION AND RECOVERY DISTRICT (GCCPRD)	2016		73		94	Storm Surge Suppression Study Phase 2 Report
95	Review	HOUSTON GALVESTON AREA COUNCIL (HGAC)	2012		952		95	Regional Hazard Mitigation Plan 2011 Update
96	Review	CAMERON COUNTY AND H2O PARTNERS, INC.	2015		282		96	Cameron County Hazard Mitigation Plan
97	Review	RIO GRAND INSTITUTE; TEXAS A&M INTERNATIONAL UNIVERSITY AND H2O PARTNERS, INC.	2008		1155		97	Hazard Mitigation Action Plan for the Rio Grande Border 2008-2013
98	Review	GALVESTON BAY ESTUARY PROGRAM	2009		32		98	Charting the Course to 2015: Galveston Bay Strategic Action Plan
99	Review	TEXAS DEPARTMENT OF TRANSPORTATION	2013	Austin, Texas: Texas Department of Transportation	20		99	Gulf Intracoastal Waterway: Legislative Report-83rd Legislature
100	Review	GULF-HOUSTON REGIONAL CONSERVATION PLAN	2015		18		100	Gulf-Houston Regional Conservation Plan Packet
101	Review	GULF-HOUSTON REGIONAL CONSERVATION PLAN	2015		16		101	Galveston Bay Habitat Acquisition & Easement Initiative Projects
102	Review	ROSATI III, J.; FREY, A. AND THOMAS, R.	2012	Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center Coastal and Hydraulics Laboratory	192	U.S. Army Corps of Engineers	102	Erosion Control and Environment Restoration Plan Development, Matagorda County, Texas; Phase 2: Preliminary Design
103	Review	PORT AUTHORITY ADVISORY COMMITTEE (PAAC)	2015		18		103	Texas Ports 2015-2016 Capital Program Executive Summary
104	Review	TEXAS DEPARTMENT OF TRANSPORTATION	2015		125		104	Texas Ports 2015-2016 Capital Program Appendices
105	Review	TRINITY BAY CONSERVATION DISTRICT	2013	Stowell, Texas: Trinity Bay Conservation District	257		105	Hazard Mitigation Action Plan FY 2013
106	Review	TEXAS COASTAL BEND COUNCIL OF GOVERNMENTS (TXCBCOG)	2013		246		106	Coastal Bend Mitigation Action Plan
107	Review	KRUSE, C.J.; ELLIS, D.; PROTOPAPAS, A.; NORBOGE, N. AND GLOVER, B.	2014	College Station, Texas: Texas A&M Transportation Institute	197		107	Texas Gulf Intracoastal Waterway Master Plan: Technical Report
108	Review	TEXAS DEPARTMENT OF TRANSPORTATION	2014		36		108	A Master Plan for the Gulf Intracoastal Waterway in Texas

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109	Review	CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE	2015	Corpus Christi, Texas: Texas A&M University-Corpus Christi	90	Texas General Land Office	109	CEPRA Beach Monitoring Phase 5 Surveys and Analysis: 2014 Survey Year Volume 1
110	Review	CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE	2015	Corpus Christi, Texas: Texas A&M University-Corpus Christi	66	Texas General Land Office	110	CEPRA Beach Monitoring Phase 5 Surveys and Analysis: 2014 Survey Year Volume 2
111	Review	CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE	2014	Corpus Christi, Texas: Texas A&M University-Corpus Christi	119	Texas General Land Office	111	CEPRA Beach Monitoring Phase 4 Surveys and Analysis: 2012/2013 Survey year
112	Review	TEXAS GENERAL LAND OFFICE	2015	Austin, Texas: Texas General Land Office	29		112	Coastal Erosion Planning & Response Act: Report to the 84th Legislature
113	Review	TAYLOR ENGINEERING, INC.	2013		123	Texas General Land Office	113	Coastal Erosion Planning and Response Act (CEPRA) Economic and Natural Resource Benefits Study
114	Review	MCKENNA, K.K.	2014		72	Texas General Land Office	114	Texas Coastwide Erosion Response Plan, 2013 Update
115	Review	TEXAS COASTAL MANAGEMENT PROGRAM	2014		75		115	Texas Coastal Management Program Biennial Report 2013-2014
116	Review	DIAMOND, J.; CHAN, T.; AUSTIN, J.; DALBOM, C. AND DAVIS, M.	2014	Environmental Law Institute & Tulane Institue on Water Resources Law & Policy	41		116	Funding Deepwater Horizon Restoration & Recovery: How Much, Going Where, for What?
117	Review	KNUDSON, LP	2015	Galveston Island Park Board of Trustees	36		117	Beach Parks Master Plan (East Beach and Stewart Beach)
118	Review	SHEPARD, C.; GILMER, B.; DEQUATTRO, J.; WEIS, S.; BLEJWAS, A. AND BENDICK, R.	2015	Washington, DC: The Nature Conservancy	32		118	Charting Restoration: Gulf Restoration Priorities and Funded Projects Five Years after Deepwater Horizon
119	Review	GALVESTON ISLAND PARK BOARD OF TRUSTEES	2014	Galveston Island Park Board of Trustees	20		119	Annual Report
120	Review	YOSKOWITZ, D.W.; LEON, C.; GIBEAUT, J.; LUPHER, B.; LOPEZ, M.; SANTOS, C.; SUTTON, G. AND MCKINNEY, L.	2013	Corpus Christi, Texas: Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi	52		120	Gulf 360: State of the Gulf of Mexico
121	Omit	CITGO PETROLEUM CORPORATION	2015		96		121	In the Eye of the Forgotten Storm: Our Story of Hurricane Rita
122	Review	TEXAS GENERAL LAND OFFICE	2009	Austin, Texas: Texas General Land Office	41		122	Coastal Protection Plan: Report to the 81st Texas Legislature
123	Review	THE GULF COAST COMMUNITY PROTECTION AND RECOVERY DISTRICT (GCCPRD)	2015		576		123	Storm Surge Suppression Study Phase 1 Report
124	Review	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	234		124	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration; Draft Integrated Feasibility Report - Environmental Impact Statement
125	Review	Lester, L. J. and L. A. Gonzalez, Eds.	2011	GALVESTON BAY ESTUARY PROGRAM	356	Texas Commission on Environmental Quality	125	The State of the Bay: A characterization of the Galveston Bay Ecosystem, Third Edition
126	Omit	CLIMATE CENTRAL AND ICF INTERNATIONAL	2016	States at Risk	9		126	States at Risk: America's Preparedness Report Card - Texas
127	Review	US DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT	2008	U.S. Department of the Interior, Bureau of Land Management	99		127	BLM Natural Resource Damage Assessment and Restoration Handbook
128	Review	THE NATURE CONSERVANCY		The Nature Conservancy	7		128	The Gulf of Mexico: The Greatest American Restoration Opportunity of Our Time
129	Review	THE HARTE RESEARCH INSTITUTE FOR THE GULF OF MEXICO STUDIES (HRI)	2014	Corpus Christi, Texas: Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi	40		129	2014 Annual Report
130	Review	PANNELL, R.	2015	USACE Galveston District, Southwest Division	44		130	Coastal Texas Protection and Restoration Study; 3x3x3 Exemption Briefing
131	Review	BEDIENT, P.B.; DUNBAR, L.G. AND BLACKBURN J.B.	2015	Houston, Texas: SSPEED Center, Rice University	89		131	SSPEED Center - H-GAPS Annual Report
132	Review	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY	2015	RESTORE the Texas Coast, TCEQ	51		132	Conserve, Restore, Renew: Framework for Implementing he RESTORE Act on the Texas Gulf Coast
133	Review	BUSH, G.P.	2015	Texas General Land Office	62		133	GLO Coastal Storm and Hurricane Plan
134	Review	TEXAS GENERAL LAND OFFICE	2013		6		134	GLO Coastal Issues Forum; Coastal Region 2, Calhoun, Jackson, Matagorda and Victoria Counties
135	Review	DAVIS, M.; VORHOFF, H. AND BOYER, D.	2015	Tulane Institute on Water Resources Law & Policy	25		135	Financing the Future; Turning Coastal Restoration and Protectino Plans into Realities: How Much is Currently Funded?
136	Review	NUECES COUNTY - COASTAL PARKS DEPARTMENT	2014	Nueces County Coastal Parks	37	Gulf Coast Restoration Council	136	Ecological Restoration, Enhancement, and Management Plan; Mustang Island and North Padre Island, Nueces and Kleberg Counties, Texas
137	Review	THE ENVIRONMENTALLY FRIENDLY DRILLING SYSTEMS TEAM	2015	THE ENVIRONMENTALLY FRIENDLY DRILLING SYSTEMS PROGRAM	55		137	2014 EFD Sponsors' Report
138	Review	TEXAS GENERAL LAND OFFICE	2015	Austin, Texas: Texas General Land Office	2		138	Memorandum of Understanding Between the U.S. Army Corps of Engineers and the Texas General Land Office
139	Review	COASTAL IMPACT ASSISTANCE PROGRAM	2015		26		139	Coastal Impact Assistance Proram: A Summary of the Successes
140	Review	ATKINS			1		140	Matagorda County Comprehensive Coastal Resiliency Master Plan
141	Review	JANUARY-BEVERS, D.; BOTHWELL, S.; DRUMMOND, J.; HARPER, L.; ROCHE, L.	2016	Houston Wilderness	44		141	The Ecosystem Services Primer: A Primer for Problem-solving Using Ecosystem Services
142	Review	THOMAS, R. AND DUNKIN, L.	2012	Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center Coastal and Hydraulics Laboratory	113	U.S. Army Corps of Engineers	142	Erosion Control and Environment Restoration Plan Development, Matagorda County, Texas; Phase 1: Preliminary Investigation
143	Review		2014	Houston Wilderness	1		143	Houston Wilderness Ecosystem Services Reference Chart
144	Review		2014	Houston Wilderness	13		144	Houston Wilderness Ecosystem Services Reference List
145	Review	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	210		145	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix A: Measure Information Sheets

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146	Review	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	119		146	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix B: Plan Forumulation
147	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	73		147	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix C: Economic Analysis
148	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	210		148	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix D: Engineering Design, Cost Estimates, and Cost Risk Analysis
149	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	29		149	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix E: Real Estate
150	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	66		150	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix F: Public Coordination
151	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	69		151	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix G: Agency and Tribal Coordination
152	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	7		152	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix H: Clean Water Act Section 404(b)(1) Evaluation
153	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	14		153	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix I: Clean Air Act Emissions Modeling
154	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	80		154	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix J: Biological Assessment for Endangered Species Act Coordination
155	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	2		155	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix K: Coordination Act Report
156	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	11		156	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix L: National Historic Preservation Act Draft Cooperative Agreement
157	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	14		157	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix M: Texas Coastal Management Program Consistency Determination
158	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	34		158	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix N: Hazardous, Toxic, and Radioactive Waste Assessment
159	Review	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	124		159	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix O: Wetland Value Assessment Modeling
160	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	3		160	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix P: Mitigation Plan and Incremental Analysis and Monitoring Plan
161	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	2		161	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix Q: Wetlands Value Assessment Sensitivity Analysis
162	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	26		162	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix R: Study Area Demographics
163	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	2		163	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix S: List of Preparers
164	Omit	UNITED STATES ARMY CORPS OF ENGINEERS	2015	USACE Galveston District, Southwest Division	12		164	Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration, Draft Integrated Feasibility Report and Environmental Impact Study, Draft Appendix T: Distribution List
165	Review		2015	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	n.p.	Texas Commission on Environmental Quality	165	Texas New Project Submissions: RESTORE Act 11-8-15 (Excel dataset)

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166	Review		2013	Galveston, TX: Order of the City Council	26		166	Code City of Galveston Texas 1982: Section 29-20: DEVELOPMENT, PRESERVATION AND PROTECTION OF SAND DUNES (Revision 10/13)
167	Review		2013	Galveston, TX: Order of the City Council	7		167	Code City of Galveston Texas 1982: Section 29-54: SAND DUNE AREA DEFINITIONS (Revision 10/13)
168	Review	THE CITY OF GALVESTON DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT	2012	CITY OF GALVESTON	71	City of Galveston	168	City of Galveston Erosion Response Plan: Galveston Planning & Development Regulations
169	Review		2012		55	County of Brazoria	169	Dune Protection and Beach Access Plan: County of Brazoria
170	Review	COAST & HARBOR ENGINEERING, INC.	2012	Austin, Texas	77	Texas Coastal Management Program	170	Brazoria County Erosion Response Plans: An Amendment to the Dune Protection and Beach Access Plans for: Brazoria County, Village of Surfside Beach, Town of Quintana, City of Freeport
171	Review		2003		194		171	Chapter 10: Beachfront Management and Construction (City of Corpus Christi and Nueces County)
172	Review	CITY OF CORPUS CHRISTI AND NUECES COUNTY	2012	Corpus Christi, Texas: The City of Corpus Christi and Nueces County	49		172	A Joint Erosion Response Plan for the Nueces County and the City of Corpus Christi
173	Review		1993	City of Jamaica Beach, Texas	46		173	Dune Protection and Beach Access Plan: Village of Jamaica Beach
174	Review	RAVELLA, P. AND WORSHAM, B.	2012		33	Texas General Land Office	174	Jamaica Beach Erosion Response Plan
175	Review	URBAN ENGINEERING	1995	Corpus Christi, Texas	76		175	Port Aransas Coastal Management Plan
176	Review	MAHONEY, M.	2011	Austin, Texas	33	Texas Coastal Management Program	176	City of Port Aransas Erosion Response Plan
177	Review		2005	South Padre Island, Texas			177	Ordinance No. 05-07
178	Review	RAVELLA, P.; WORSHAM, B.; MANN, R.; AND TREVINO, R.	2012		51	Texas General Land Office	178	City of South Padre Island Erosion Response Plan
179	Review		2004	Galveston County, Texas	109		179	Galveston County Dune and Beach Access Plan
180	Review	COASTAL STRATEGIES GROUP, LLC	2012	High Island, Texas	45	Texas General Land Office	180	Galveston County Erosion Response Plan
181	Review		1994		79		181	Matagorda County Dune Protection and Beach Access Plan
182	Review	COASTAL TECH: COASTAL TECHNOLOGY CORPORATION	2012		35	Texas General Land Office	182	Matagorda County Erosion Response Plan
183	Review	JACOB, J.S. AND SHOWALTER, S.	2007	Sea Grant Texas	42		183	The Resilient Coast: The Built Environment
184	Review	JACOB, J.S. AND SHOWALTER, S.	2008	Sea Grant Texas	37		184	The Resilient Coast: Wetlands
185	Review		2012	Coastal Protection and Restoration Authority	189	Effective May 23, 2012	185	Louisiana's Comprehensive Master Plan for a Sustainable Coast
186	Review		2005	Great Lakes Regional Collaboration	64	December 2005	186	Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes
187	Review		2012	International Joint Commission	31	December 31, 2012	187	A Binational AIS Rapid Response Plan for the Great Lakes-St. Lawrence River Basin: A Pilot Plan for the Lake Huron/Lake Erie Corridor
188	Review		2009	Utah Lake Commission	51	June 26, 2009	188	Utah Lake Master Plan: Awake Utah Lake
189	Review	US ARMY CORPS OF ENGINEERS	2013	Washington, DC: Directorate of Civil Works, US Army Corps of Engineers	21		189	Coastal Risk Reduction and Resilience. CWTS 2013-3.
190	Review	CONNOR, C.	2016	Hatch Mott MacDonald	1	Texas General Land Office	190	Treasure Island MUD Long Term Strategy
191	Information Only	WATSON, A., J. REECE, B.E. TIRPAK, C.K. EDWARDS, L. GESELBRACHT, M. WOODREY, M. LAPEYRE, AND P.S. DALYANDER.	2015	U.S. Fish and Wildlife Service Fish and Aquatic Conservation Program	132	Available from: http://gulfcoastprairielcc.org/science/science-projects/gulf-coast-vulnerability-assessment/	191	The Gulf Coast Vulnerability Assessment: Mangrove, Tidal Emergent Marsh, Barrier Islands, and Oyster Reef - Executive Summary
192	Information Only	WATSON, A., J. REECE, B.E. TIRPAK, C.K. EDWARDS, L. GESELBRACHT, M. WOODREY, M. LAPEYRE, AND P.S. DALYANDER.	2015	U.S. Fish and Wildlife Service Fish and Aquatic Conservation Program	16	Available from: http://gulfcoastprairielcc.org/science/science-projects/gulf-coast-vulnerability-assessment/	192	The Gulf Coast Vulnerability Assessment: Mangrove, Tidal Emergent Marsh, Barrier Islands, and Oyster Reef
193	Information Only	MOULTON, D.W.; MCKINNEY, L.D.; AND BUZAN, D.L.	2004	Texas Parks and Wildlife Department Resource Protection Division. Austin, Texas.	43		193	Texas Coastal Ecosystems: Past, Present and Future
194	Review		2016		n.p.	Texas General Land Office	194	CB&I Consolidated Project List (Excel dataset)
195	Information Only		2011	U.S. Fish and Wildlife Service Coastal Impact Assistance Program	48	Land Trust for Mississippi Coastal Plain	195	Conservation Strategy for the Mississippi Gulf Coast: Implementation Framework Report
196	Review	BALBOA, W., et al.	2016	Matagorda and Calhoun Counties, Regional Coastal Planning	1		196	Matagorda - Calhoun Planning Project List
197	Information Only	BRODY, S.D., SEBASTIAN, A., BLESSING, R., AND BEDIENT, P.B.	2015	Journal of Flood Risk Management	11	CIWEM	197	Case Study Results from Southeast Houston, Texas: Identifiying the Impacts of Residential Location on Flood Risk and Loss
198	Information Only	BRODY, SAMUEL D. AND HIGHFIELD, WESLEY E.	2013	Land Use Policy	7	Land Use Policy 32	198	Open Space Protection and Flood Mitigation: A National Study
199	Information Only	BRODY, SAMUEL D., HIGHFIELD, WESLEY E., WILSON, MORGAN, LINDELL, MICHAEL K., AND BLESSING, RUSSELL	2016	Journal of Risk Management	17		199	Understanding the Motivations of Coastal Residents to Voluntarily Purchase Flood Insurance

OBJECTID	Review_Status	Author	Document_Year	Publisher	Pages	Prepared_For	Document_ID	Document_Name
200	Information Only	BRODY, SAMUEL D., PEACOCK, WALTER GILLIS, AND GUNN, JOSHUA	2012	Ecological Indicators	8	Ecological Indicators 18	200	Ecological Indicators of Flood Risk Along the Gulf of Mexico
201	Information Only	BRODY, SAMUEL, KIM, HEEJU, AND GUNN, JOSHUA	2013	Urban Studies Journal Limited	18	Urban Studies at 50	201	Examining the Impacts of Development Patterns on Flooding on the Gulf of Mexico Coast
202	Information Only	BRODY, SAMUEL D., HIGHFIELD, WESLEY E., AND BLESSING, RUSSELL B.	2014	Natural Hazards	50		202	Measuring the Impact of Mitigation Activities on Flood Loss Reduction at the Parcel Level: the Case of the Clear Creek Watershed on the Upper Texas Coast
203	Information Only	BRODY, SAMUEL, BLESSING, RUSSELL, SEBASTIAN, ANTONIA, AND BEDIENT, PHILLIP	2014	Journal of Environmental Planning and Management	15		203	Examining the Impact of Land Use/Land Cover Characteristics on Flood Losses
204	Information Only	HIGHFIELD, WESLEY E., NORMAN, SARAH A., AND BRODY, SAMUEL D.	2013	Risk Analysis	6	Risk Analysis Vol 33 No 2	204	Examining the 100-Year Floodplain as a Metric of Risk, Loss, and Household Adjustment
205	Information Only	HIGHFIELD, WESLEY E., AND BRODY, SAMUEL D.	2013	Natural Hazards Review	8		205	Evaluating the Effectiveness of Local Mitigation Activities in Reducing Flood Losses
206	Information Only	BRODY, SAMUEL D., BLESSING, RUSSELL, SEBASTIAN, ANTONIA, AND BEDIENT, PHILLIP	2013	Natural Hazards Review	9		206	Delineating the Reality of Flood Risk and Loss in Southeast Texas
207	Information Only	BRODY, SAMUEL D., HIGHFIELD, WESLEY E., AND BLESSING, RUSSELL	2015	Journal of the American Water Resources Association	12	JAWRA Vol 51 No 6	207	An Analysis of the Effects of Land Use and Land Cover on Flood Losses Along the Gulf of Mexico Coast from 1999 to 2009
208	Review	Technical Advisory Committee	2016	Unpublished	147	Texas General Land Office	208	July 2016 Technical Advisory Committee Gap Analysis Project Submissions
209	Review	Harte Research Institute	2013	Unpublished	664	Texas General Land Office	209	2012 Texas General Land Office Coastal Plan Project Descriptions
213	Review	ANDERSON, J. AND SMITH WELLNER, J.	2002	Department of Earth Science, Rice University	4	Report to the Texas General Land Office	210	Evaluation of Beach Nourishment Sand Resources along the East Texas Coast
215	Information Only	TISSOT, P. AND REISINGER, A.	2016	Conrad Blucher Institute and Harte Research Institute, Texas A&M University Corpus Christi	39	2016 Gulf Coast Association of Geological Societies Annual Convention	211	Relative Sea Level Rise around the Gulf of Mexico and its Impact: Spatial Variability at Different Scales
216	Review		2014	National Wildlife Federation	28		212	Restoring the Gulf of Mexico for People and Wildlife: Recommended Projects and Priorities
218	Information Only	ANDERSON, J.B., D.J. Wallace, A.R. Simms, A.B. Rodriguez, R.W.R. Weight, and Z.P. Taha	2016	Earth-Science Reviews	28	Ed. 153, pp. 111-138	213	Recycling sediments between source and sink during a eustatic cycle: Systems of late Quaternary northwestern Gulf of Mexico Basin
219	Information Only	Freese and Nichols, Inc.	2016		225	Texas General Land Office	214	Texas Coastal Sediment Sources General Evaluation Study (Draft)

Appendix B. Technical Advisory Committee Process

Issues of Concern Online Assessment

What follows is the introductory portion of the Issues of Concern Technical Advisory Committee online survey, as well as an example questionnaire for one subregion.

Texas Coastal Issues of Concern Technical Advisory Committee Survey

The purpose of this survey is to elicit expert assessment of the issues of concern (IOC) related to coastal resiliency along the Texas coast. The Texas coast has been sectioned into 68 subregions to capture information at the HUC-10 watershed level.

The eight potential issues of concern to evaluate are the following:

- Altered, degraded, or lost habitat
- Gulf beach erosion and dune degradation
- Bay shoreline erosion
- Existing and future coastal storm surge damage
- Coastal flood damage
- Impact on water quality and quantity
- Impact on coastal resources
- Abandoned or derelict vessels, structures, and debris

The survey is structured as follows:

1. On an interactive map, you will select all subregions for which you can effectively evaluate the IOCs.
2. You will have the opportunity to review a short description, maps, and data for each selected subregion.
3. You will answer questions for each selected subregion, as the following example shows.
4. You will be asked to provide any additional information you are aware of to assist with the IOC assessment. Examples of additional information that would be useful include knowledge of on-going or planned restoration efforts in an area, erosional hot-spots, recent degradation or damage, or other issues and processes known to local experts.

If you complete the survey and would like to provide input on additional subregions, you can start the survey again from the beginning. If you do repeat the survey, you will not be able to view your previous responses. During analysis, we will only consider your most recent response for each subregion.

For more information, including example considerations for each IOC and supporting information for datasets presented in this survey, please download this PDF.

Note: This survey is not anonymous. You will be required to enter your contact information below. You may be contacted via this email address for further clarification of your responses.

The following table lists eight issues of concern in this subregion with the current level of concern, if previously evaluated, shown in parenthesis as **(red bold numbers)**.

Please indicate if you agree (A) with the current level of concern, if you do not have enough knowledge to evaluate (?) the current level of concern, or use the following scale to provide your level of concern regarding the issue:

0 = not at all concerned
1 = slightly concerned
2 = moderately concerned
3 = very concerned
4 = extremely concerned

	A	?	0	1	2	3	4
Altered, degraded, or lost habitat	○	○	○	○	○	○	○
Gulf beach erosion and dune degradation	○	○	○	○	○	○	○
Bay shoreline erosion	○	○	○	○	○	○	○
Existing and future coastal storm surge damage	○	○	○	○	○	○	○
Coastal flooding damage	○	○	○	○	○	○	○
Impact on water quality and quantity	○	○	○	○	○	○	○
Impact on coastal resources	○	○	○	○	○	○	○
Abandoned or derelict vessels, structures and debris	○	○	○	○	○	○	○

Q2. Please enter your contact information (required)

Name

Organization

Email address

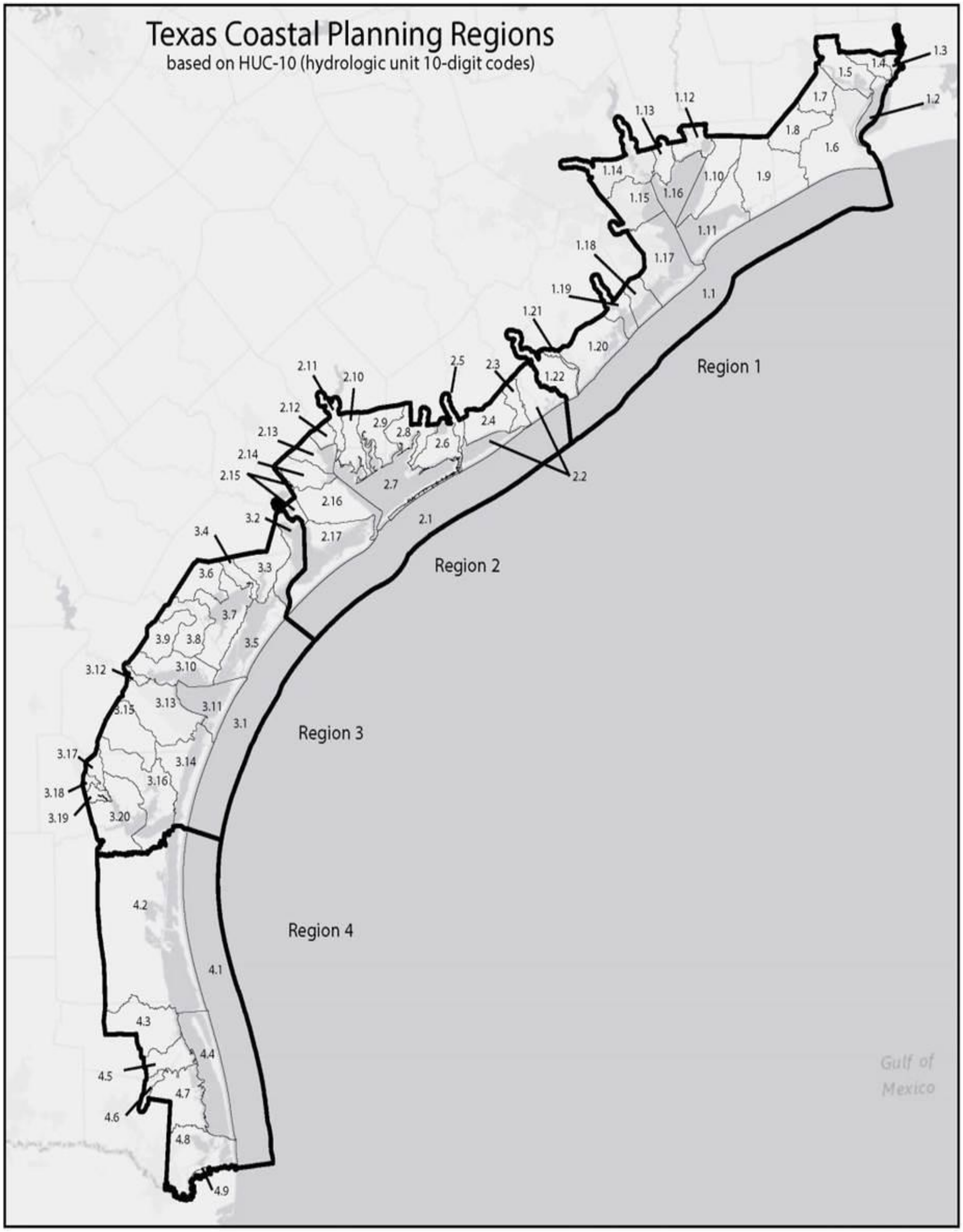
>>

Q3. Please select the subregions for which you can effectively evaluate the IOCs.

Please only select subregions you feel you have sufficient knowledge of to provide feedback regarding one or more of the following issues:

- Altered, degraded or lost habitat
- Gulf beach erosion and dune degradation
- Bay shoreline erosion
- Existing and future coastal storm surge damage
- Coastal flood damage
- Impacts on water quality and quantity
- Impacts on marine resources
- Abandoned or derelict vessels, structures and debris

To select a subregion please click on the subregion label to highlight the label green. If you would like to provide input on all the subregions within a region, please select the region label by clicking to highlight it green. After you make your selections click the next arrow to advance.



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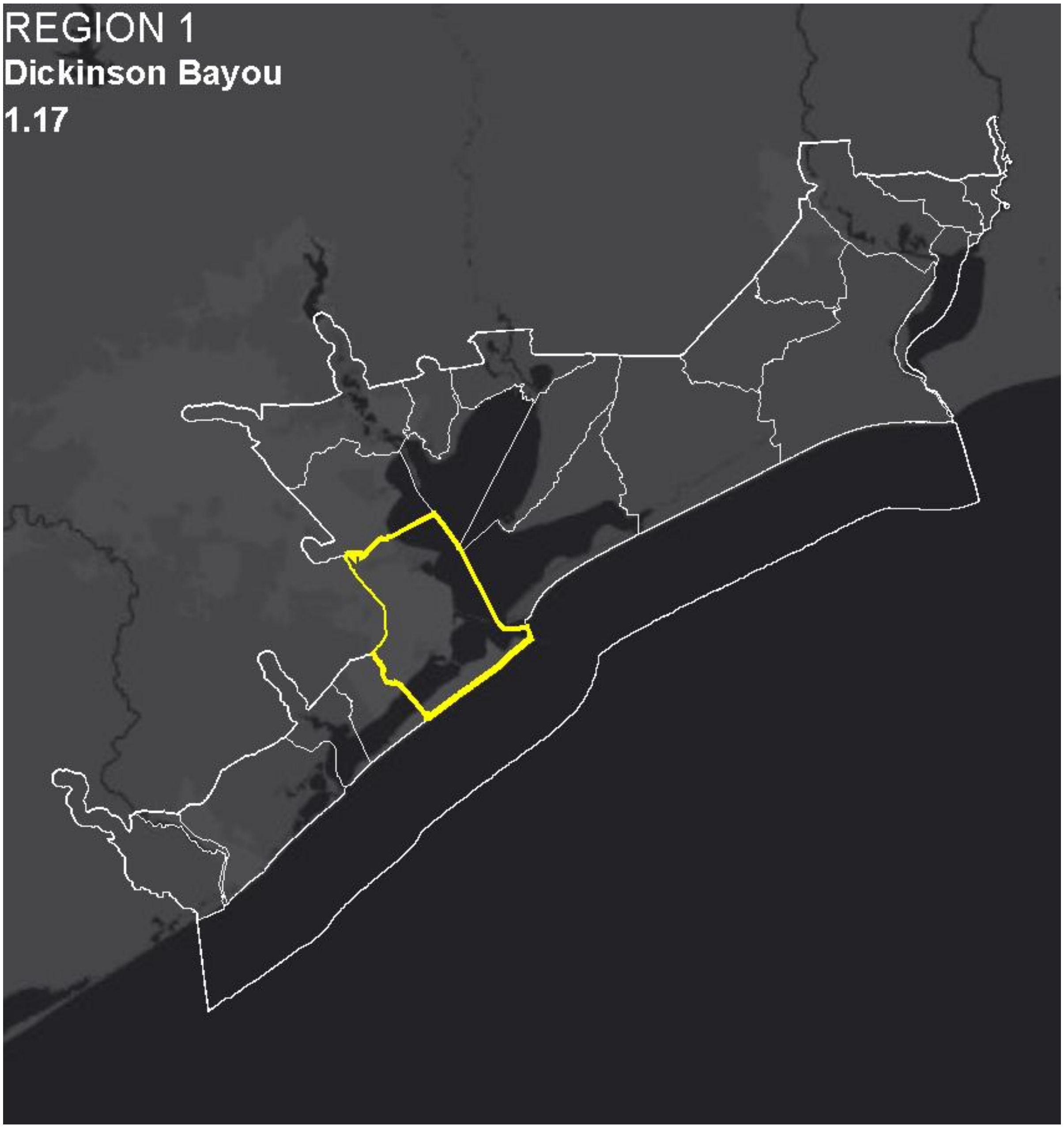
Q52. Subregion 1.17 Dickinson Bayou



- Includes Galveston Island from Bolivar Roads to just north of Jamaica Beach, excluding the Gulf-facing beaches and dunes
- Includes the Texas City dike and the Galveston Ship Channel from Bolivar Roads to Middle Pass
- Includes the southwestern portion of Galveston Bay and the eastern portion of West Bay
- Includes the cities of Galveston, Texas City, La Marque, and Dickinson
- Texas City houses one of the largest petrochemical refinery complexes in the United States

Maps and Data

Figure 1: Historical shoreline change rates where available and locations of armored shorelines overlaid on 2009 natural color aerial imagery. Shoreline change data from BEG, armored shoreline data from HRI ESI data.

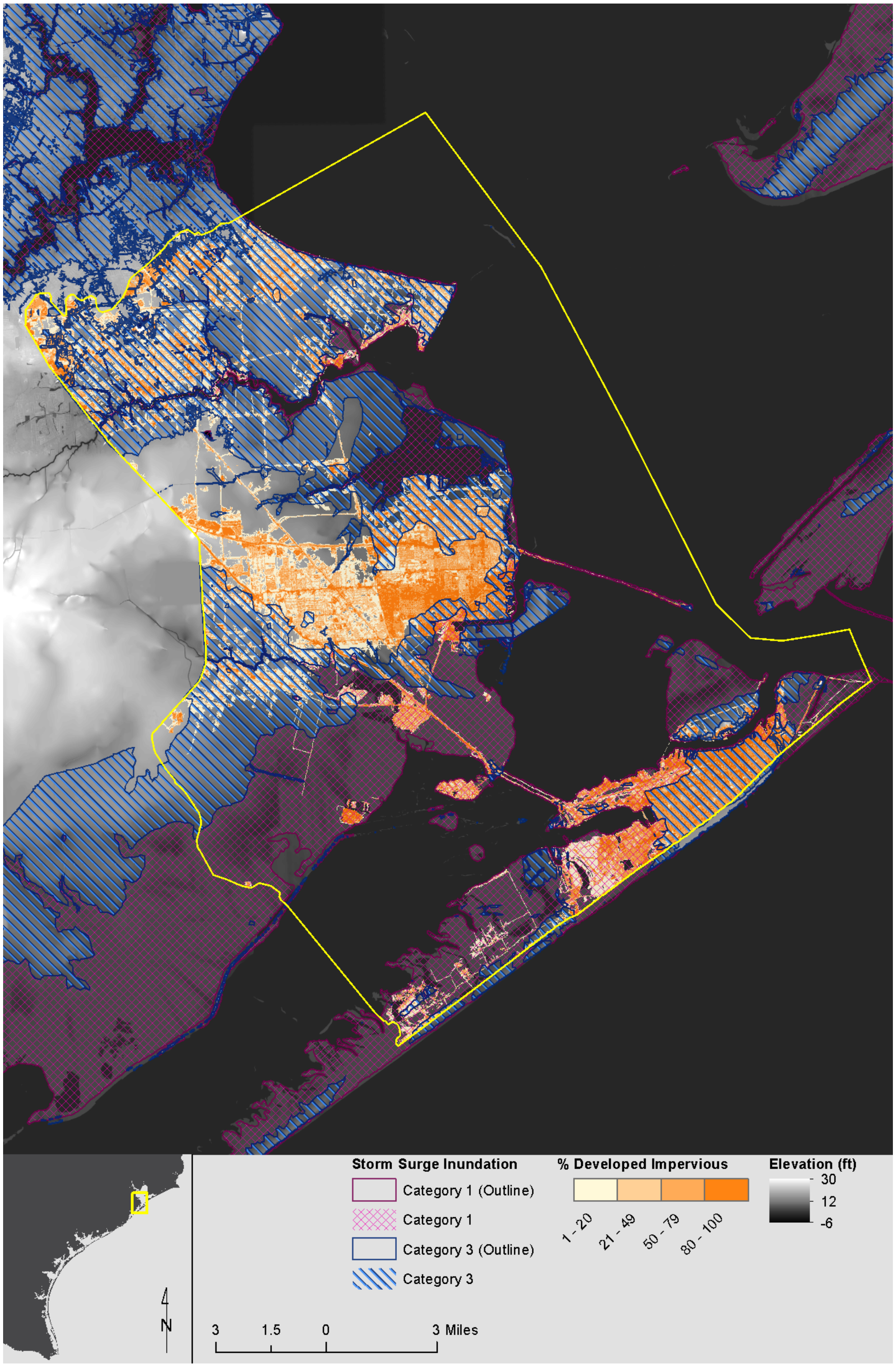


Figure 2: Percent of developed impervious cover shows open space (< 1% cover), developed open space (1-20% cover), low intensity development (21-49% cover), medium intensity development (50-79% cover) and high intensity development (80-100% cover) from C-CAP data. Inundation envelopes show the inland extent of storm surge from worst case scenarios for Category 1 and Category 3 hurricanes from SLOSH model output. Basemap is a Digital Elevation Model depicting land surface elevation in feet.

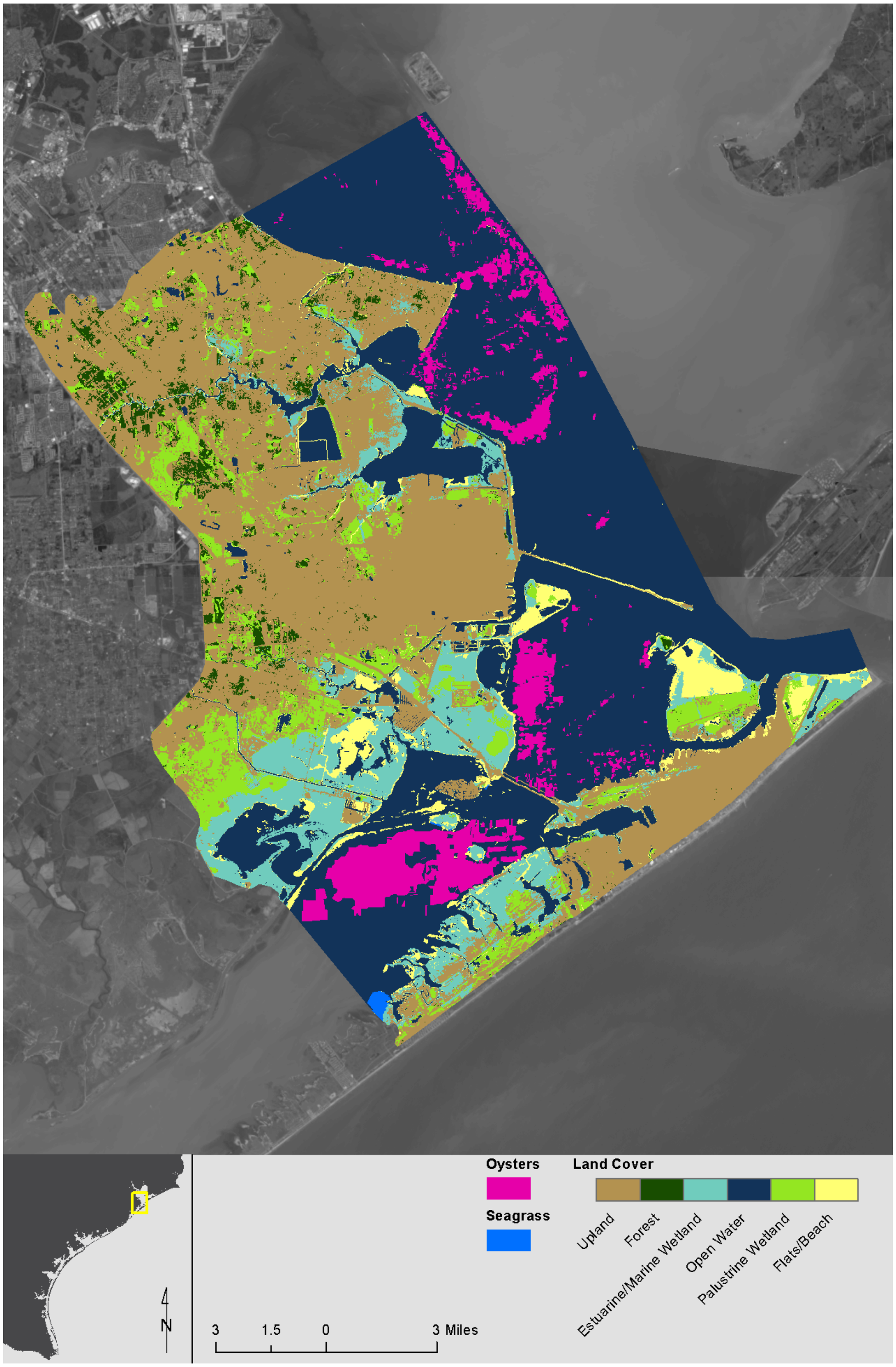


Figure 3: Coverage of marine, estuarine, palustrine, and upland environments from C-CAP, oysters compiled by HRI from multiple sources, and seagrass from NOAA and TPWD.

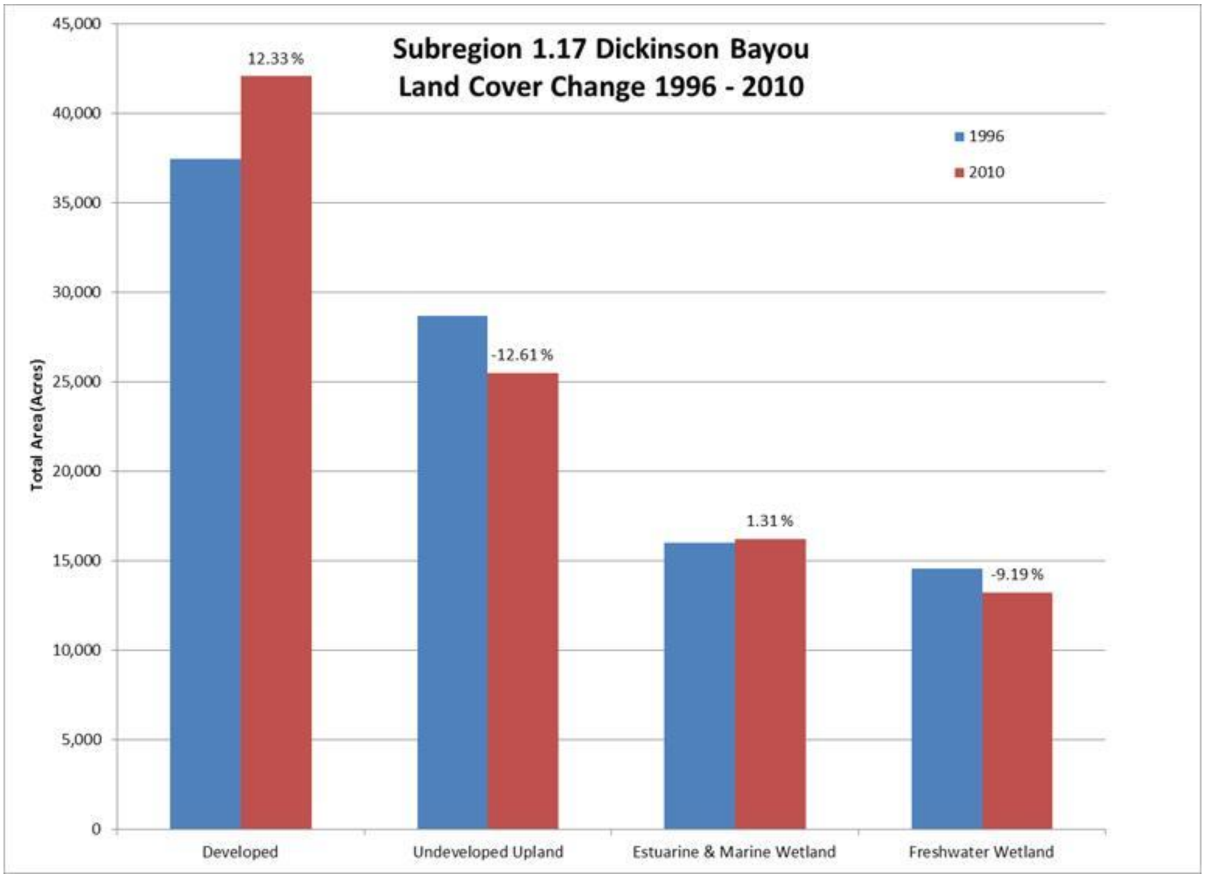


Figure 4: Total area (acres) for four land cover categories in the subregion in 1996 (blue bars) and 2010 (red bars). Percentages indicate the change in each land cover type from 1996-2010. Data from NOAA's Coastal Change Analysis Program (C-CAP) land cover database.

Table 1: Regional Ocean Economy Data for Region 1. NOAA Economics: National Ocean Watch (ENOW) data for 6 counties (Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange) located in Region 1. Data shown are from 2013. For more information on NOAA ENOW for 6 counties (Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange) located in Region 1. Data shown are from 2013. For more information on NOAA ENOW data, please see https://coast.noaa.gov/enowexplorer/#/employment/total/2013/48000.

REGION 1 (6 COUNTIES)					
Total Ocean Economy					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
152217	3775	$19,268,600,000	$126,586	$129,602,300,000	$851,431
Tourism and Recreation					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
21666	1051	$355,700,000	$16,417	$768,000,000	$35,447
Living Marine Resources					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
612	64	$13,900,000	$22,712	$39,600,000	$64,706
Marine Construction					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
3601	122	$265,200,000	$73,646	$550,600,000	$152,902
Offshore Mineral Extraction					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
98659	1966	$16,976,300,000	$172,070	$123,101,500,000	$1,247,747
Marine Transportation					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
18793	448	$1,028,100,000	$54,707	$2,157,900,000	$114,825
Ship and Boat Building					
Total Employment	Number of Establishments	Wages	Wages per Employee	Total GDP	GDP /employee
618	7	$39,000,000	$63,107	$100,700,000	$162,945

Q53. The following table lists eight issues of concern in this subregion with the current level of concern, if previously evaluated, shown in parenthesis as **(red bold numbers)**.

Please indicate if you agree (A) with the current level of concern, if you do not have enough knowledge to evaluate (?) the current level of concern, or use the following scale to provide your level of concern regarding the issue:

0 = not at all concerned
1 = slightly concerned
2 = moderately concerned
3 = very concerned
4 = extremely concerned

	A	?	0	1	2	3	4
Altered, degraded, or lost habitat (3.3)							
Gulf beach erosion and dune degradation (0.0)							
Bay shoreline erosion (3.1)							
Existing and future coastal storm surge damage (2.8)							
Coastal flood damage (2.8)							
Impact on water quality and quantity (2.7)							
Impact on coastal resources (2.8)							
Abandoned or derelict vessels, structures, and debris (1.1)							

Q54. Please provide any additional information to support the assessment of issues of concern in this subregion.

Issues of Concern Online Assessment Information Packet

The following information was provided as a companion document for TAC members completing the IOC online assessment.

Texas Coastal Resiliency Master Plan

Identifying Texas Coastal Issues of Concern

Frequently Asked Questions

What is the Texas Coastal Resiliency Master Plan?

Under development by the Texas General Land Office ("GLO"), the Texas Coastal Resiliency Master Plan ("Plan") is a long-term framework to mitigate damage from future coastal natural disasters, and to preserve and enhance the state's coastal resources. This Plan will be presented to the 85th Texas Legislature in 2017 to raise awareness of the state's coastal vulnerabilities from natural hazards and present possible solutions to these hazards.

This work builds on previous GLO coastal planning efforts, most notably work starting in 2012 to identify coastal priorities along the Texas coast. In this effort, a Technical Advisory Committee ("TAC") was formed to identify Issues of Concern ("IOCs") for coastal regions and evaluate potential solutions. Potential solutions were developed from a wide variety of information gathered through public comment, grant deliverables, projects collected from GLO partner assessments, plans, and reports, and recent projects submitted to the GLO. A summary document, "The Texas Coast: Shoring up our Future," was published in 2013.

What is the Technical Advisory Committee ("TAC")?

The TAC is a diverse group of professionals and subject matter experts in the broad field of coastal studies, with specific expertise in one or more regions of the Texas coast.

How were the Issues of Concern ("IOCs") developed?

Sixteen Issues of Concern ("IOCs") were developed during the 2012 GLO effort to identify Texas coastal needs. At that time, the TAC was asked to assess the level of concern for IOCs in 36 subregions along the Texas coast. For the current effort in 2016, the GLO streamlined the IOCs to a list of eight, to reflect issues most directly related to coastal resiliency.

Identified Issue of Concern	Example Considerations	
a. **Altered, Degraded or Lost Habitat**	• Seagrass • Mangroves • Coastal Marshes • Forested Wetlands	• Coastal Prairies • Invasive Species • Future Projections of Loss
b. **Gulf Beach Erosion & Dune Degradation**	• Subsidence • Sediment Deficit • Impacts from Development	• Storm Impacts • Erosion • Sea Level Rise
c. **Bay Shoreline Erosion**	• Subsidence • Sediment Deficit • Impacts from Development	• Storm Impacts • Erosion • Sea Level Rise
d. **Existing and Future Coastal Storm Surge Damage**	• Sea Level Rise • Coastal Storms • Impacts from Development	
e. **Coastal Flood Damage**	• Rainfall • Associated Riverine	• Nuisance Flooding • Impacts from Development
f. **Impact on Water Quality & Quantity**	• Freshwater Inflows • Nutrients • Water Pollution (Chemical) • Sediment • Saltwater Intrusion	• Nonpoint Source • Hydrologic Connectivity • Harmful Algal Blooms • Oil Spills
g. **Impact on Coastal Resources**	• Oysters • Turtles • Birds	• Fish • Crabs • Endangered Species
h. **Abandoned or Derelict Vessels, Structures, and Debris**	• Obstructions to Public's Easement • Abandoned Oil and Gas Wells • Abandoned Boats	• Dock Pilings • Post Storm Cleanup • Obstacles • Plastics, Glass, Rubber, Metal

How were the levels of concern determined for IOCs?

In 2012, the TAC was asked to assess their level of concern for sixteen IOCs across 36 subregions on a scale from zero (no concern) to four (extremely concerned). All TAC members' responses were averaged for each IOC within each subregion to obtain the level of concern (i.e. IOC score). For the current 2016 effort, the IOC scores for the 2012 subregions were applied to the subregions delineated in 2016 in areas where the two sets of subregions coincided. If there was no 2012 subregion to intersect a 2016 subregion, no IOC scores were applied.

One of the first steps in the 2016 process is to have the TAC help us determine levels of concern for IOCs in subregions that have not yet been assessed and verify the levels of concern for IOCs in the subregions that have been assessed.

How were the subregions delineated?

One of the lessons learned from the 2012 effort was that the subregions should be ecologically meaningful, based on units with readily available boundary data, and be applicable along the entire Texas coast. After considering many different ways to divide the Texas coast, it was decided that watershed boundaries fit these requirements. For the most part, the subregions are based on the USGS Watershed Boundary Dataset (10 digit Hydrologic Unit Codes). Gulf-facing beaches and dunes are the exception. For Gulf-facing beaches and dunes, a line was drawn 1,000 ft landward and parallel to the shoreline to encompass the foredune complex and the entire Gulf-facing beach in each subregion. Gulf-facing subregions extend to the Gulfward boundary of the state, three leagues (10.35 miles) out into the Gulf of Mexico.

Where did the underlying data for IOC survey come from?

Another lesson learned from the 2012 effort was that the TAC could use more information when assessing the Issues of Concern in each subregion. We have produced several maps and graphs in order to provide more subregion information to the TAC in 2016. For each subregion, four maps, one chart, and one table were produced.

Location map

The location map serves to show the location of the selected subregion within the larger region. The basemap is the standard dark grey basemap from ESRI.

Figure 1, Shorelines

This map shows historical shoreline change rates where available and armored shorelines overlaid on 2009 natural color aerial imagery. Bay and Gulf shoreline change data comes from the University of Texas Bureau of Economic Geology and armored shorelines are from Environmental Sensitivity Index data developed by Harte Research Institute.

Figure 2, Storm Surge and Human Development

This map shows potential inundation from worst case scenario (direct hit, high tide) Category 1 and Category 3 hurricanes, along with developed lands. Storm surge inundation model results are from NOAA's [Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model] outputs. The SLOSH product used in this map is known as the MOM ([more detailed information can be found here]) which is the maximum level of possible inundation generated by running SLOSH several thousand times with hypothetical hurricanes under a variety of different storm conditions. SLOSH MOMs are used nationwide in emergency management to develop evacuation zones for hurricane preparedness.

Developed lands are derived from percent impervious data from NOAA's Coastal Change Analysis Program (C-CAP) Land Cover Atlas. The basemap is a Digital Elevation Model depicting land surface elevation in feet.

Figure 3, Land Cover and Habitats

This map shows the coverage of marine, estuarine, palustrine, and upland environments from C-CAP, oyster reef locations compiled by HRI from multiple sources, and seagrass from NOAA and TPWD. The basemap is black and white aerial imagery. C-CAP land cover classes were generalized according to the following table:

Land Cover Class	C-CAP Land Cover Categories Included	
Upland	• Bare Land • Cultivated Crops • Developed, High Intensity • Developed, Medium Intensity	• Developed, Low Intensity • Developed, Open Space • Grassland/Herbaceous • Pasture/Hay • Scrub/Shrub
Forest	• Deciduous Forest • Evergreen Forest • Mixed Forest	
Estuarine and Marine Wetland	• Estuarine Emergent Wetland • Estuarine Forested Wetland • Estuarine Scrub/Shrub Wetland	
Freshwater Wetland	• Palustrine Emergent Wetland • Palustrine Forested Wetland • Palustrine Scrub/Shrub Wetland	
Flats and Beaches	• Unconsolidated Shore	
Open Water	• Open Water	

Figure 4, Land Cover Change

This bar chart shows the total area (acres) and percent change for four broad land cover categories in the subregion in 1996 and 2010. Data is taken from C-CAP, and land cover classes were generalized according to the table above.

Table 1, Regional Ocean Economy Data

This table shows dollar amounts, number of establishments, and number of employees related to different sectors of the ocean economy. Data is taken from NOAA Economics: National Ocean Watch (ENOW) by county. Data for all counties within a single region were aggregated to show totals on a region-wide level. For more information on NOAA ENOW data, please see the FAQ sheet here, and explore the data here.

What if I completed the survey but want to change my answers or provide information for additional subregions?

You can always go back to the survey link in your email and complete the survey again. Please be sure to provide the same name and email address each time you complete the survey. For each IOC in each subregion, only the MOST RECENT answers will be analyzed. If you go complete the survey multiple times for a single subregion, the newest answer will supersede the older answer. If you complete the survey for new subregions, both sets of responses will be saved. If you would like to provide more clarification regarding your responses, you can always let us know in the comment box within the survey or contact Luz.Lumb@tamucc.edu.

What can I expect next?

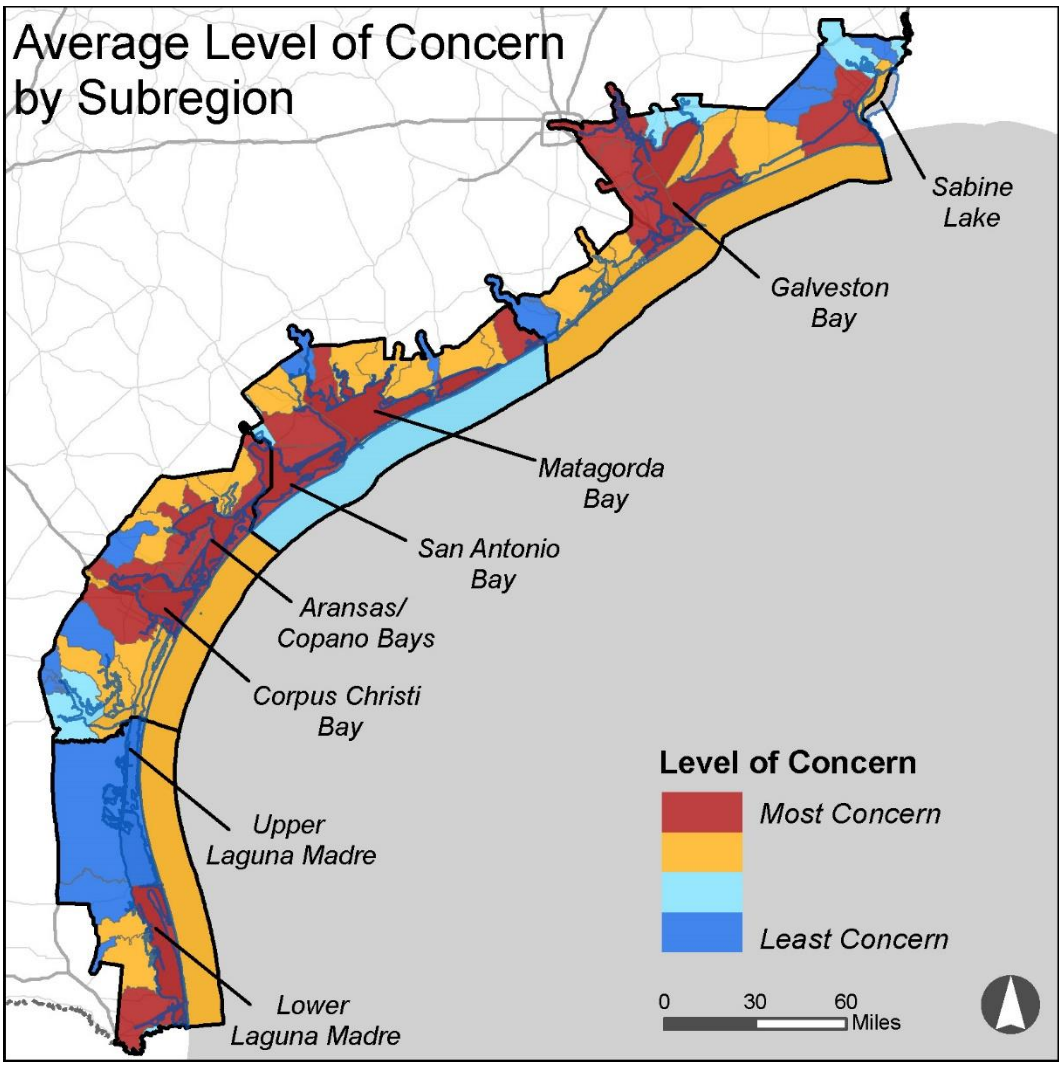
After all the responses are collected and analyzed, HRI will develop new scores for each Issue of Concern within each subregion. During face-to-face TAC meetings in July, we will present these results and the TAC will be given another opportunity to provide input on IOCs. At that time, the TAC will also be asked to evaluate potential solutions to IOCs for each subregion along the Texas coast.

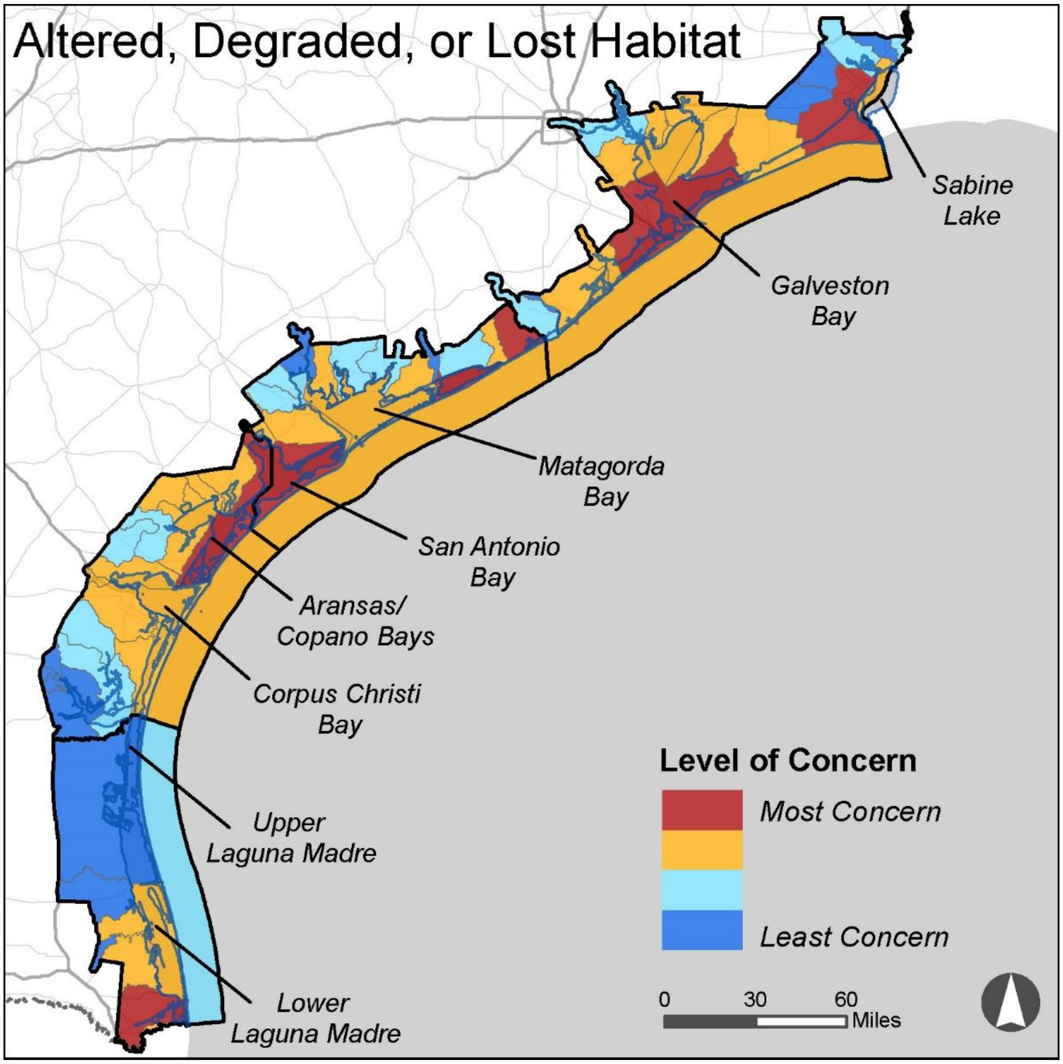
Whom can I contact for more information?

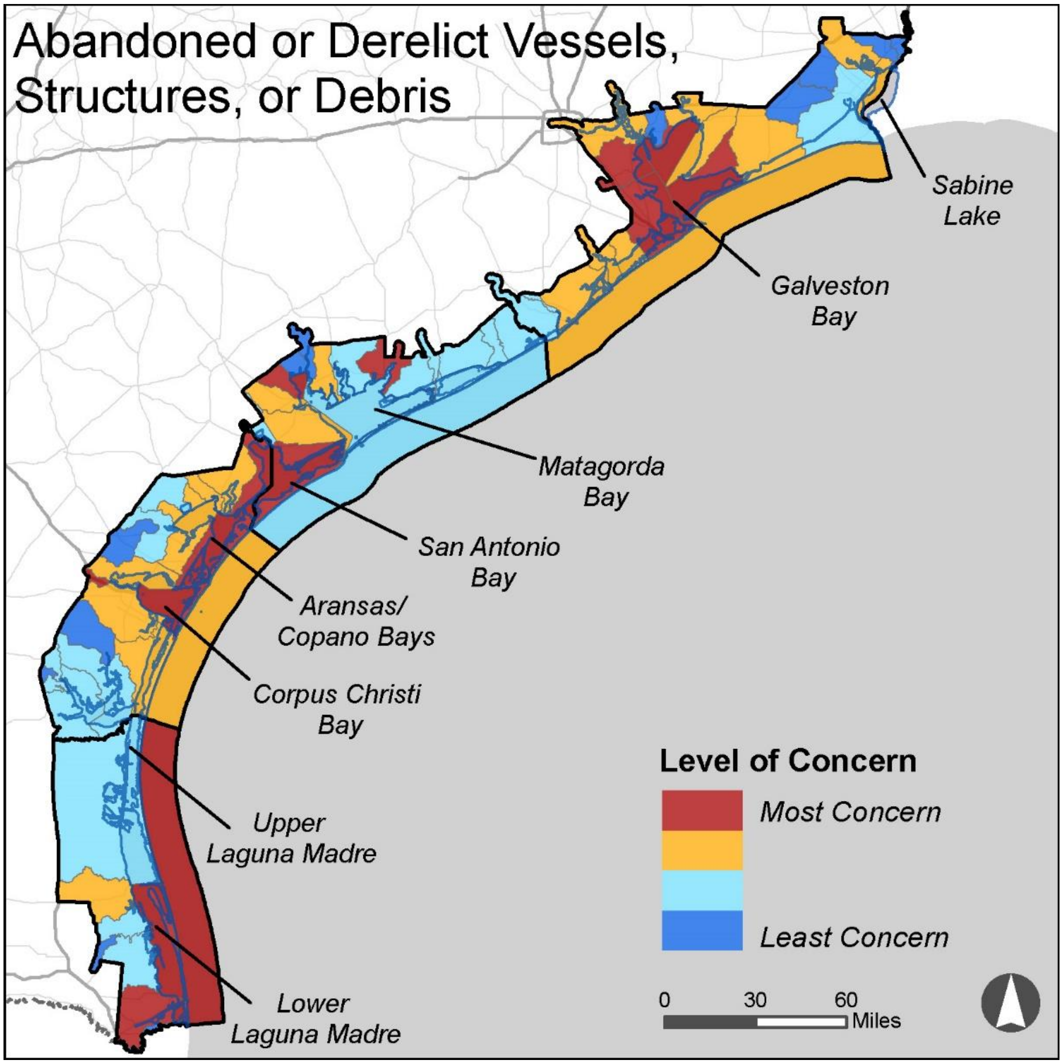
For any questions regarding the IOC survey, please contact Luz Lumb at the Harte Research Institute. Luz.lumb@tamucc.edu, 361-825-3681

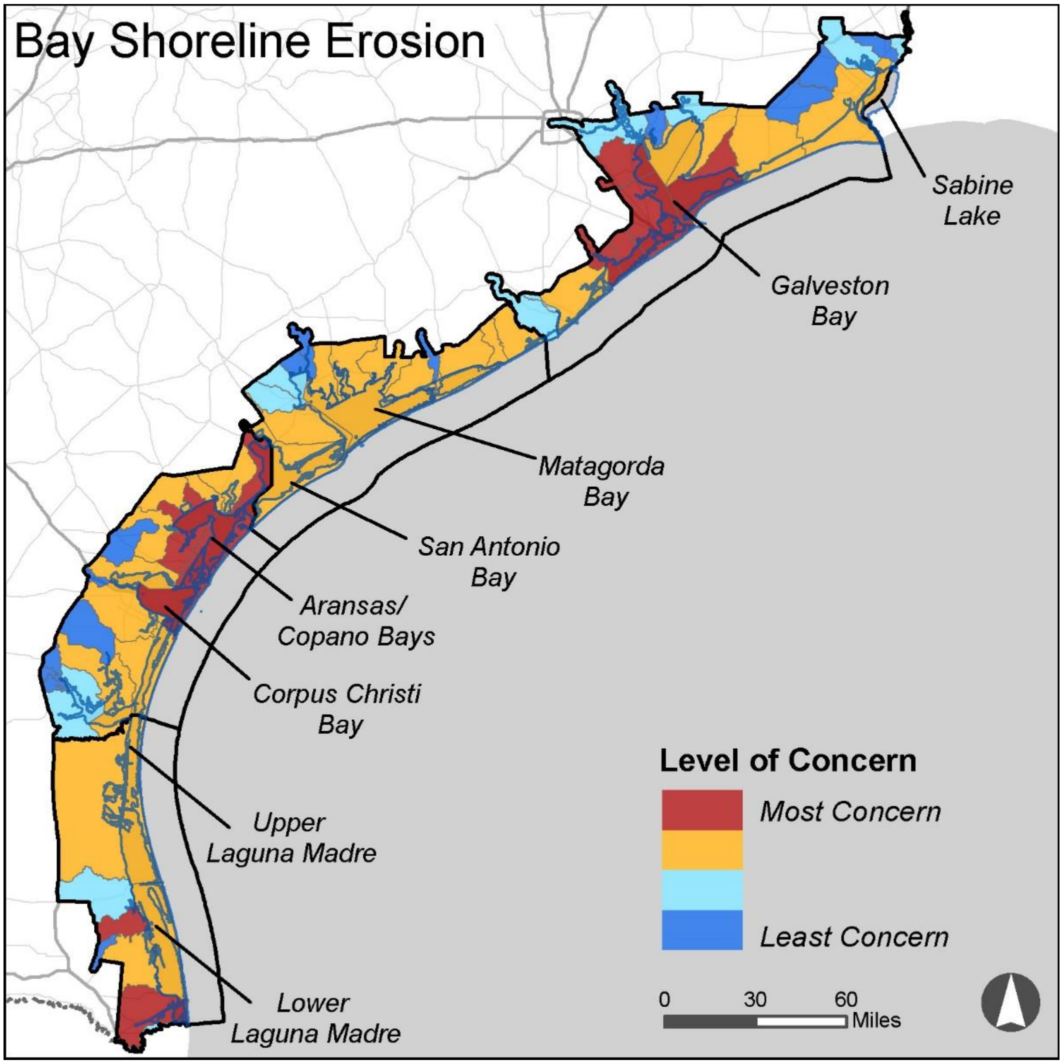
Issues of Concern Results (Maps)

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.

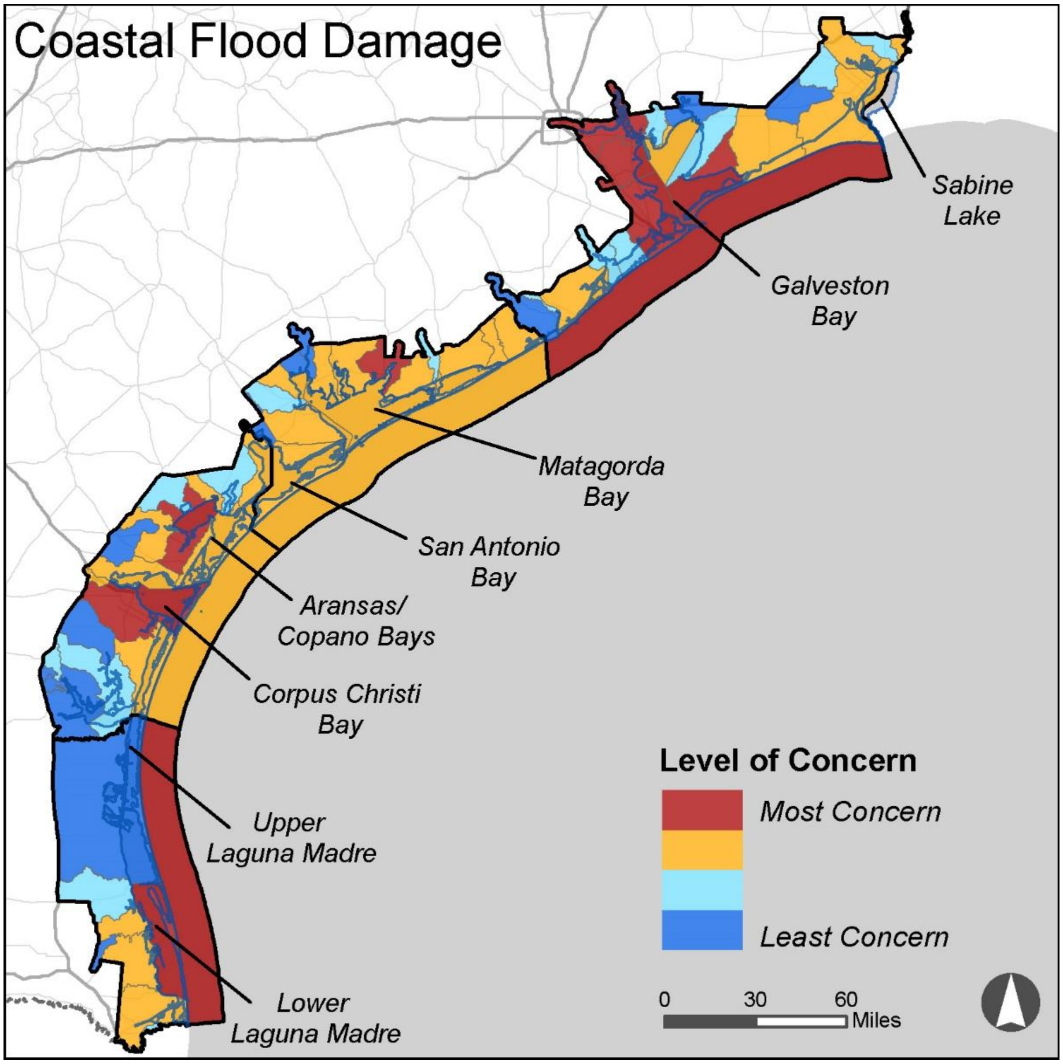


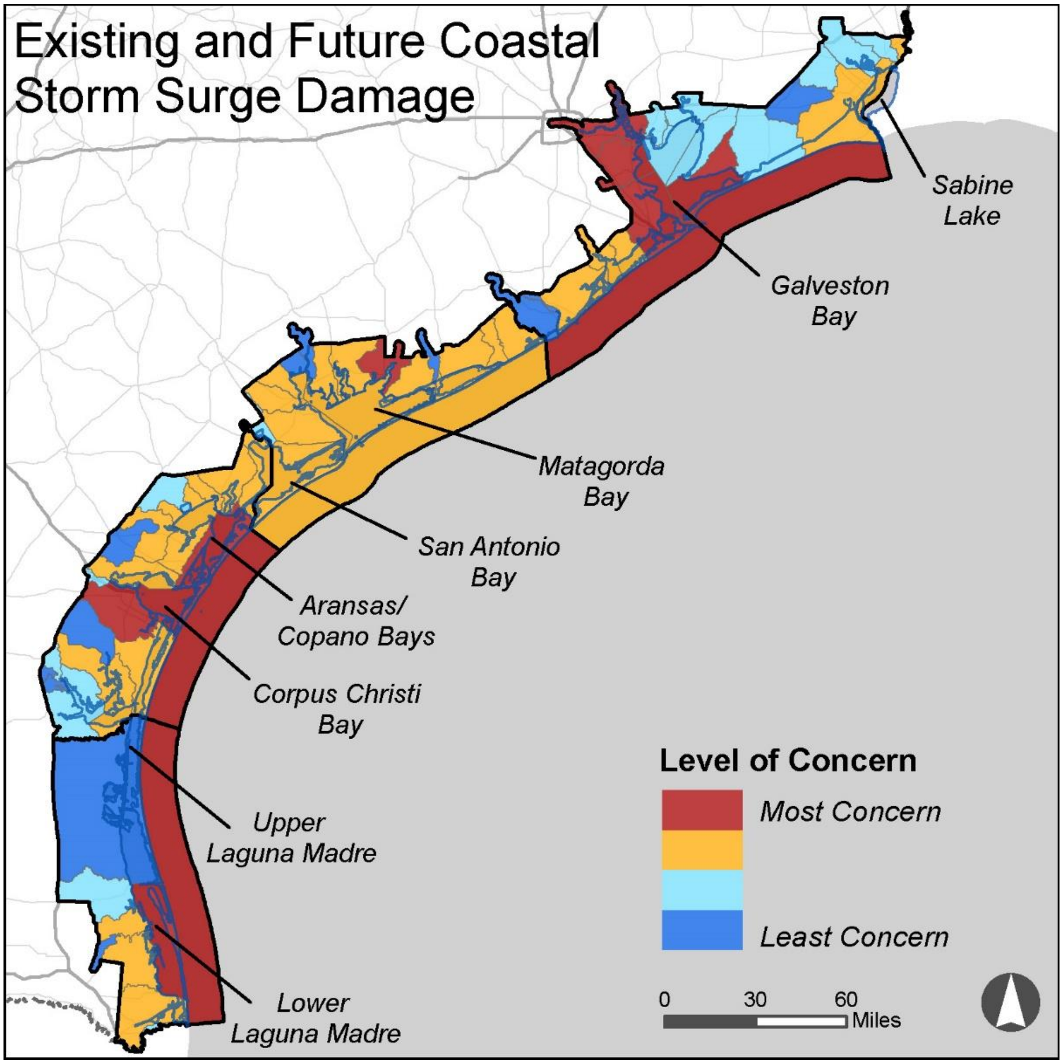

Altered, Degraded, or Lost Habitat
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0 30 60 Miles

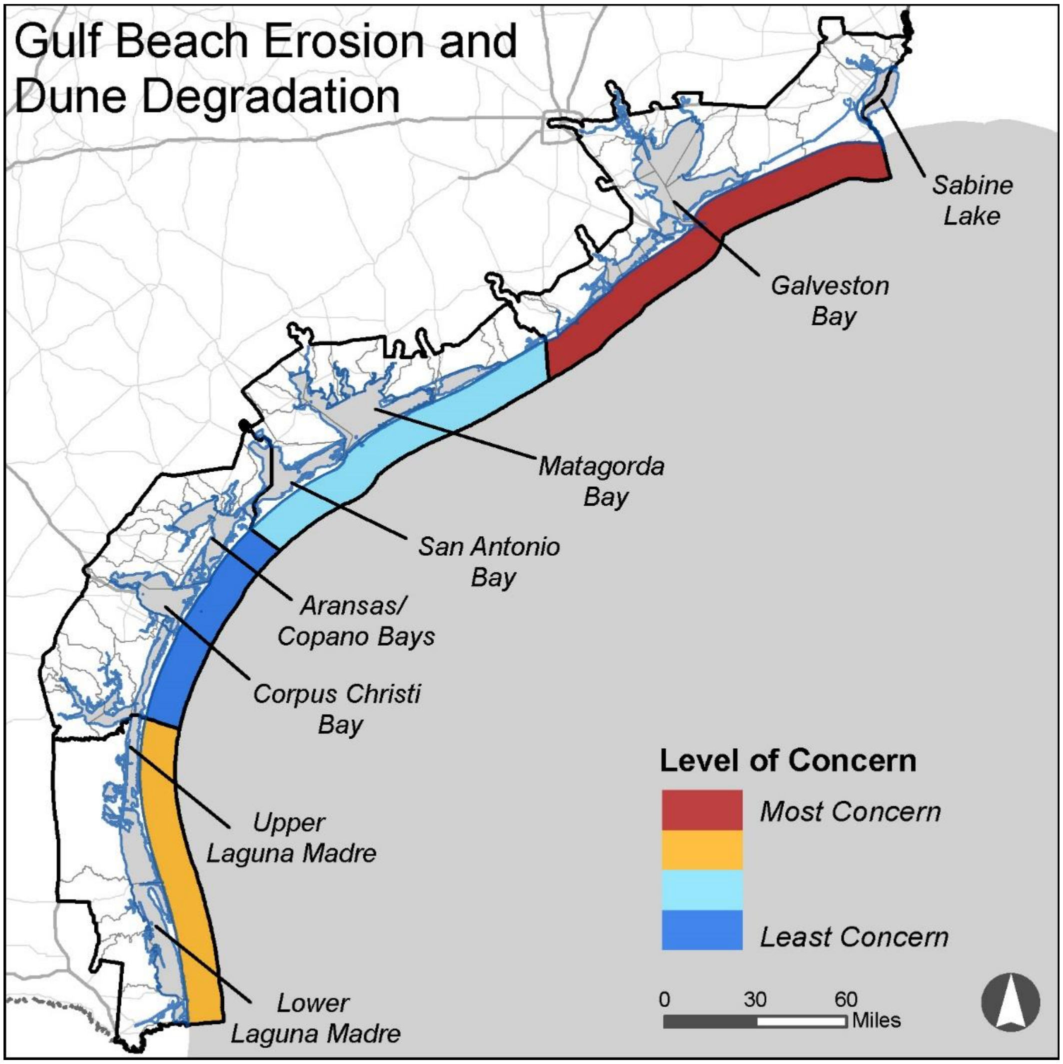

Abandoned or Derelict Vessels, Structures, or Debris
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles

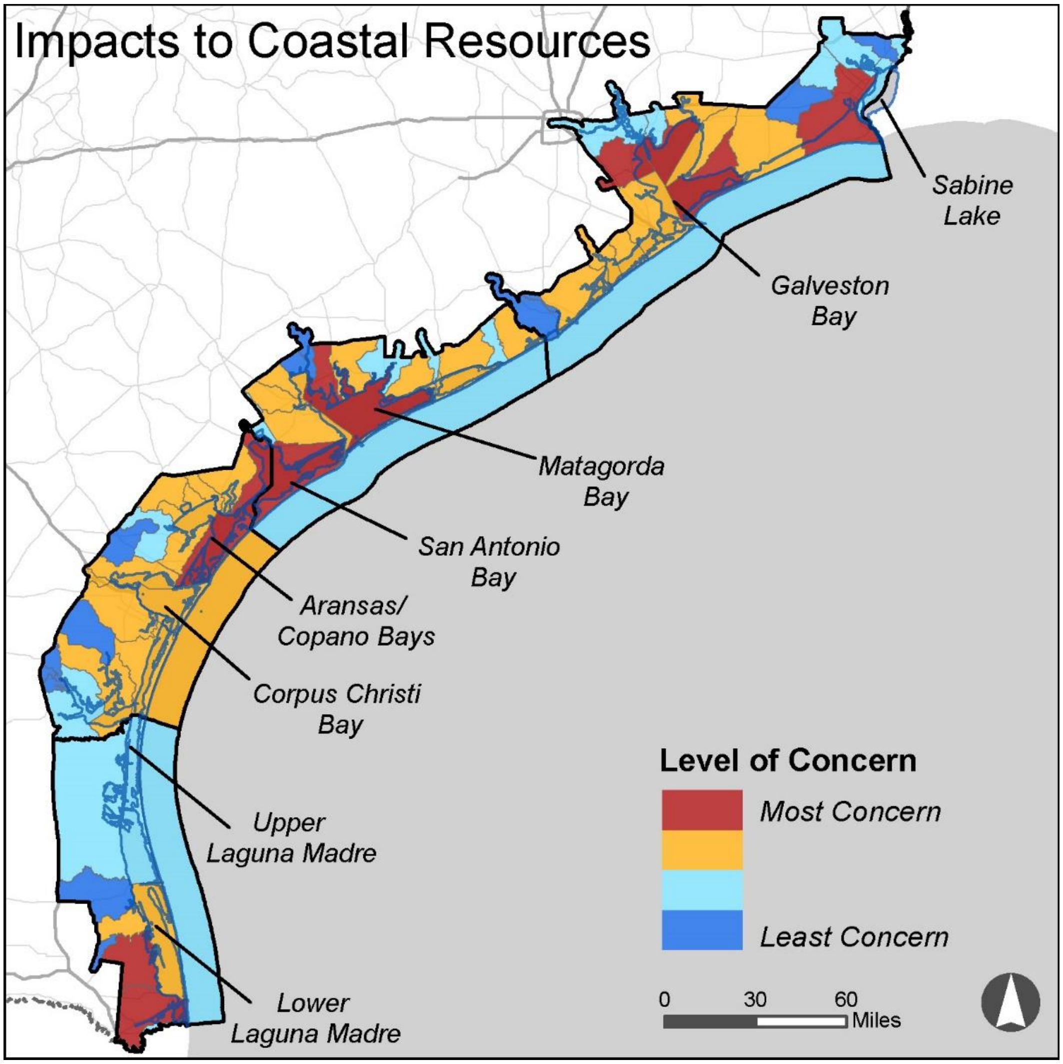


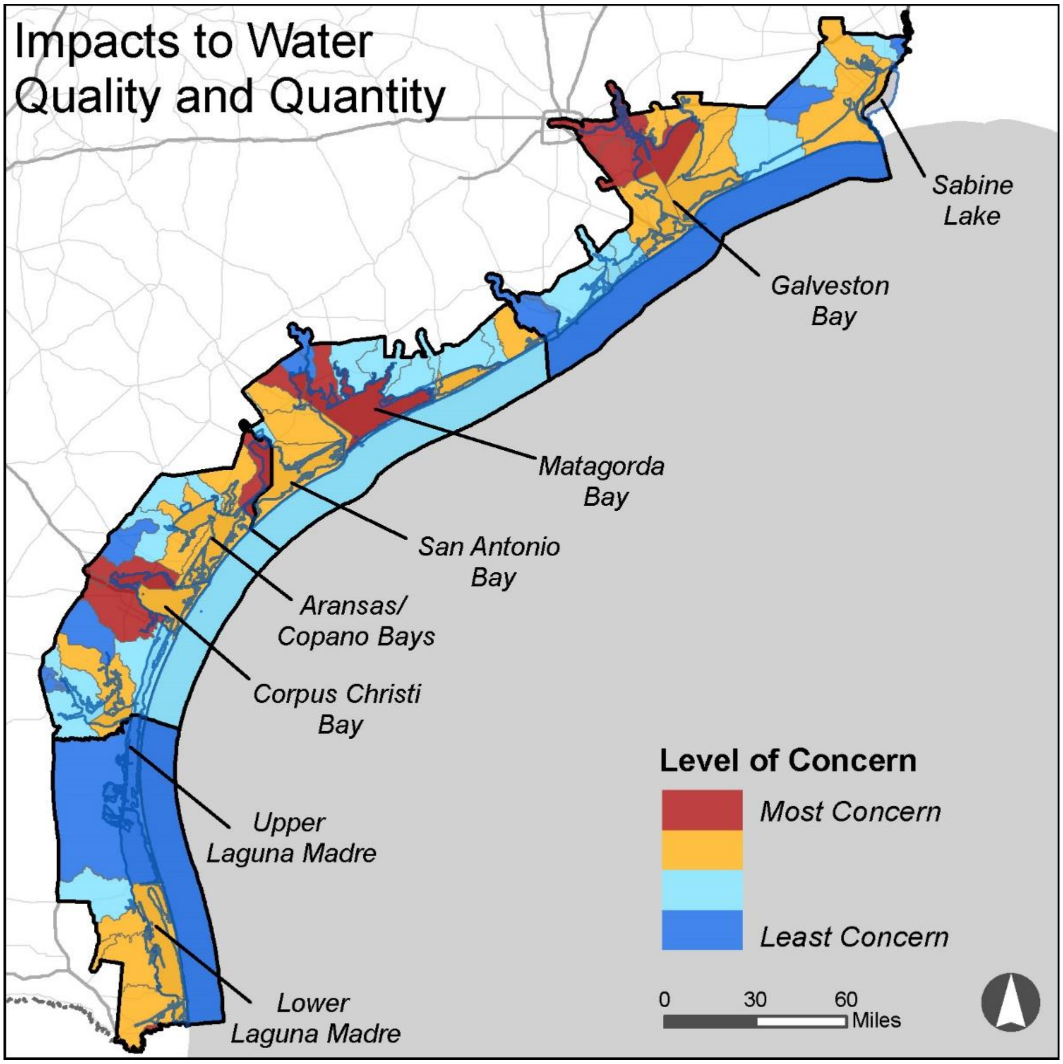
Bay Shoreline Erosion
Sabine Lake
Galveston Bay
Matagorda Bay
San Antonio Bay
Aransas/ Copano Bays
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Level of Concern
Most Concern
Least Concern
0
30
60
Miles


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

Issues of Concern Results (Tabular)

Average scores for TAC member responses to the online survey for IOCs by subregion.

Score Breakdown
0-1
1-2
2-3
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

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
	1.19	3.26		2.85	2.78	2.52	2.39	2.70	1.10
	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

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		ADL H	GBED D	BSE	EFCSS D	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
	1.11	1.10		1.16	1.05	1.08	0.18	1.50	1.31	1.76

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
	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
R2	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
	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
	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	-	-1.44	-2.51	-1.35	-4.61

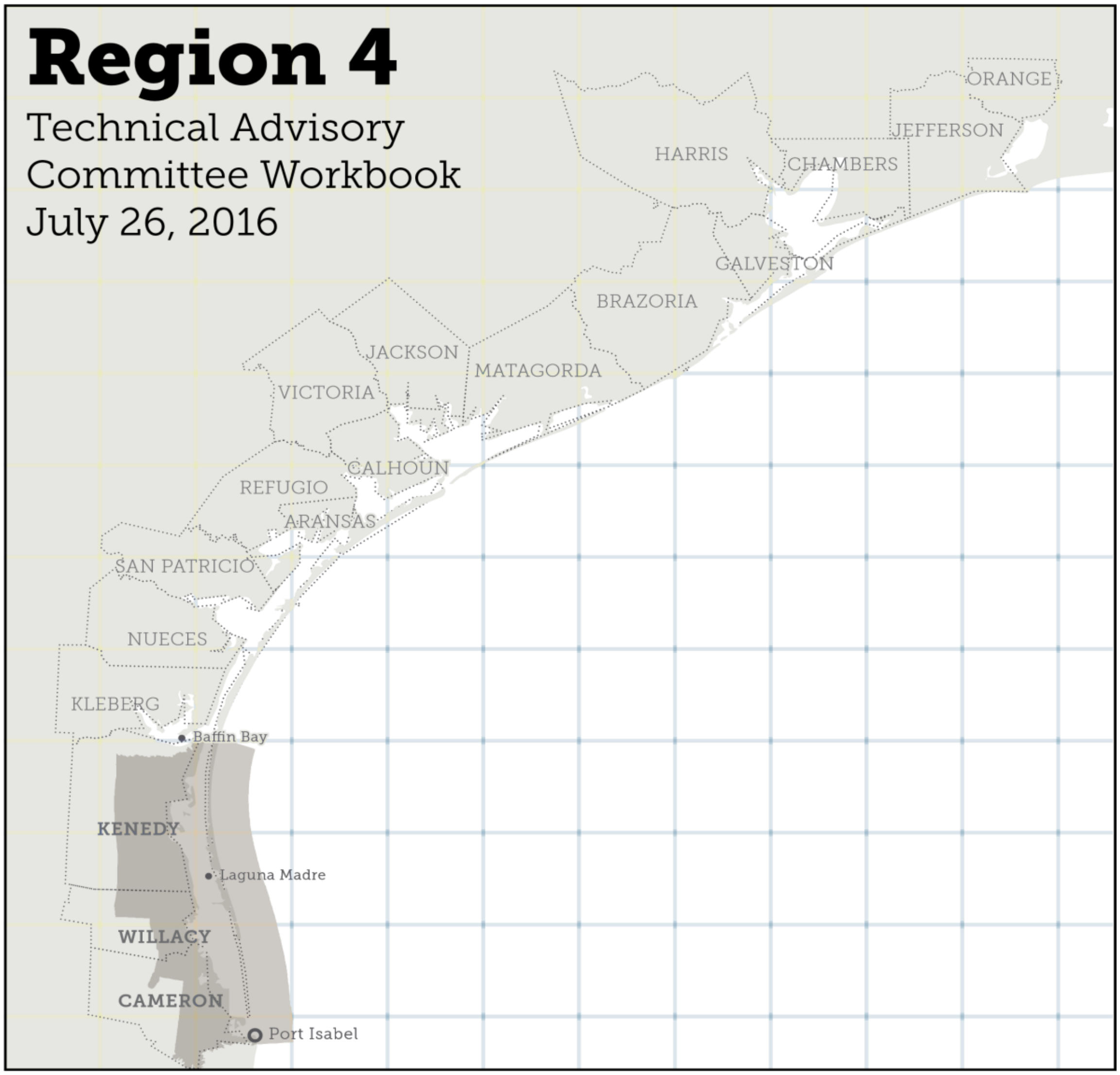
Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
						2.87				
	2.12	-1.45		-1.33	-2.34	-1.83	-2.04	-1.41	-1.52	-3.77
	2.13	-0.02		-0.04	0.12	0.54	1.31	0.57	2.21	0.85
	2.14	-0.25		-0.07	0.12	-0.33	0.86	0.59	0.46	0.30
	2.15	0.60		0.60	-0.92	-1.02	-0.39	-0.19	-0.67	-0.51
	2.16	0.31		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
	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
R3	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
	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

Subregion		ADLH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD	Overall (no ADVSD)
	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
R4	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
	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

WORKBOOK EXAMPLE

What follows is the introductory portion of the workbook used to solicit TAC feedback on potential projects at the Region 4 TAC meeting, as well as several example projects. Supplementary regional Information Packets distributed for Regions 1 to 4 are provided at the end of this appendix.

Texas General Land Office



Would you like your workbook mailed back to you?

Please write down your name and mailing address.

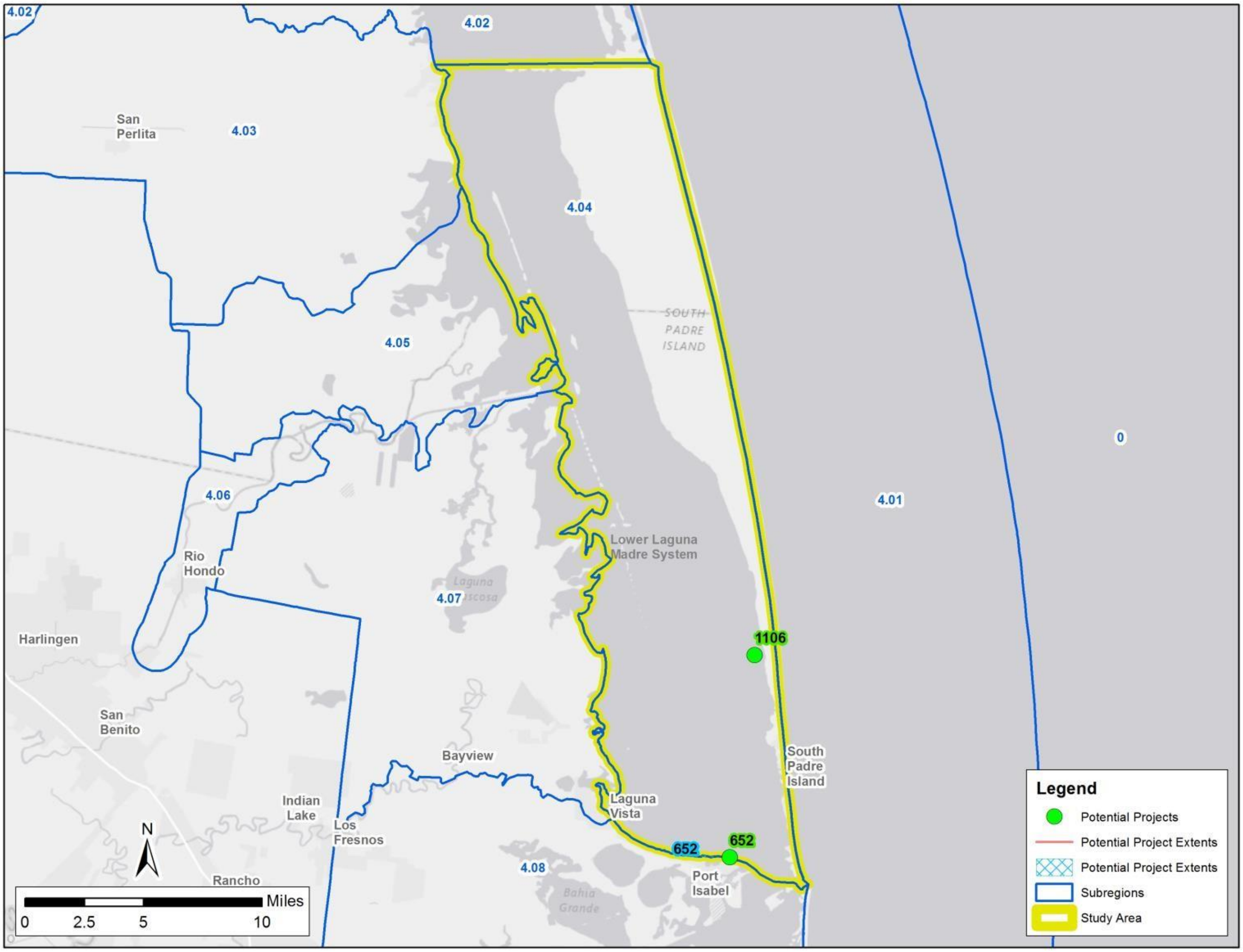
Name:
Address:

Region 4 Technical Advisory Committee Workbook

Table of Contents

Study Area #4: Lower Laguna Madre Area

Subregion 4.04



Issues of Concern – Average TAC Scores by Subregion

Subregion Number	Subregion Name	ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
4.04	Lower Laguna Madre		N/A						

Subregion 4.04

Study Area #4: Lower Laguna Madre Area

Project ID	Project Name	Project Subtype (Type)	Description
652	Port Isabel Ecological Restoration Program	Marsh (Habitat Creation & Restoration) Birds (Wildlife) Other (Public Access & Improvements) Program (Studies, Policies & Programs)	The USACE currently assists the City of Port Isabel with dredging of the GIWW; however, additional dredging is required in other areas in the Laguna Madre, resulting in the need to identify other sedimentation management solutions and beneficial uses for the dredged material. Funding for this program would: implement the beneficial use of dredged material for the creation of bird habitat, convert an existing USACE placement area into an ecological park, construct a living shoreline, and enhance public access beneath the Queen Isabella Causeway.

Please fill in the issue boxes below with the corresponding level of benefit achieved by this project.

0 – no benefit 1 – slight benefit 2 - medium benefit 3 - high benefit 4 - essential

ALDH	BSE	EFCSSD	CFD	IWQQ	ICR	Would you consider this project a priority for coastal resiliency? (Y/N)

What is the feasibility of executing this project?

0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Additional information (for example, additional project details, known impediments to implementing this project, ways the project could be improved)?

Subregion 4.04

Study Area #4: Lower Laguna Madre Area

Project ID	Project Name	Project Subtype (Type)	Description
1106	Cameron County Living Coastline	Misc. Wave Break (Shoreline Stabilization) Marsh (Habitat Creation & Restoration)	This project would develop a living coastline constructed from natural, regional materials such as rock and seagrass to stabilize the Laguna Madre shoreline and reduce the risk of dune washout.

Please fill in the issue boxes below with the corresponding level of benefit achieved by this project.

0 – no benefit 1 – slight benefit 2 - medium benefit 3 - high benefit 4 - essential

ALDH	GBEDD	EFCSSD	CFD	IWQQ	ICR	Would you consider this project a priority for coastal resiliency? (Y/N)

What is the feasibility of executing this project?

0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Additional information (for example, additional project details, known impediments to implementing this project, ways the project could be improved)?

Gap Analysis Form

The following form was used to solicit any additional potential projects for consideration for inclusion in the Plan.

Gap Analysis – Project Submission

Place Number Here

PROPOSED PROJECT

Project Name	
Location*	
Description & Purpose	

CONTACT INFORMATION

Name	**Affiliation**

E-mail	Phone

*Please use the map provided on the back of this card to indicate an approximate location for this project.

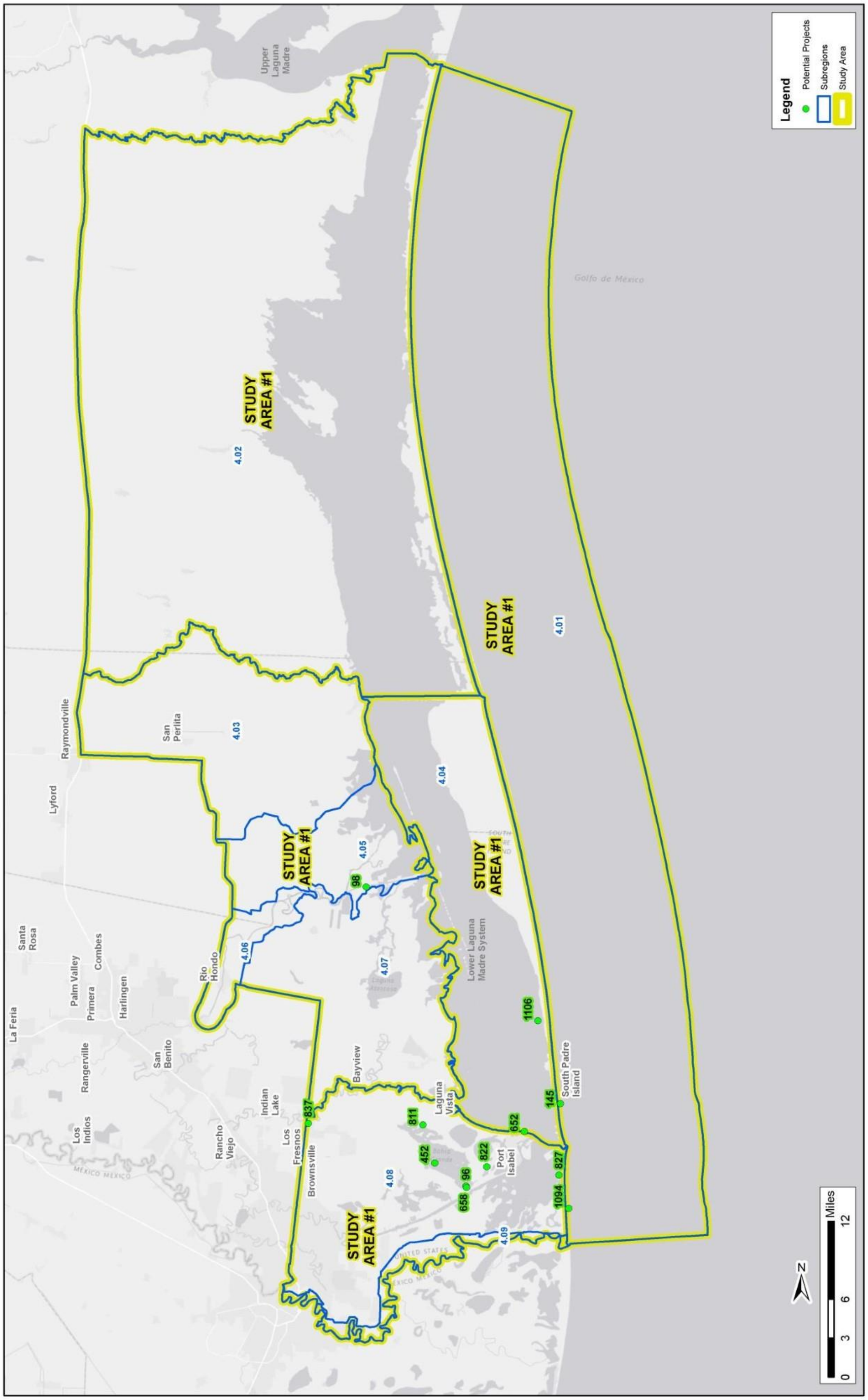
PROJECT TYPE(S)

- ☐ *Land Acquisitions*
- ☐ *Public Access & Improvements*
- ☐ *Studies, Policies & Programs*
- ☐ *Shoreline Stabilization*
- ☐ *Flood Risk Reduction*
- ☐ *Structure / Debris Removal*
- ☐ *Habitat Creation & Restoration*
- ☐ *Wildlife*
- ☐ *Environmental*
- ☐ *Beach Nourishment*
- ☐ *Dune Restoration*

ISSUE(S) OF CONCERN ADDRESSED

- ☐ *Altered, Lost, or Degraded Habitat*
- ☐ *Gulf Beach Erosion and Dune Degradation*
- ☐ *Bay Shoreline Erosion*
- ☐ *Existing and Future Coastal Storm Surge Damage*
- ☐ *Coastal Flood Damage*
- ☐ *Impacts on Water Quality and Quantity*
- ☐ *Impacts on Coastal Resources*
- ☐ *Abandoned or Derelict Vessels, Structures, and Debris*

Region 4 Overview

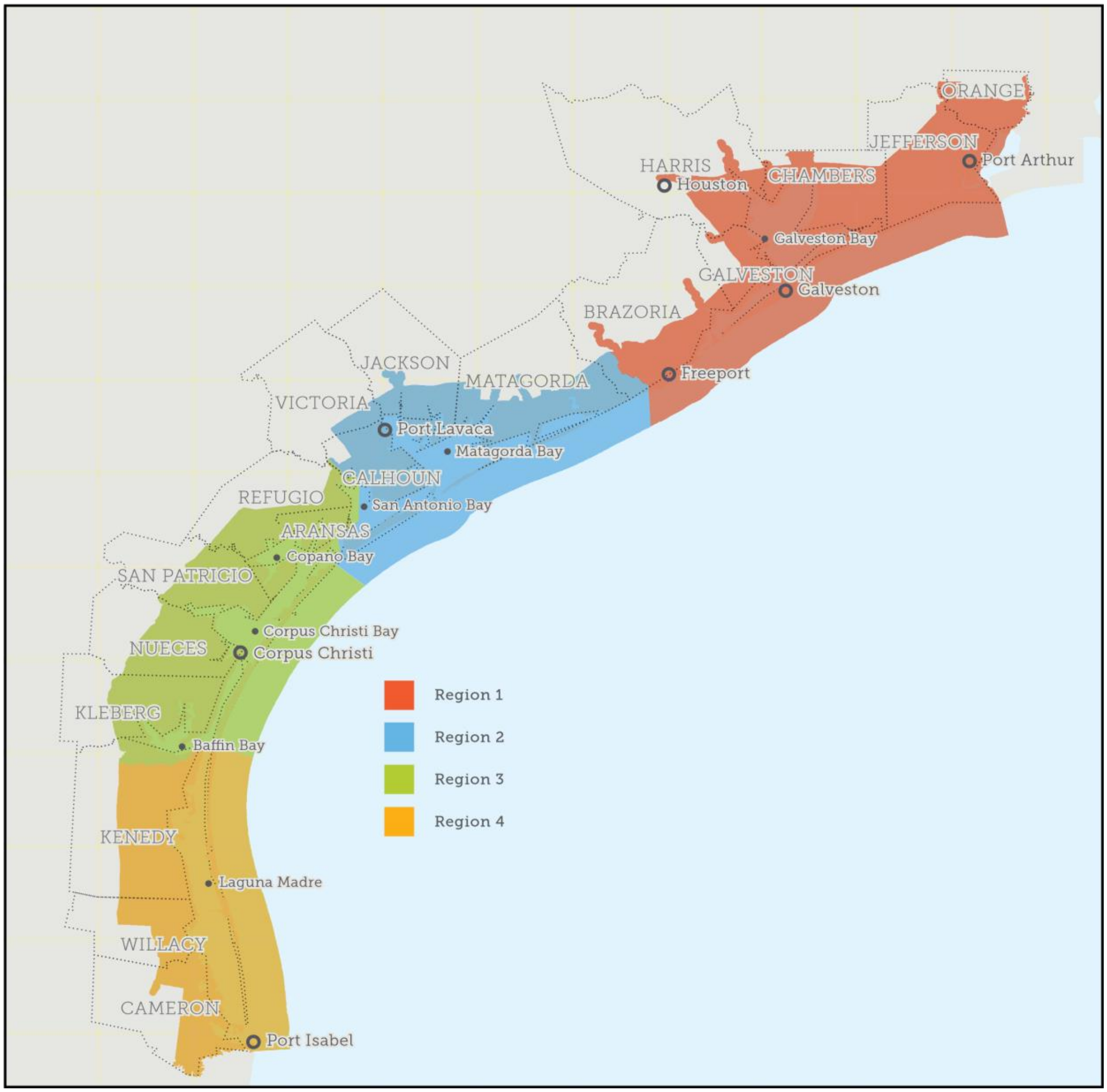


Gap Analysis Survey

What follows is the introductory portion of the Online Gap Analysis Survey, as well as a few example projects from Region 1.

Texas General Land Office

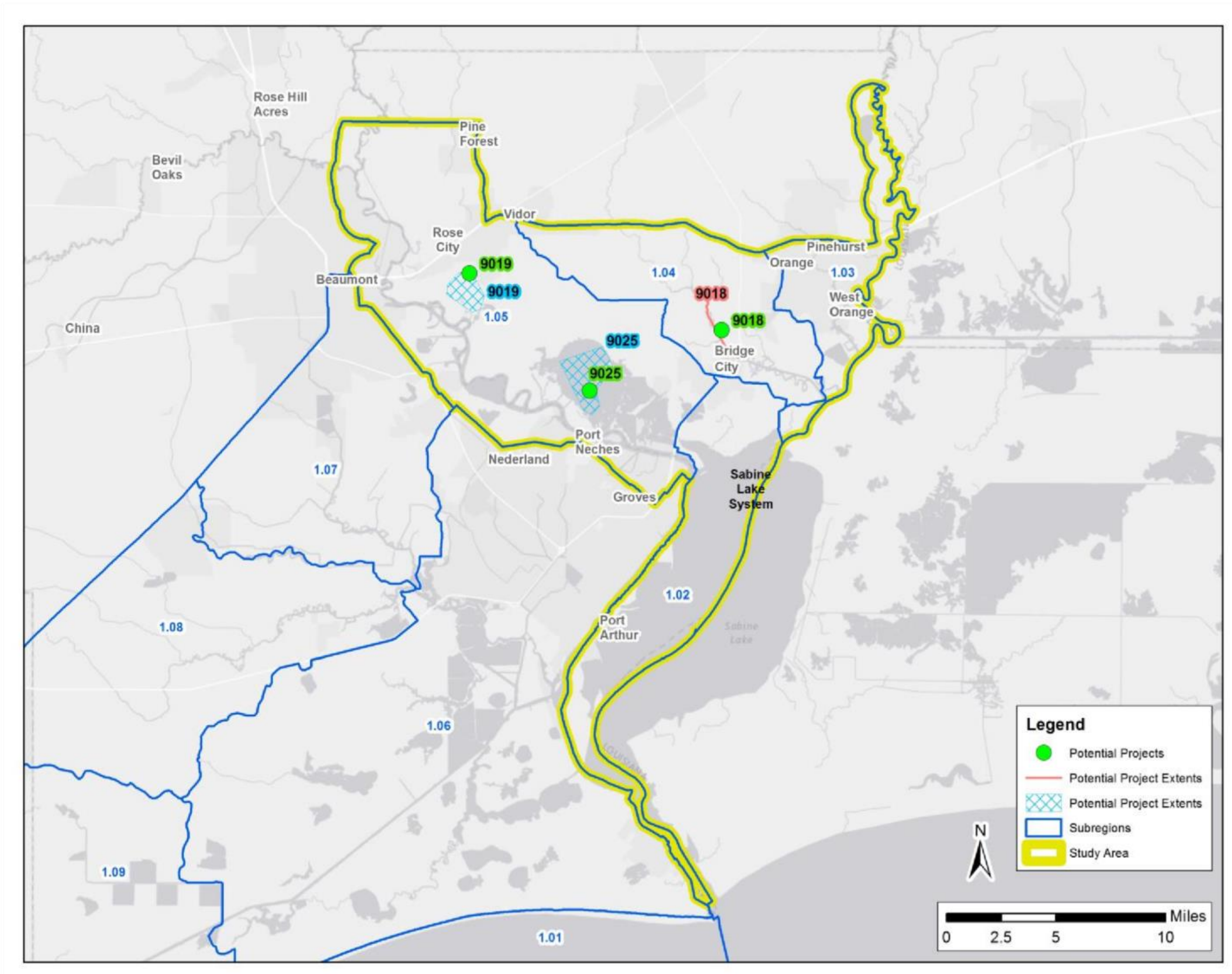
Technical Advisory Committee Project Gap Submissions



Technical Advisory Committee Workbook – Project Gap Submissions

Table of Contents

Region 1
Study Area #2: Sabine Lake Area
Subregions 1.02, 1.03, 1.04, and 1.05



Issues of Concern – Average TAC Scores by Subregion

Subregion Number	Subregion Name	ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
1.02*	Old River Bayou		N/A						
1.03*	Adams Bayou-Sabine River		N/A						
1.04	Cow Bayou		N/A						
1.05	Tenmile Creek-Neches River		N/A						

**This subregion does not have a project.*

Study Area #2: Sabine Lake Area

Subregion 1.04

Project ID	Project Name	Project Subtype (Type)	Description
9018	Hydrologic Restoration of Upper Cow Bayou	Wetlands/Forested Wetlands (Habitat Creation & Restoration) Hydrologic Restoration (Environmental) Studies (Studies, Policies & Programs)	The goal of the proposed project is to return Upper Cow Bayou, a tributary to Sabine River, to its natural hydrologic state by restoring meanders and reducing saltwater intrusion. This will in turn protect the existing Cypress-Tupelo habitat. A study may be required to determine the best methodology to restore the hydrology and protect the wetlands.

Please fill in the issue boxes below with the corresponding level of benefit achieved by this project.

0 – no benefit 1 – slight benefit 2 - medium benefit 3 - high benefit 4 - essential

ALDH	BSE	EFCSSD	CFD	IWQQ	ICR	Would you consider this project a priority for coastal resiliency? (Y/N)

What is the feasibility of executing this project?

0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Additional information (for example, additional project details, known impediments to implementing this project, ways the project could be improved)?

Region 1
Study Area #2: Sabine Lake Area

Subregion 1.05

Project ID	Project Name	Project Subtype (Type)	Description
9019	Rose City Marsh Restoration	Wetlands/Forested Wetlands (Habitat Creation & Restoration)	The project involves the beneficial use of dredged materials to restore substrate for marsh and forested wetlands in former Cypress-Tupelo swamp.

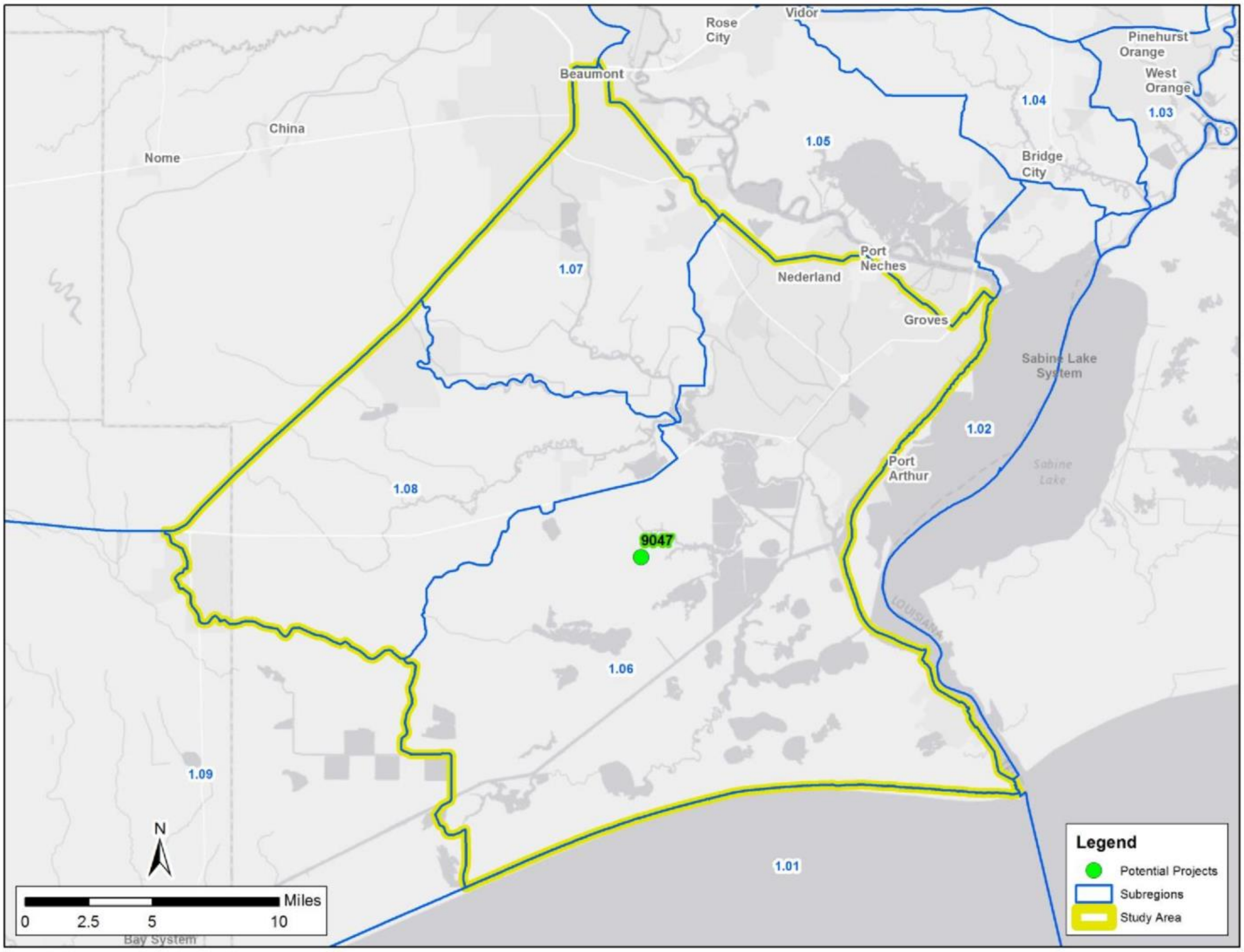
Please fill in the issue boxes below with the corresponding level of benefit achieved by this project. **0 – no benefit 1 – slight benefit 2 - medium benefit 3 - high benefit 4 - essential**						**Would you consider this project a priority for coastal resiliency? (Y/N)**
ALDH	BSE	EFCSSD	CFD	IWQQ	ICR	

What is the feasibility of executing this project?
0 – not feasible 1 – low feasibility 2 – moderate feasibility 3 – high feasibility 4 – certain feasibility

Additional information (for example, additional project details, known impediments to implementing this project, ways the project could be improved)?

Study Area #3: West Sabine Lake Area

Subregions 1.06, 1.07, and 1.08



Issues of Concern – Average TAC Scores by Subregion

Subregion Number	Subregion Name	ALDH	GBEDD	BSE	EFCSSD	CFD	IWQQ	ICR	ADVSD
1.06	Salt Bayou		N/A						
1.07*	Hillebrandt Bayou		N/A						
1.08*	Lower Neches Valley Authority Canal-Taylor Bayou		N/A						

**This subregion does not have a project.*

Study Area #3: West Sabine Lake Area

Subregion 1.06

Project ID	Project Name	Project Subtype (Type)	Description
9047	Sabine Ranch Habitat Protection	Acquisitions (Land Acquisition)	Sabine Ranch is a critical, 12,100 acre component of the largest remaining contiguous coastal freshwater marsh system in Texas. Protection of the Sabine Ranch, almost entirely within the McFaddin NWR boundary, is the U.S. Fish and Wildlife Service's (USFWS) top conservation priority for the upper Texas coast. Sabine Ranch's central position within 100,000+ acres of federal and state protected beach and marshland make the permanent protection of this coastal habitat critical to the entire complex. Conserving and restoring these lands will avert further losses of marshland and biological diversity. Sabine Ranch's coastal marshes, prairies and woodlots provide important habitat for 35 of the 48 avian species that are USFWS Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.

Please fill in the issue boxes below with the corresponding level of benefit achieved by this project.

0 – no benefit   1 – slight benefit   2 - medium benefit   3 - high benefit   4 - essential

ALDH	BSE	EFCSSD	CFD	IWQQ	ICR	Would you consider this project a priority for coastal resiliency? (Y/N)

What is the feasibility of executing this project?

0 – not feasible   1 – low feasibility   2 – moderate feasibility   3 – high feasibility   4 – certain feasibility

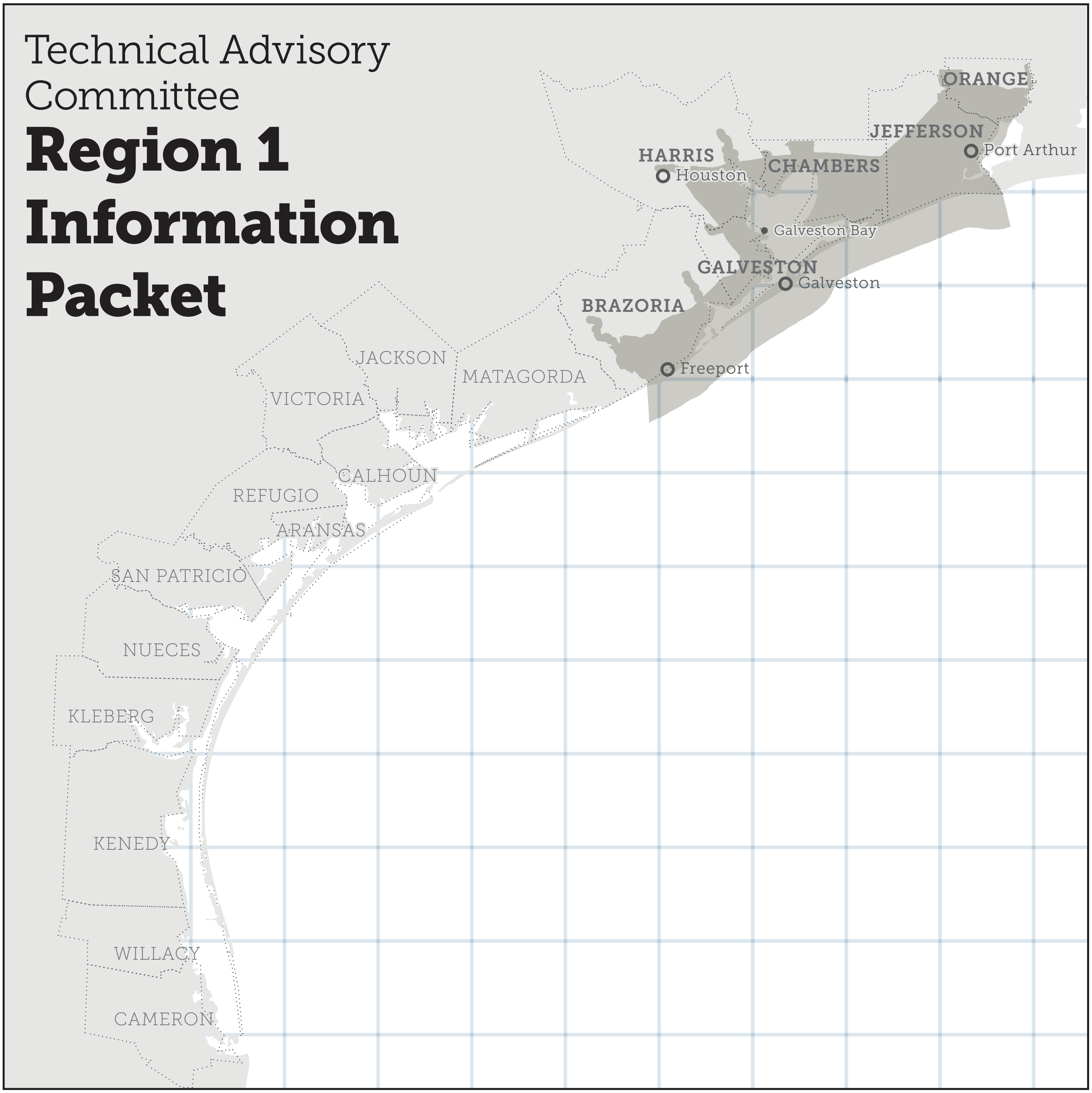
Additional information (for example, additional project details, known impediments to implementing this project, ways the project could be improved)?

REGIONAL INFORMATION PACKETS

Texas General Land Office

Technical Advisory Committee

Region 1 Information Packet



Texas Coastal Resiliency Master Plan

Technical Advisory Committee Region 1 Information Packet Table of Contents

NOTES:

The Table of Contents for the Technical Advisory Committee Workbook has been included for your convenience here.

Region 1 Technical Advisory Committee Workbook Table of Contents

The Table of Contents for the Technical Advisory Committee Workbook has been included for your convenience here.

The Table of Contents for the Technical Advisory Committee Workbook has been included for your convenience here.

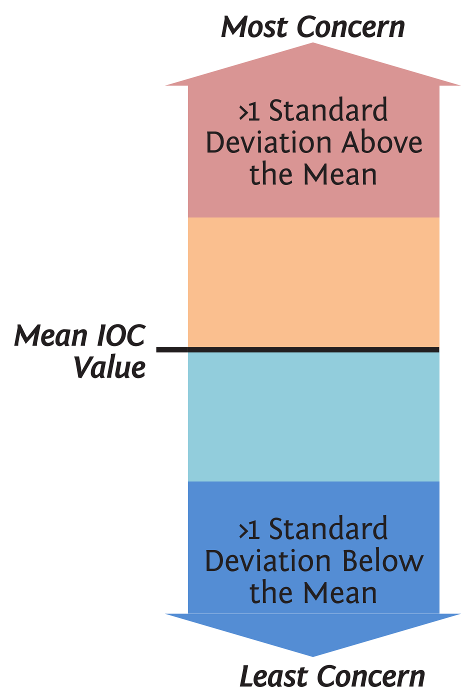
Project Type	Project Subtypes
Land Acquisitions	• Acquisitions • Conservation Easements • Fee Simple
Public Access & Improvements	• ADA Accessibility • Walkovers • Piers, Boat Ramps
Studies, Policies & Programs	• Erosion Response Plans • Structure Raising • Setbacks • Studies • Sediment Management
Shoreline Stabilization	• Seawall • Bulkhead • Revetment • Breakwater • Misc. Wave Break • Jetty • Groin
Flood Risk Reduction	• Levees • Flood Wall • Storm Surge Barrier • Road Elevation
Structure/Debris Removal	• Structures on Public's Easements • Abandoned Oil and/or Gas Wells • Abandoned Boats • Dock Pilings • Post Storm Cleanup • Plastics, Glass, Rubber, Metal • Obstacles
Habitat Creation & Restoration	• Marsh • Oyster Reef • Wetlands/Forested Wetlands • Barrier Islands • Coastal Prairies • Rookery Islands
Wildlife	• Fisheries • Birds • Oysters • Sea Turtles • Invasive Species
Environmental	• Fresh Water Inflow • Hydrologic Restoration
Beach Nourishment	• Bay • Gulf
Dune Restoration	• Dune

Issue(s) of Concern Addressed & Example Considerations

- **Altered, Lost, or Degraded Habitat - *ALDH***
  - » Seagrass
  - » Mangroves
  - » Coastal Marshes
  - » Forested Wetlands
  - » Coastal Prairies
  - » Invasive Species
  - » Future Projections of Loss
- **Gulf Beach Erosion and Dune Degradation - *GBEDD***
  - » Subsidence
  - » Sediment Deficit
  - » Impacts from Development
  - » Storm Impacts
  - » Erosion
  - » Sea Level Rise
- **Bay Shoreline Erosion - *BSE***
  - » Subsidence
  - » Sediment Deficit
  - » Impacts from Development
  - » Storm Impacts
  - » Erosion
  - » Sea Level Rise
- **Existing and Future Coastal Storm Surge Damage - *EFCSSD***
  - » Sea Level Rise
  - » Coastal Storms
  - » Impacts from Development
- **Coastal Flood Damage - *CFD***
  - » Rainfall
  - » Associated Riverine
  - » Nuisance Flooding
  - » Impacts from Development
- **Impacts on Water Quality and Quantity - *IWQQ***
  - » Freshwater Inflows
  - » Nutrients
  - » Water Pollution (Chemical)
  - » Sediment
  - » Saltwater Intrusion
  - » Nonpoint Source
  - » Hydrologic Connectivity
  - » Harmful Algal Blooms
  - » Oil Spills
- **Impacts on Coastal Resources - *ICR***
  - » Oysters
  - » Turtles
  - » Birds
  - » Fish
  - » Crabs
  - » Endangered Species
- **Abandoned or Derelict Vessels, Structures and Debris - *ADVSD***
  - » Obstructions to Public's Easement
  - » Abandoned Oil and/or Gas Wells
  - » Abandoned Boats
  - » Dock Pilings
  - » Post Storm Cleanup
  - » Obstacles
  - » Plastics, Glass, Rubber, Metal

Issue of Concern Categories

The Issues of Concern (IOC) categories were determined statistically based on the 2016 TAC survey results collected in May and June. The highest threshold represents all subregional IOC values that were at least one standard deviation above the average IOC value. The second highest threshold represents the remaining subregional IOC values above the mean IOC value. The third and fourth thresholds were determined in the same manner, but fall below the average IOC value.

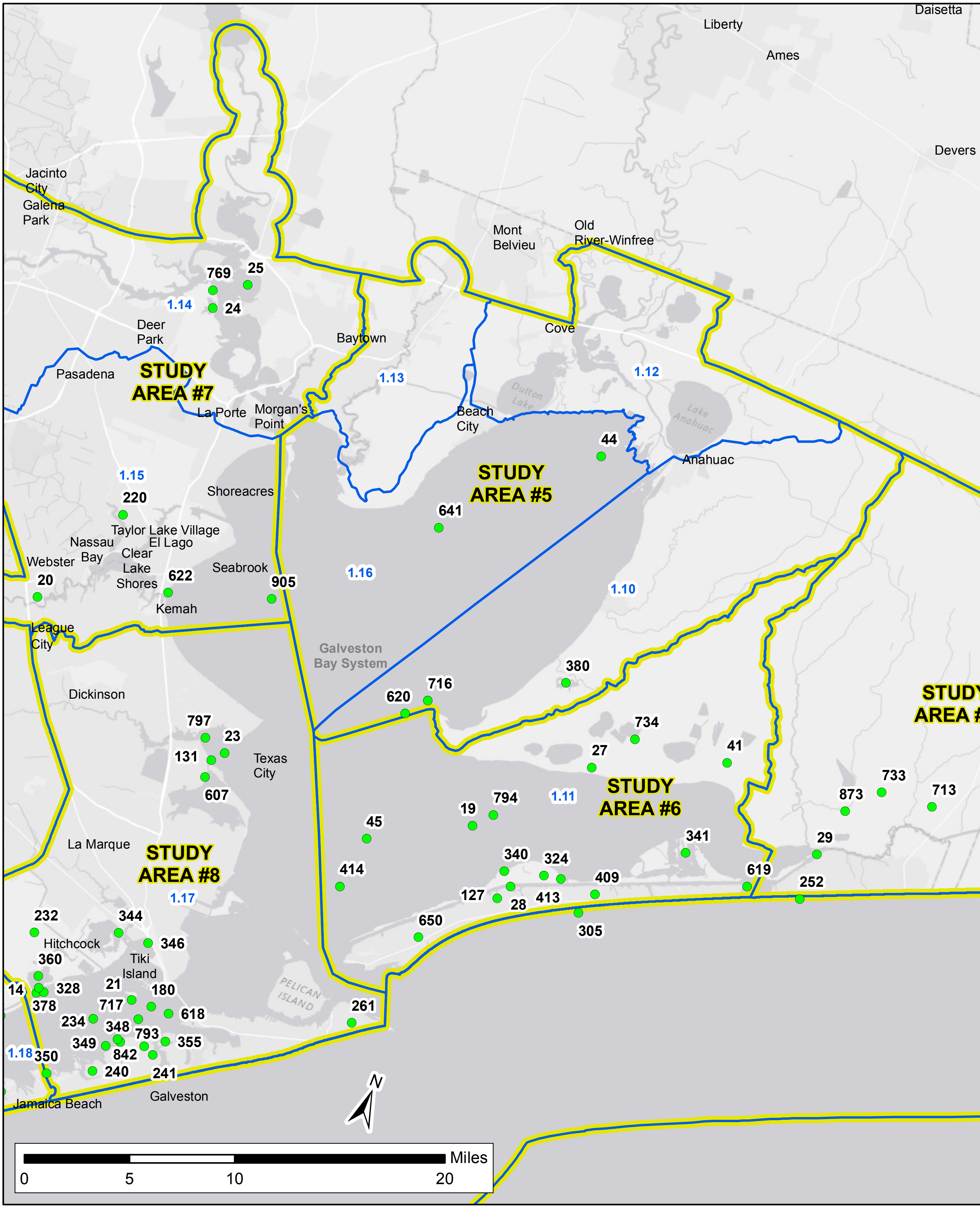


Definitions

Priority: A program, project, policy, or course of action determined to be of particular significance and warranting prompt attention and action.

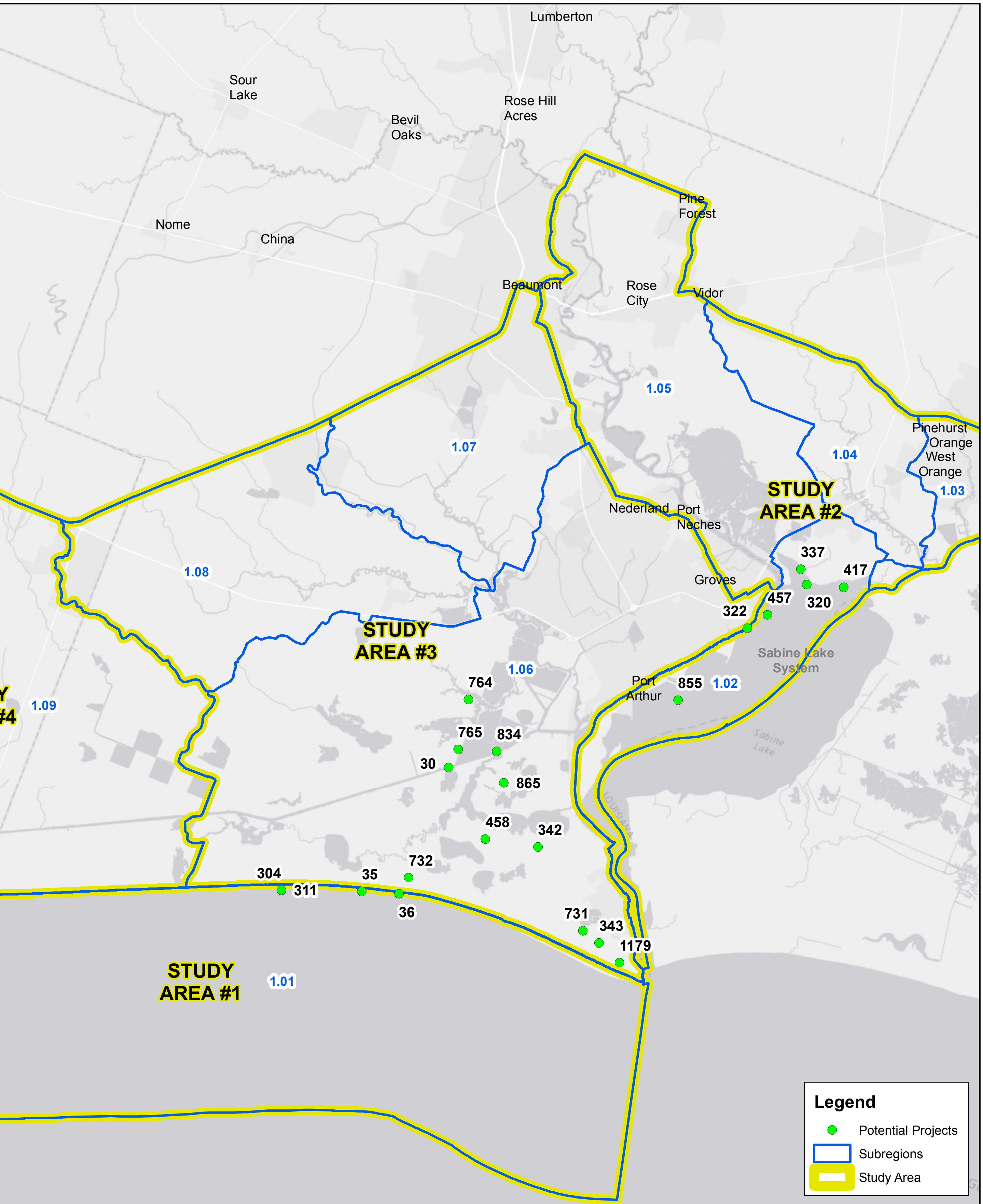
Resiliency: The ability of a given system (e.g., ecological, socio-economic, infrastructure) to absorb natural and/or anthropogenic disturbances and retain or quickly return to a previous desired state.

Region 1 O



Daisetta
Liberty
Ames
Devers
Jacinto City
Galena Park
Mont Belvieu
Old River-Winfree
769
25
24
1.14
Deer Park
Baytown
Cove
Pasadena
STUDY AREA #7
1.13
1.12
La Porte
Morgan's Point
Beach City
44
Anahuac
1.15
220
Shoreacres
STUDY AREA #5
641
Taylor Lake Village
Nassau Bay
El Lago
Clear Lake Shores
Webster
20
622
Seabrook
905
1.16
1.10
Kemah
League City
Galveston Bay System
380
Dickinson
716
620
734
797
23
131
Texas City
27
41
607
STUDY AREA #6
1.11
794
19
45
733
873
713
341
29
La Marque
STUDY AREA #8
414
340
324
409
619
252
1.17
127
28
413
305
650
232
344
346
Hitchcock
360
Tiki Island
14
328
21
180
378
717
618
234
348
793
355
349
842
1.18
350
240
241
261
Jamaica Beach
Galveston
N
Miles
0
5
10
20

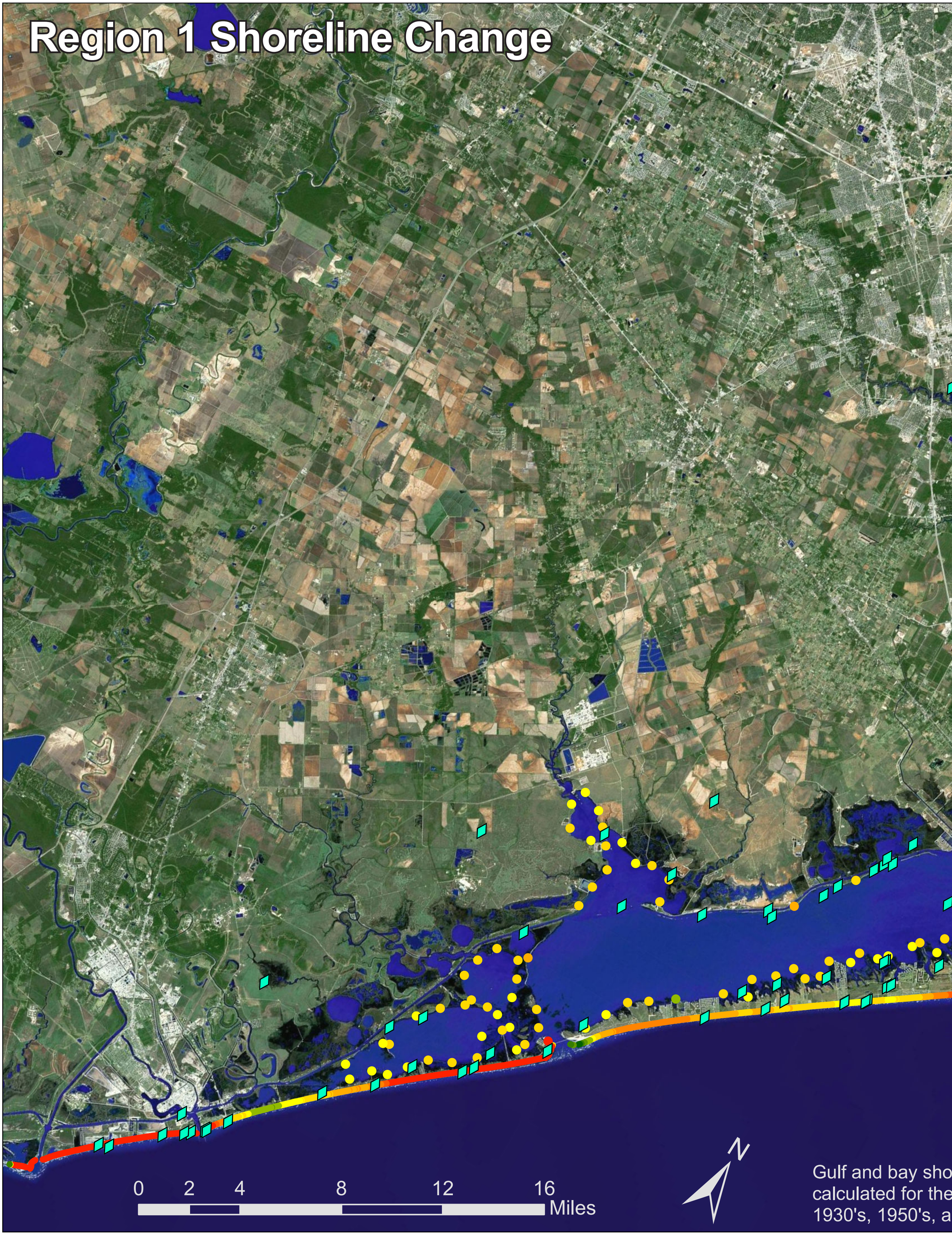
verview (East)

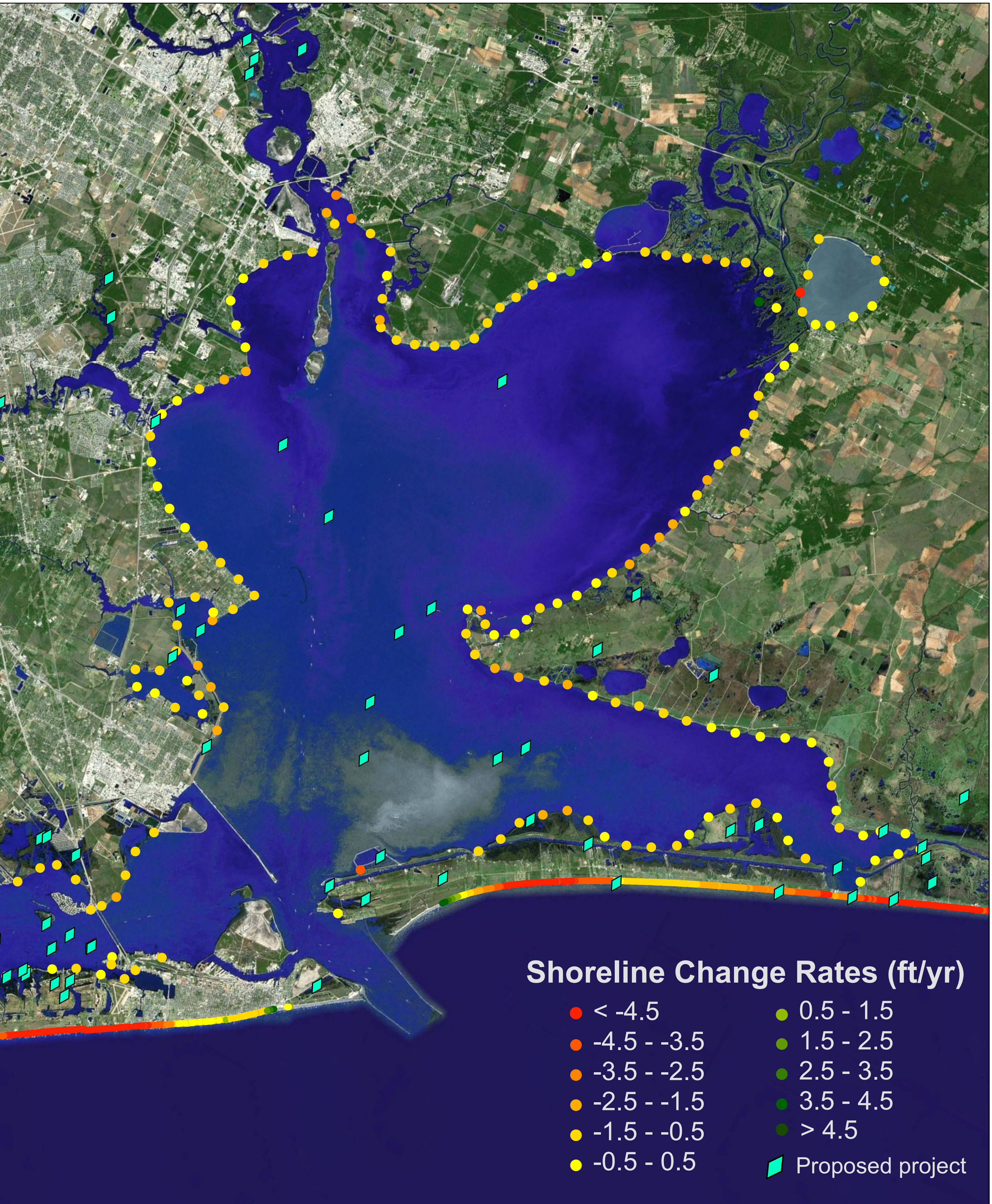


Region 1 O


Holiday
Lakes
Liverpool
Bailey's
Prairie
Danbury
Angleton
Brazoria
Lake
Jackson
Richwood
1.19
397
870
Clute
Jones
Creek
1.20
1.21
STUDY
AREA #10
Oyster
Creek
10
9
112
1.22
11
308
Freeport
315
637
318
133
132
309
310
Quintana
STUDY
AREA #1
N
Miles
0
2.5
5
10

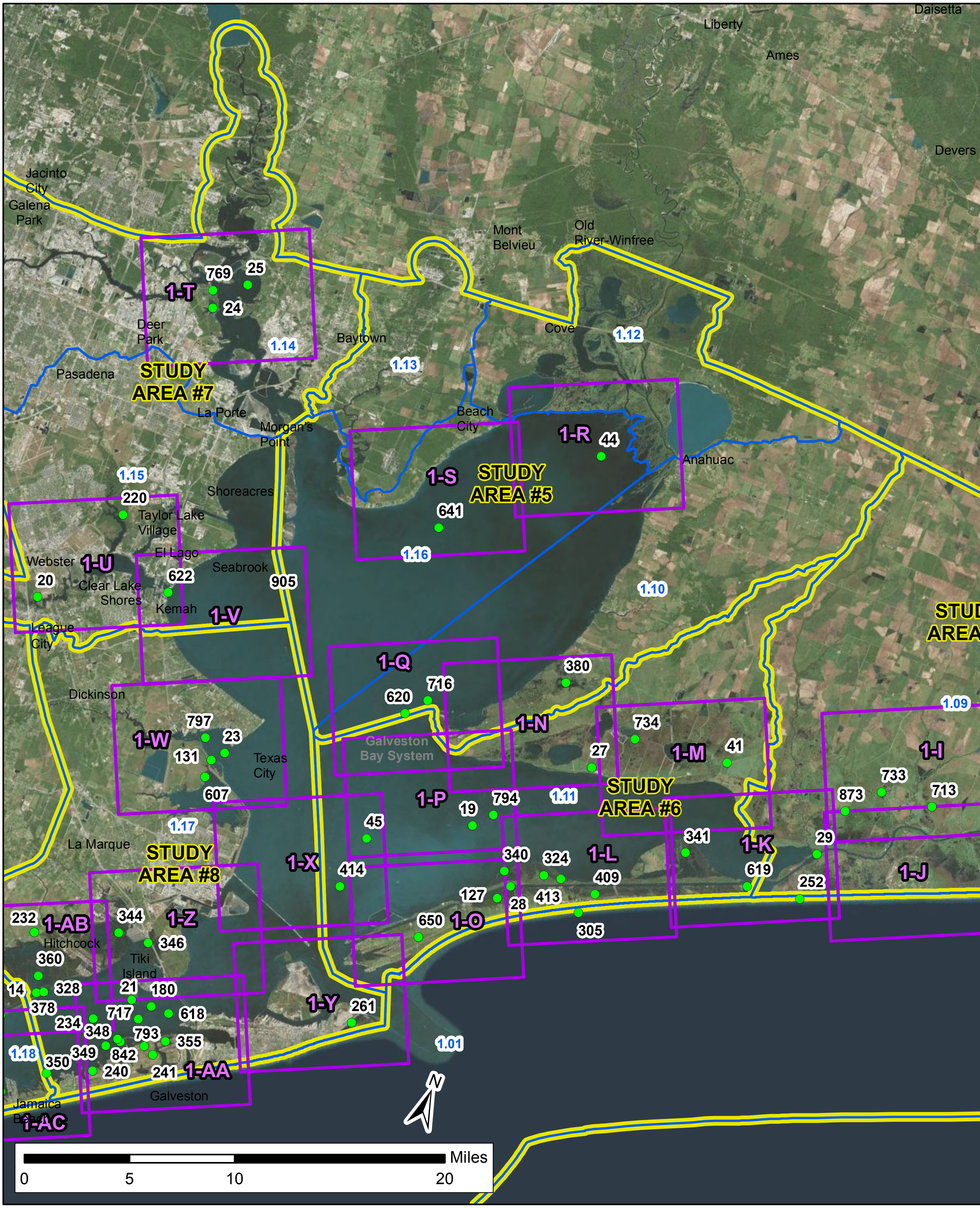
verview (West)


Region 1 Shoreline Change
0
2
4
8
12
16
Miles
N
Gulf and bay sho
calculated for the
1930's, 1950's, a



reline change rates from the University of Texas Bureau of Economic Geology. Gulf shoreline change rates were
e time period 1950's - 2007. Bay shoreline change rates were calculated up to 2000, with starting years from the
nd 1970's depending on data available.

Region 1 In


Daisetta
Liberty
Ames
Devers
Jacinto City
Galena Park
Mont Belvieu
Old River-Winfree
Deer Park
Baytown
Cove
Pasadena
La Porte
Morgan's Point
Beach City
Anahuac
Shoreacres
Taylor Lake Village
El Lago
Seabrook
Webster
Clear Lake Shores
Kemah
League City
Dickinson
Texas City
La Marque
Hitchcock
Tiki Island
Galveston
Jamaica Beach
Galveston Bay System
STUDY AREA #7
STUDY AREA #5
STUDY AREA #6
STUDY AREA #8
STUD AREA
1-T
1-U
1-V
1-W
1-X
1-Y
1-Z
1-AA
1-AB
1-AC
1-S
1-R
1-Q
1-P
1-O
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1-M
1-L
1-K
1-J
1-I
1.01
1.09
1.10
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1.16
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1.18
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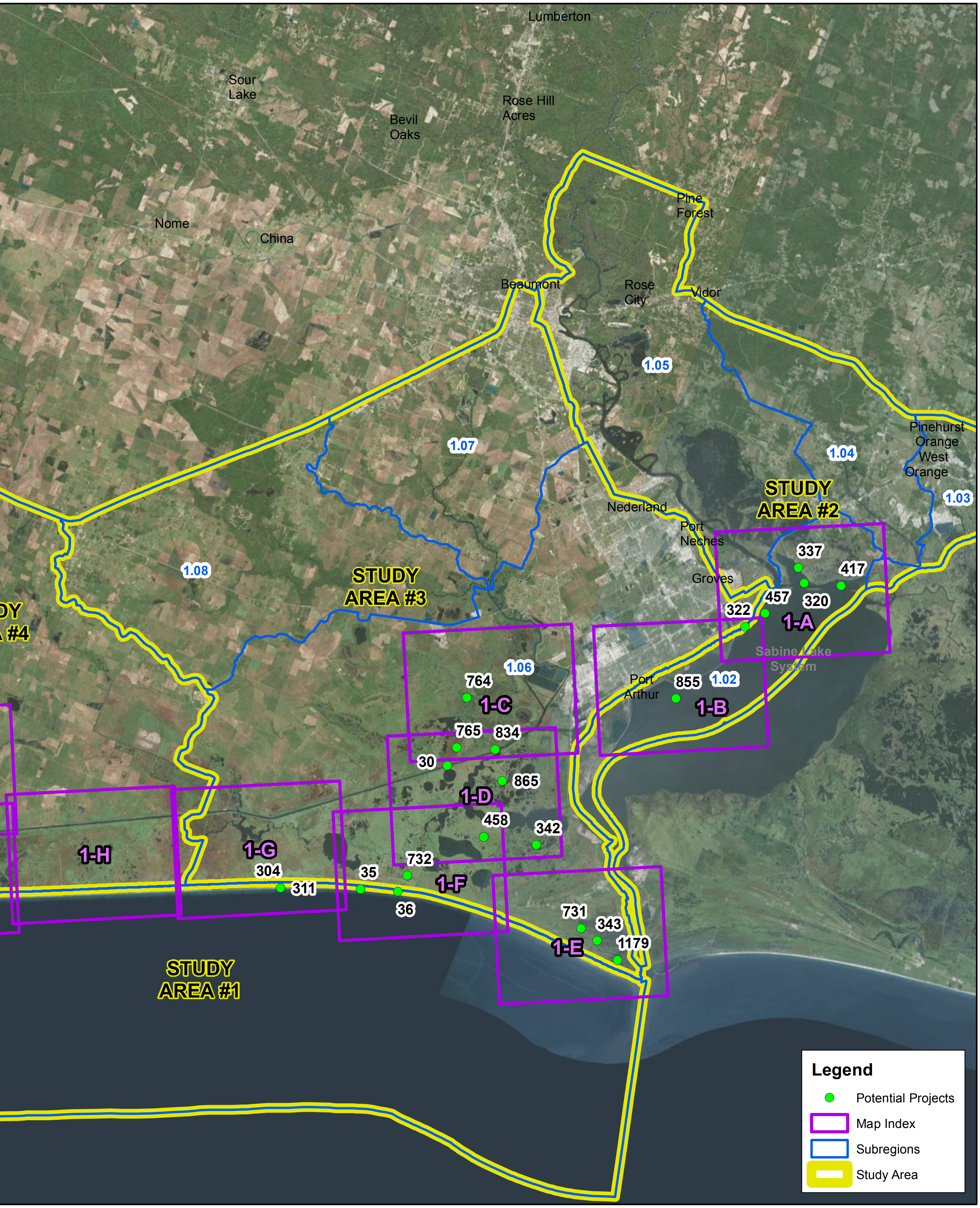
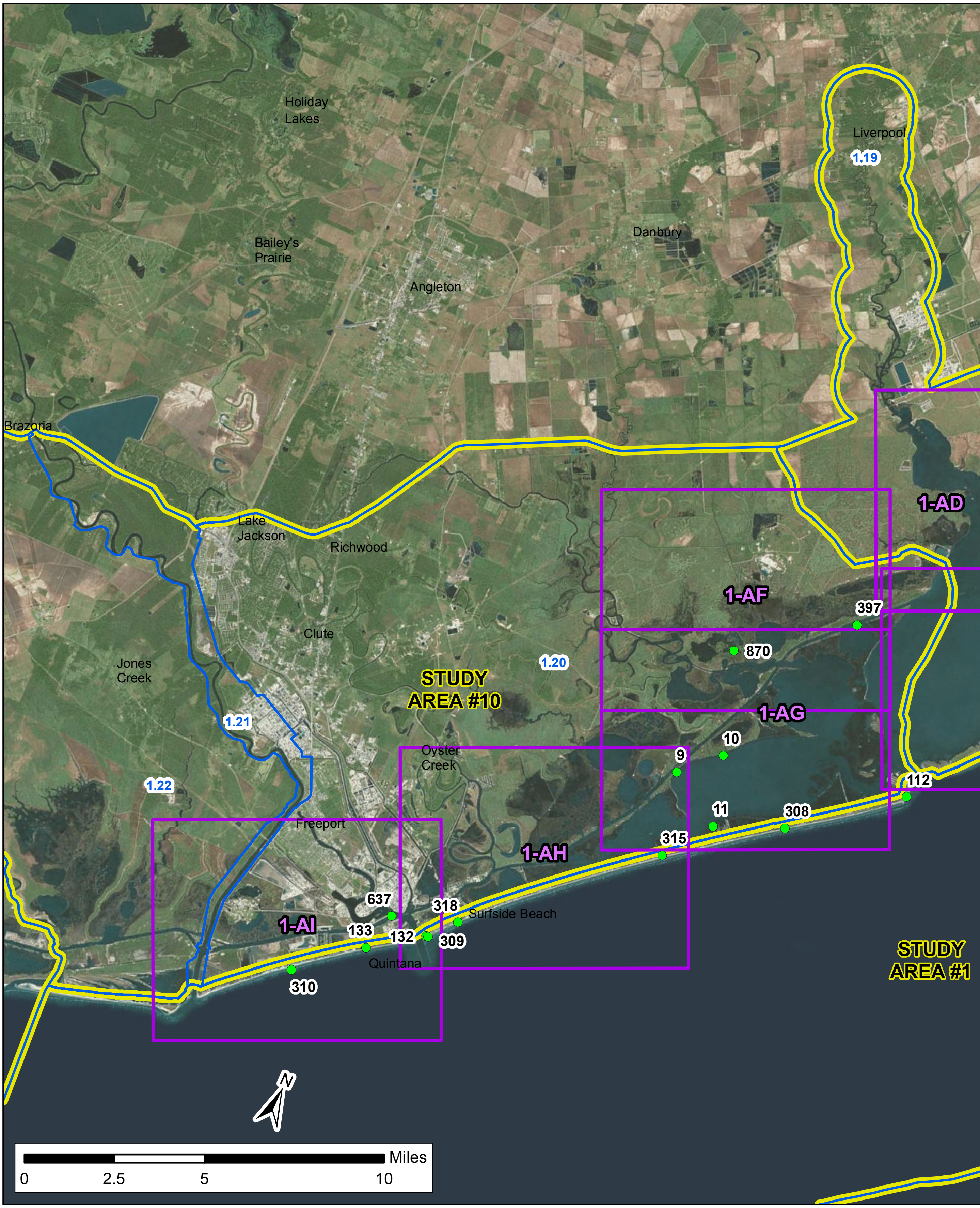
797
23
131
607
734
41
27
45
19
794
340
324
409
414
127
28
413
305
650
341
619
29
252
873
733
713
232
344
346
360
14
328
21
180
378
717
618
234
348
793
355
349
842
240
241
350
261
N
Miles
0
5
10
20

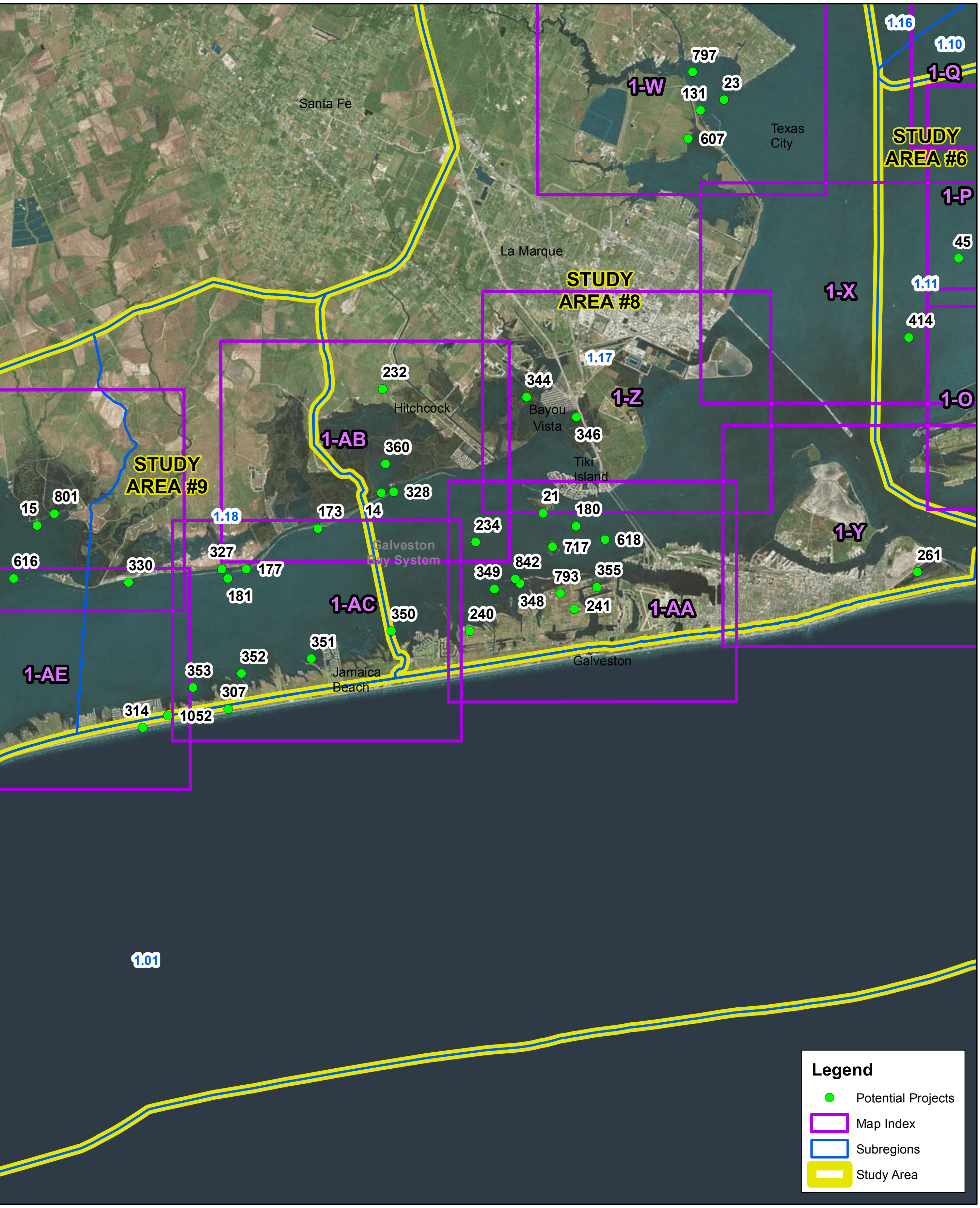
ndex Map (East)



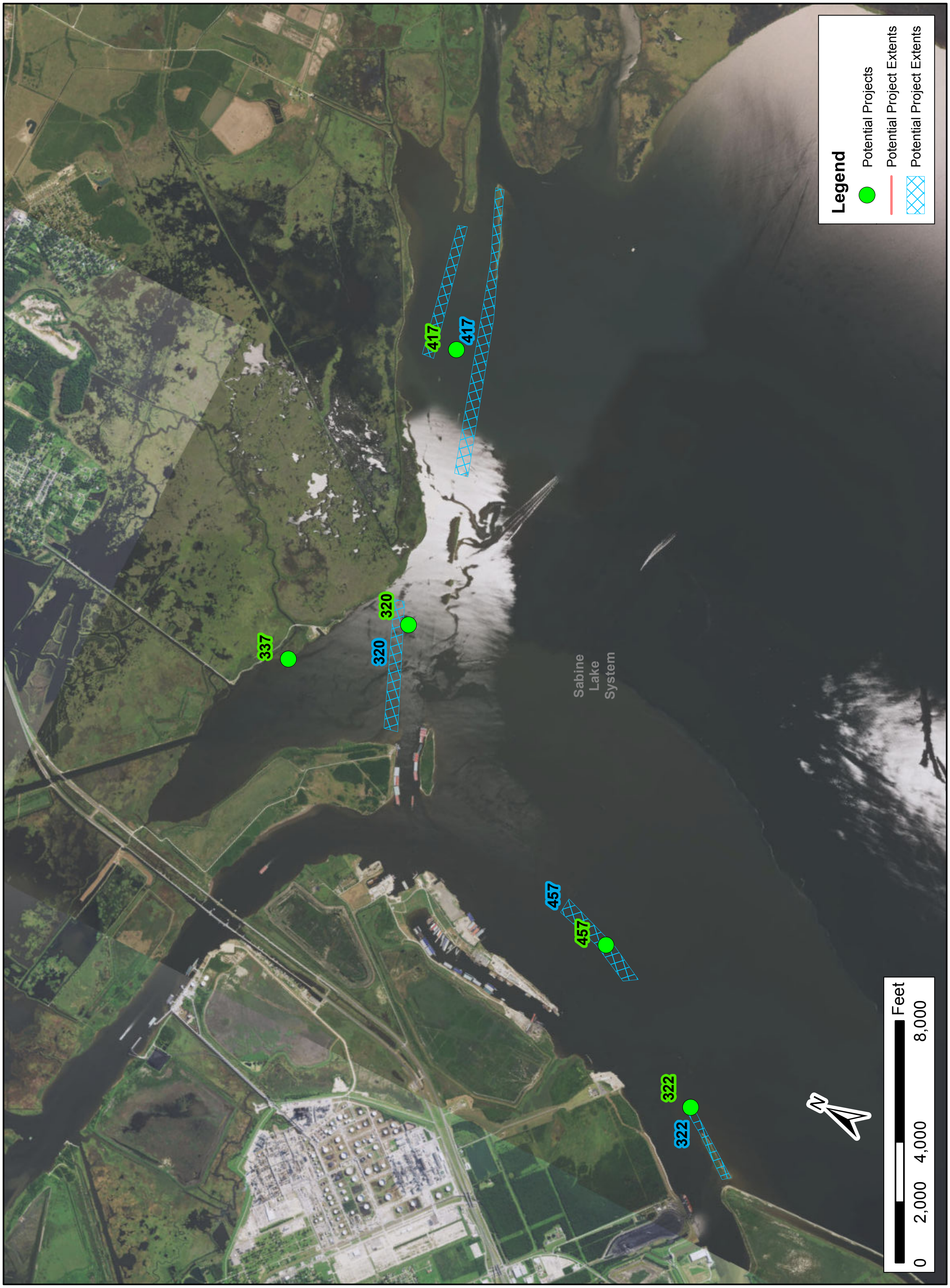
Region 1 In


Holiday Lakes
Bailey's Prairie
Angleton
Danbury
Liverpool
1.19
Brazoria
Lake Jackson
Richwood
Clute
Jones Creek
1.20
1.21
1.22
STUDY AREA #10
Oyster Creek
Freeport
Surfside Beach
Quintana
1-AD
1-AF
1-AG
1-AH
1-AI
397
870
10
9
11
308
315
112
637
318
133
132
309
310
STUDY AREA #1
N
Miles
0
2.5
5
10

ndex Map (West)



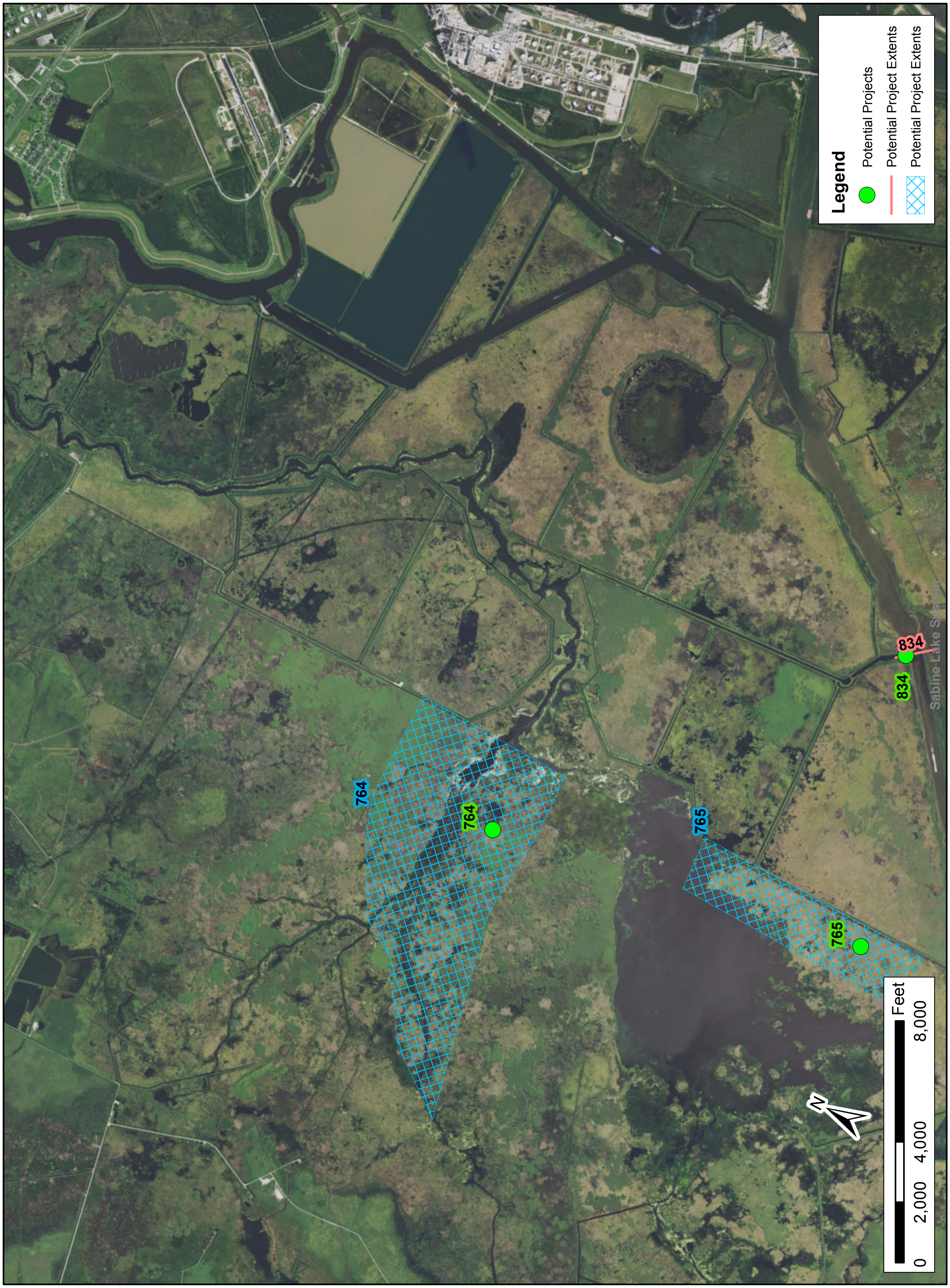
Map 1-A


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
417
417
320
320
337
Sabine Lake System
457
457
322
322
0 2,000 4,000 8,000
Feet

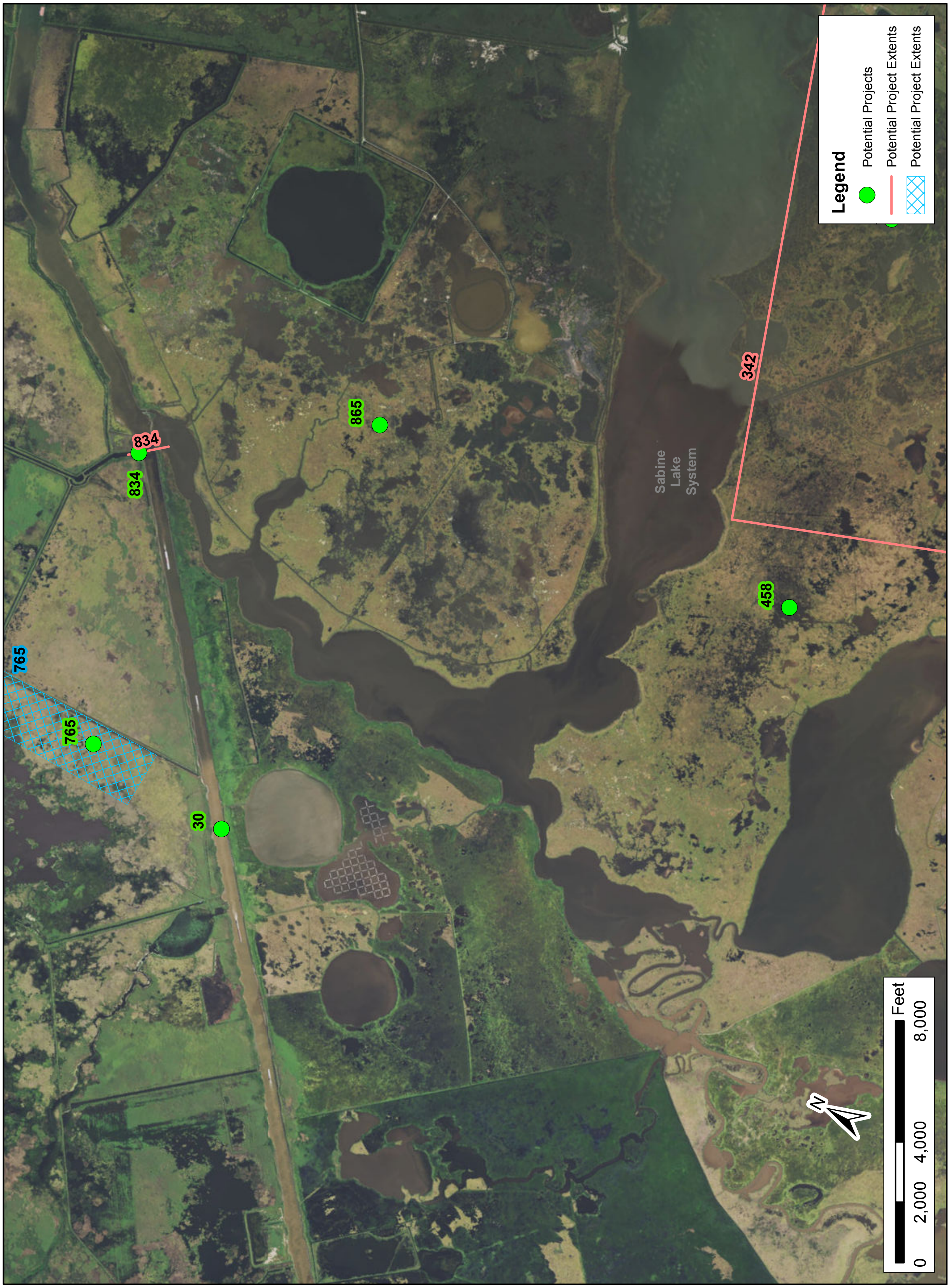
Map 1-B


322
322
855
Sabine Lake System
Port Arthur
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
N
0 2,000 4,000 8,000
Feet

Map 1-C


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
764
764
765
765
834
834
N
0
2,000
4,000
8,000
Feet

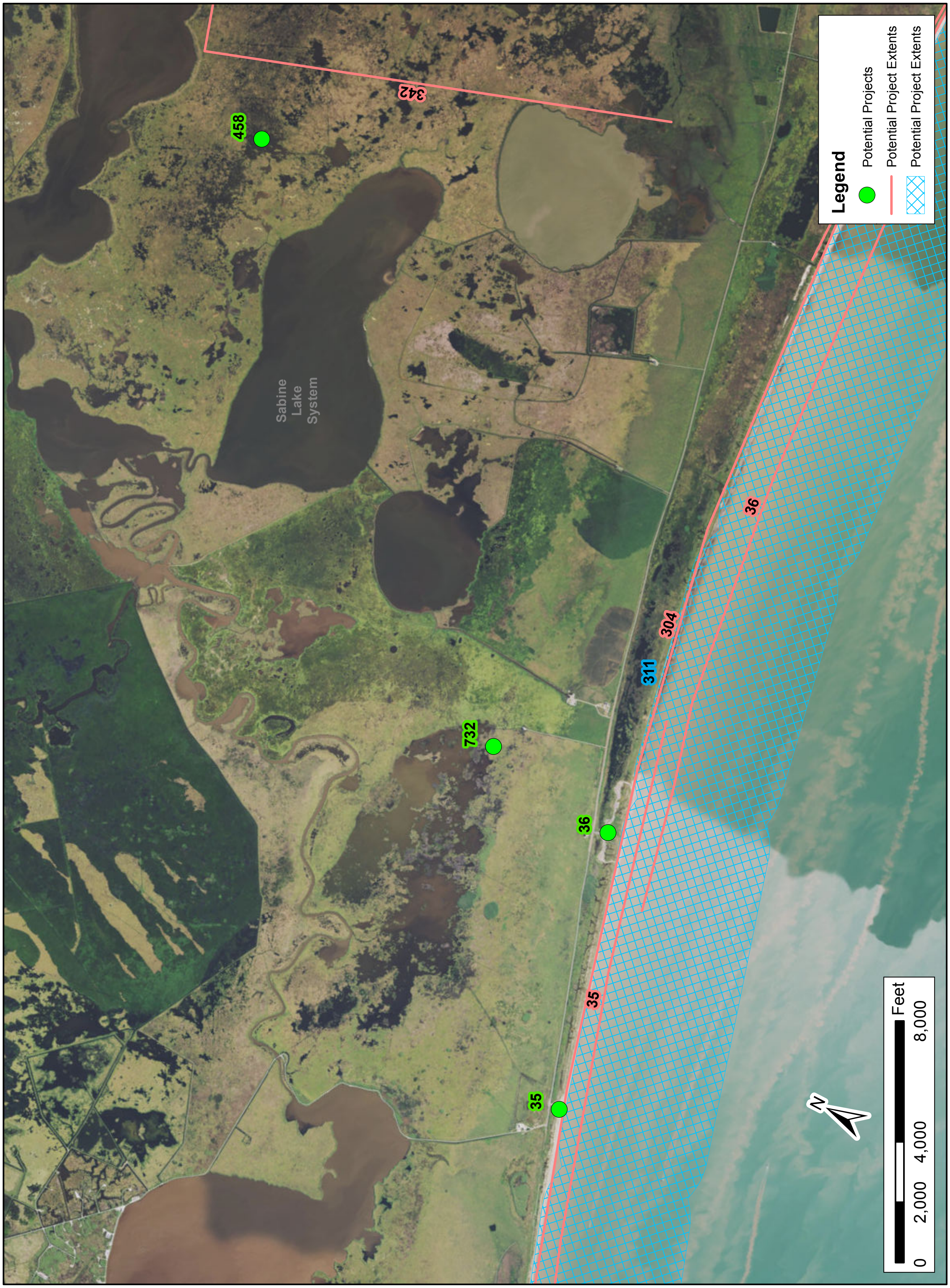
Map 1-D


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Sabine Lake System
834
865
765
30
458
342
0
2,000
4,000
8,000
Feet
N

Map 1-E


Sabine Lake System
1179
343
731
343
304
311
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
N
0 2,000 4,000 8,000
Feet

Map 1-F


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Sabine Lake System
342
458
36
304
311
732
36
35
35
N
0
2,000
4,000
8,000
Feet

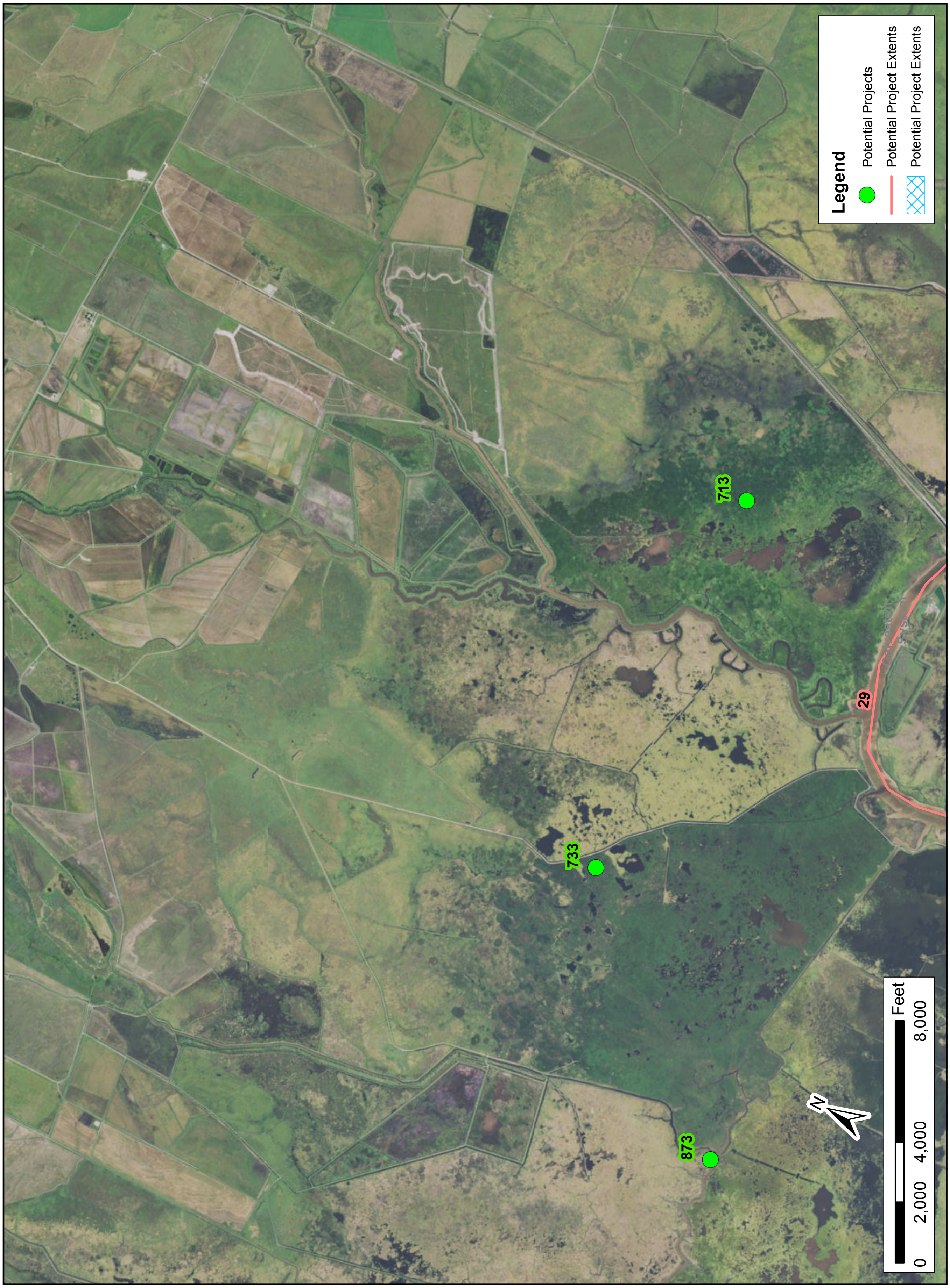
Map 1-G


Sabine Lake System
311
304
311
304
35
834
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
N
0
2,000
4,000
8,000
Feet

Map 1-H


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
311
304
35
N
0
2,000
4,000
8,000
Feet

Map 1-I


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
713
733
873
29
Feet
0
2,000
4,000
8,000
N

Map 1-J


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Sabine Lake System
311
304
35
305
252
29
N
0
2,000
4,000
8,000
Feet

Map 1-K


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Galveston Bay System
29
29
252
305
252
27
21
619
341
341
409
28
N
0
2,000
4,000
8,000
Feet

Map 1-L


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Feet
0
2,000
4,000
8,000
N
341
28
409
409
305
305
413
324
340
28
340

Map 1-M


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
41
734
27
Galveston Bay System
0
2,000
4,000
8,000
Feet
N

Map 1-N


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
380
27
21
716
Galveston Bay System
N
0
2,000
4,000
8,000
Feet

Map 1-O


340
340
28
28
127
305
650
Galveston Bay System
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
N
0
2,000
4,000
8,000
Feet

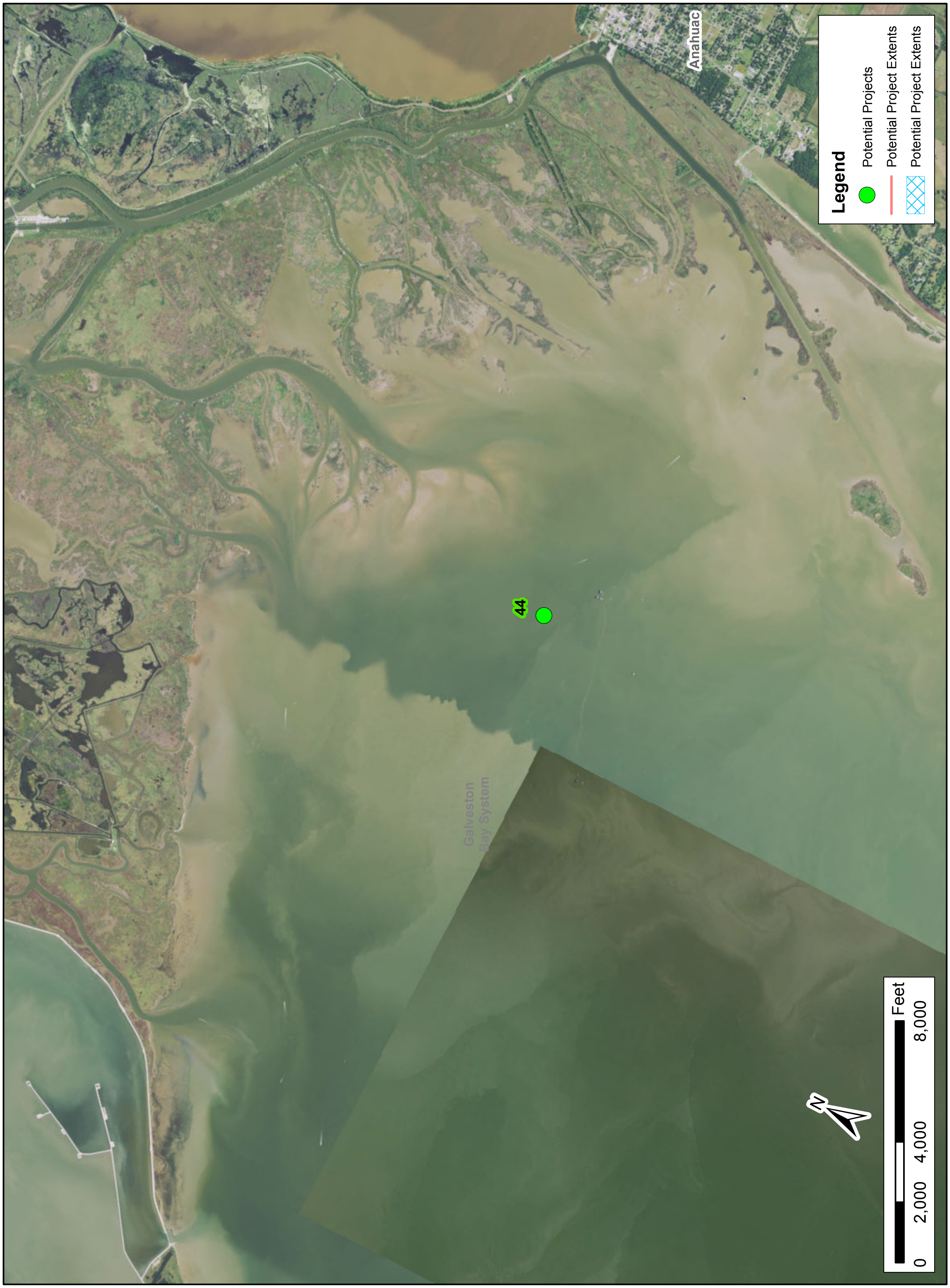
Map 1-P


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
27
794
19
45
Galveston Bay System
N
0
2,000
4,000
8,000
Feet

Map 1-Q


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
21
716
716
620
620
Galveston Bay System
N
0
2,000
4,000
8,000
Feet

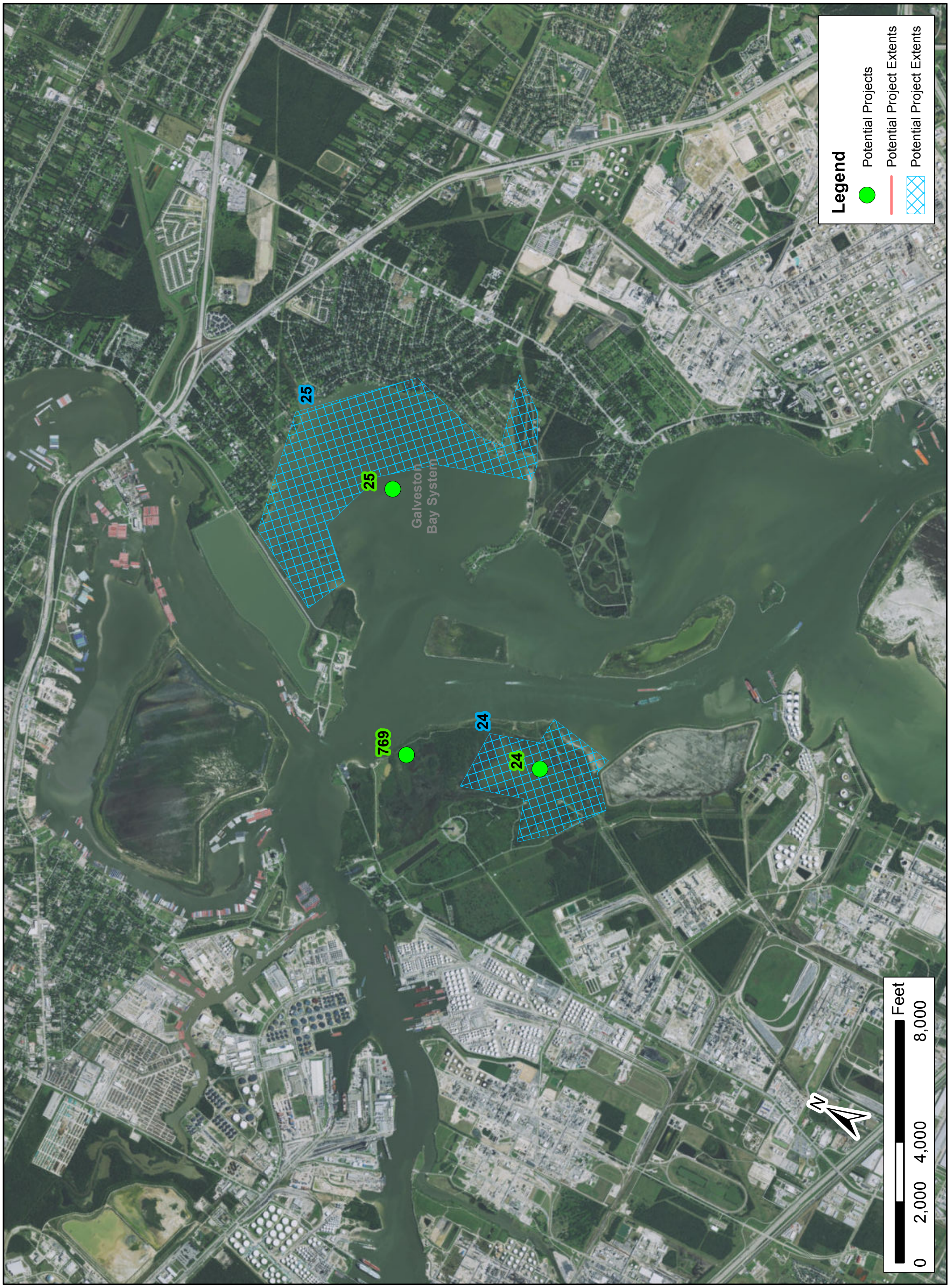
Map 1-R


Anahuac
44
Galveston Bay System
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
0 2,000 4,000 8,000
Feet
N

Map 1-S


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Beach City
Galveston Bay System
641
Feet
0 2,000 4,000 8,000
N

Map 1-T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Potential Projects
Potential Project Extents
Potential Project Extents
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24
24
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Galveston Bay System
Feet
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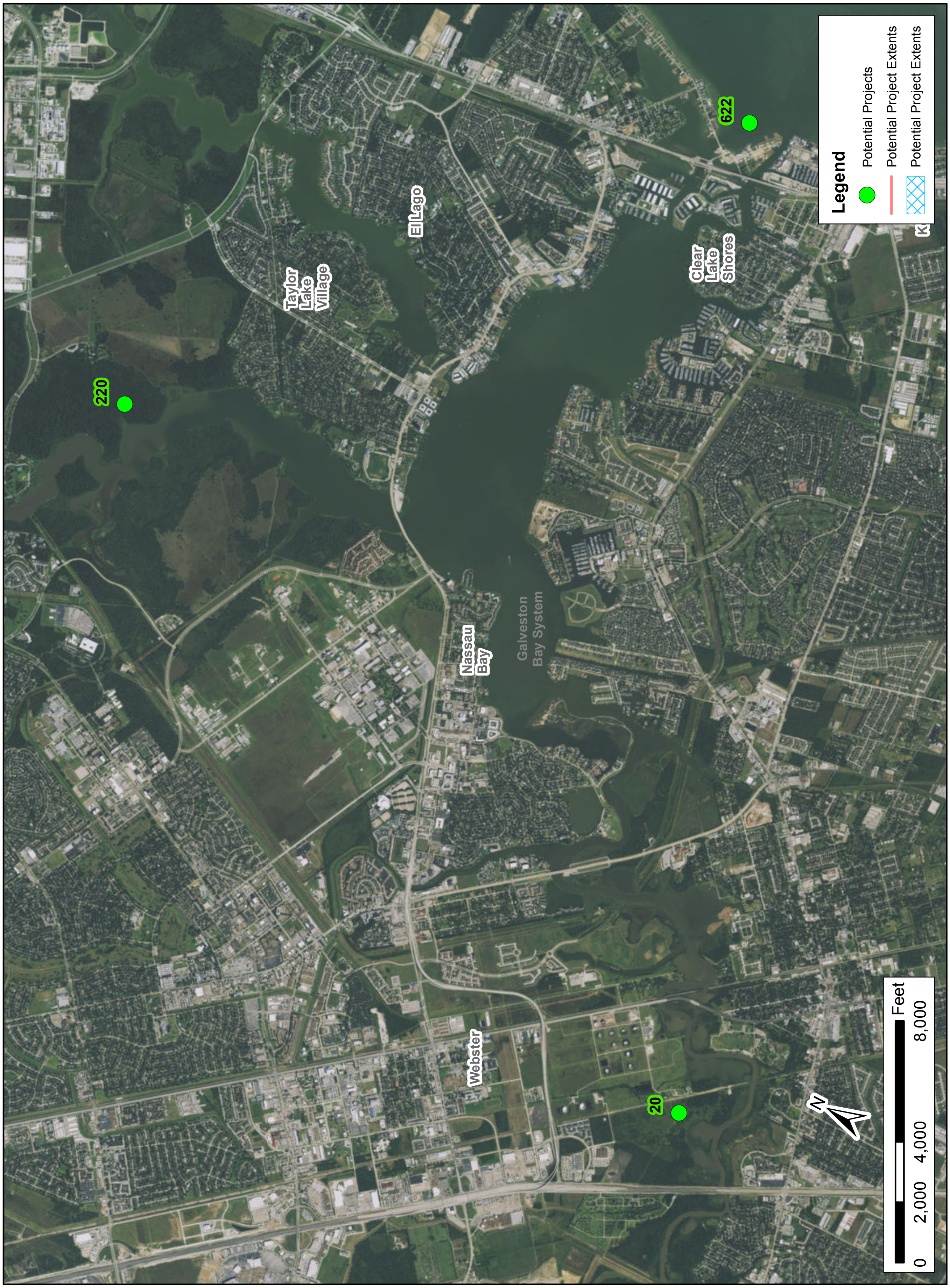
8,000
N

Map 1-U



Legend
Potential Projects
Potential Project Extents
Potential Project Extents
220
622
20
El Lago
Taylor Lake Village
Clear Lake Shores
Nassau Bay
Galveston Bay System
Webster
N
0 2,000 4,000 8,000 Feet

Map 1-V


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Galveston
Bay System
Seabrook
622
Kemah
Clear
Lake
Shores
N
0
2,000
4,000
8,000
Feet

Map 1-W


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Galveston Bay System
Texas City
23
131
131
797
797
607
607
0
2,000
4,000
8,000
Feet
N

Map 1-X


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
45
414
607
Galveston Bay System
0
2,000
4,000
8,000
Feet
N

Map 1-Y


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
261
261
Galveston Bay System
0
2,000
4,000
8,000
Feet
N

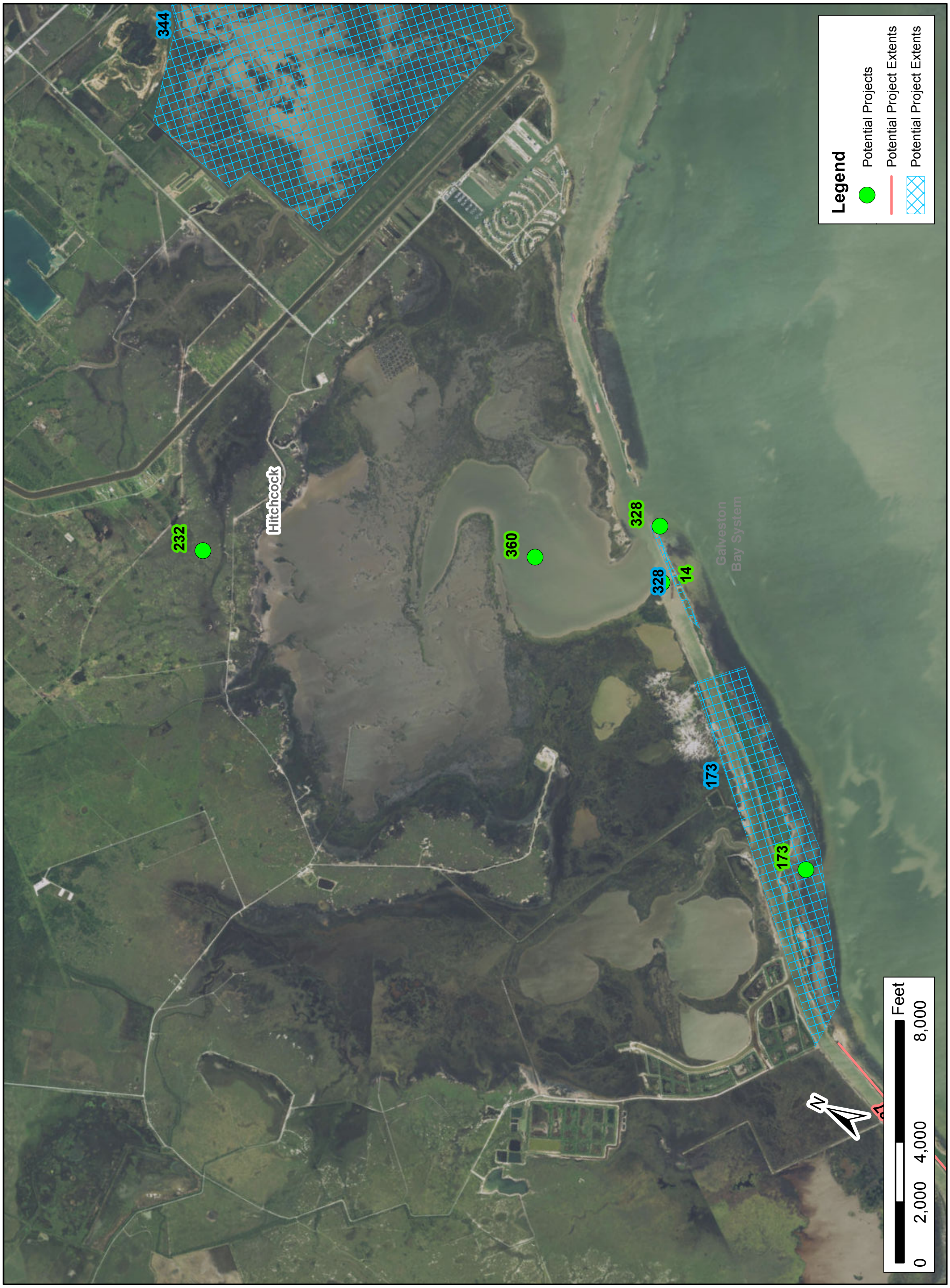
Map 1-Z

Legend
Potential Projects
Potential Project Extents
Potential Project Extents
131
346
346
344
344
Bayou Vista
Tiki Island
Galveston Bay System
180
21
N
0
2,000
4,000
8,000
Feet

Map 1-AA


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Tiki Island
Galveston Bay System
Galveston
180
21
717
618
355
241
793
348
842
349
234
240
314
307
Feet
0
2,000
4,000
8,000
N

Map 1-AB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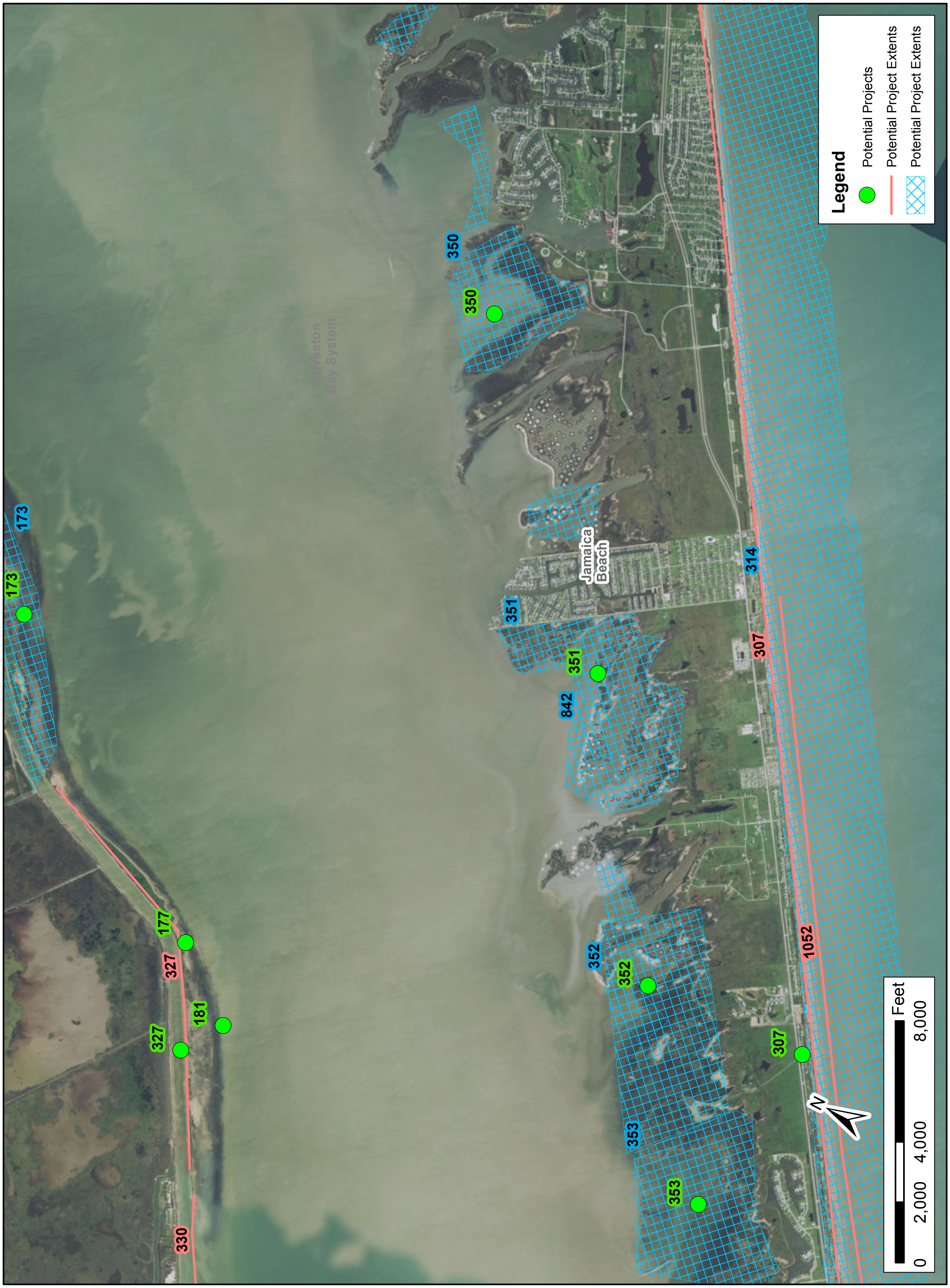
Potential Projects
Potential Project Extents
Potential Project Extents
Hitchcock
Galveston Bay System
344
232
360
328
328
14
173
173
Feet
0
2,000
4,000
8,000

Map 1-AC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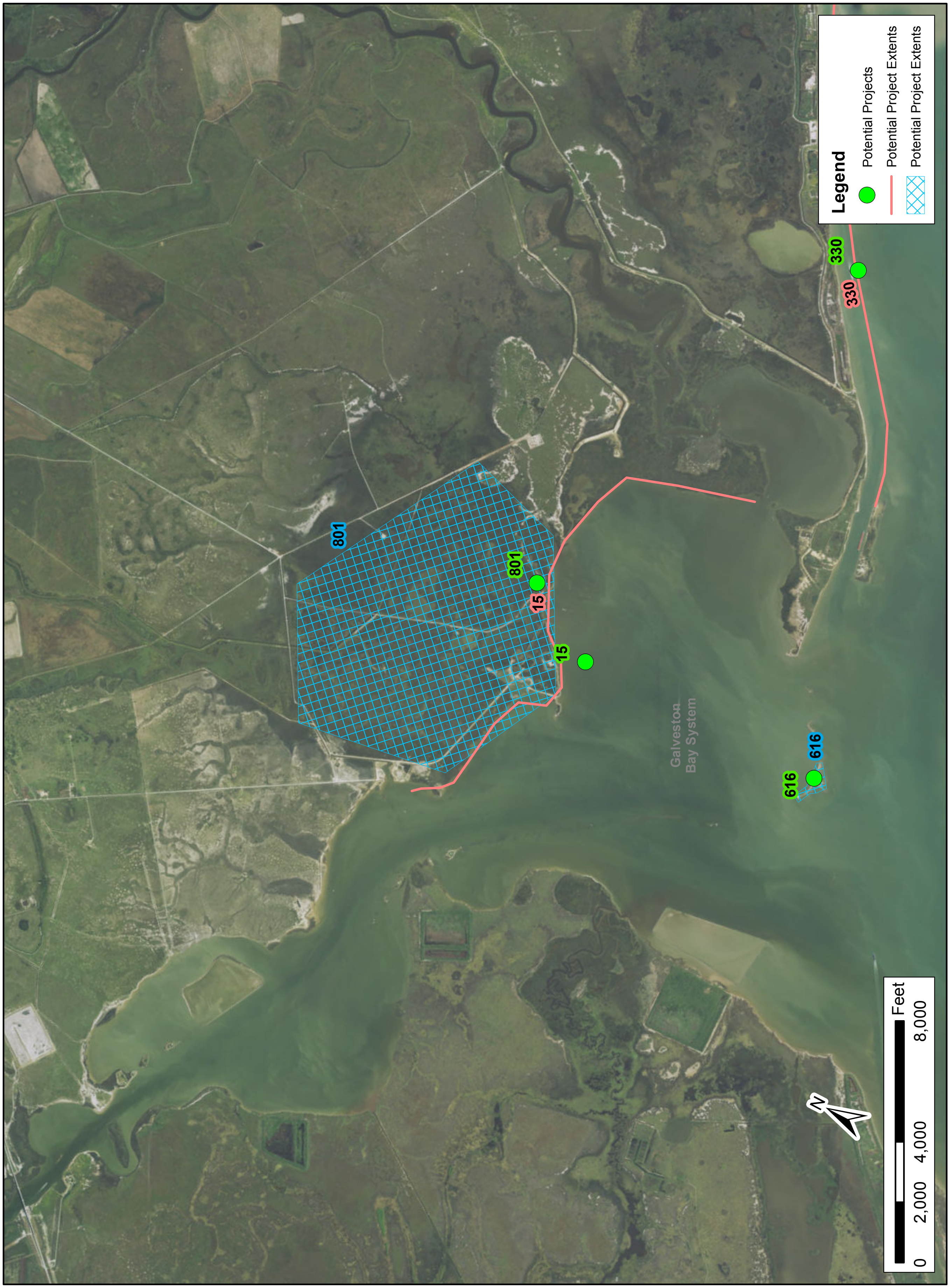
Potential Projects
Potential Project Extents
Potential Project Extents
Jamaica Beach
173
173
177
327
327
181
330
350
350
351
351
842
314
307
307
352
352
353
353
1052
N
0 2,000 4,000 8,000
Feet

Map 1-AD


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
330
330
801
801
15
15
616
616
Galveston Bay System
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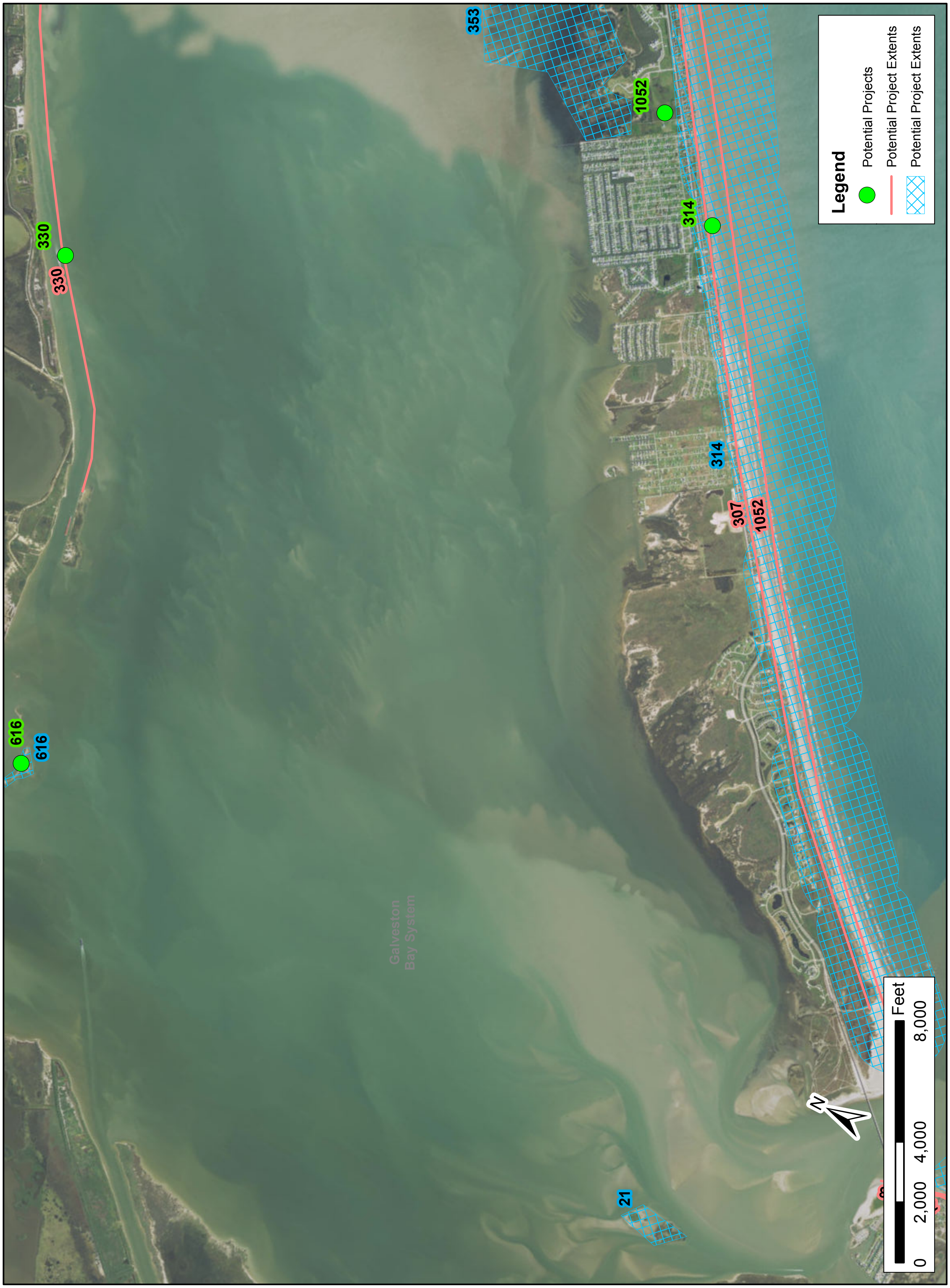
2,000
4,000
8,000
Feet

Map 1-AE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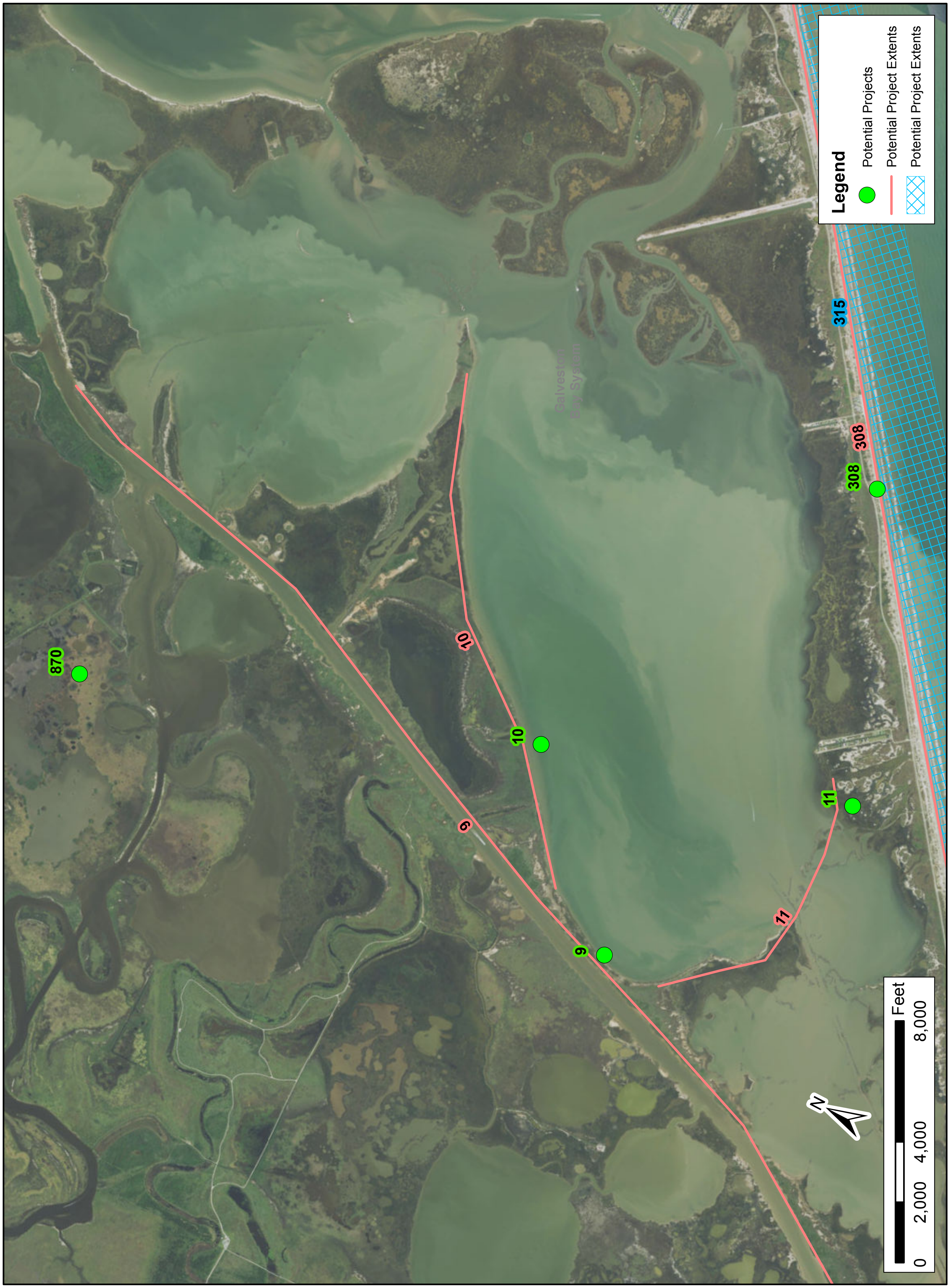
Potential Projects
Potential Project Extents
Potential Project Extents
353
1052
314
330
330
616
616
314
307
1052
21
Galveston Bay System
N
0
2,000
4,000
8,000
Feet

Map 1-AF


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
397
870
9
Galveston Bay System
Feet
0
2,000
4,000
8,000
N

Map 1-AG


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Galveston Bay System
870
10
10
9
9
11
11
308
308
315
N
0 2,000 4,000 8,000
Feet

Map 1-AH


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Feet
0
2,000
4,000
8,000
N
Oyster Creek
9
11
315
6
308
132
318
309
310
133

Map 1-AI


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Freeport
Quintana
Galveston Bay System
308
132
309
132
315
309
637
133
133
310
310
N
0
2,000
4,000
8,000
Feet

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Tony Risko, *Freese and Nichols*
Chris Robbins, *Ocean Conservancy*
Jackie Robinson, *Texas Parks & Wildlife Department*
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Edmond Russo, *U.S. Army Corps of Engineers*
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Angela Sunley, *Texas General Land Office*
Sharon Tirpak, *U.S. Army Corps of Engineers*
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Victoria Vazquez, *Audubon Society*
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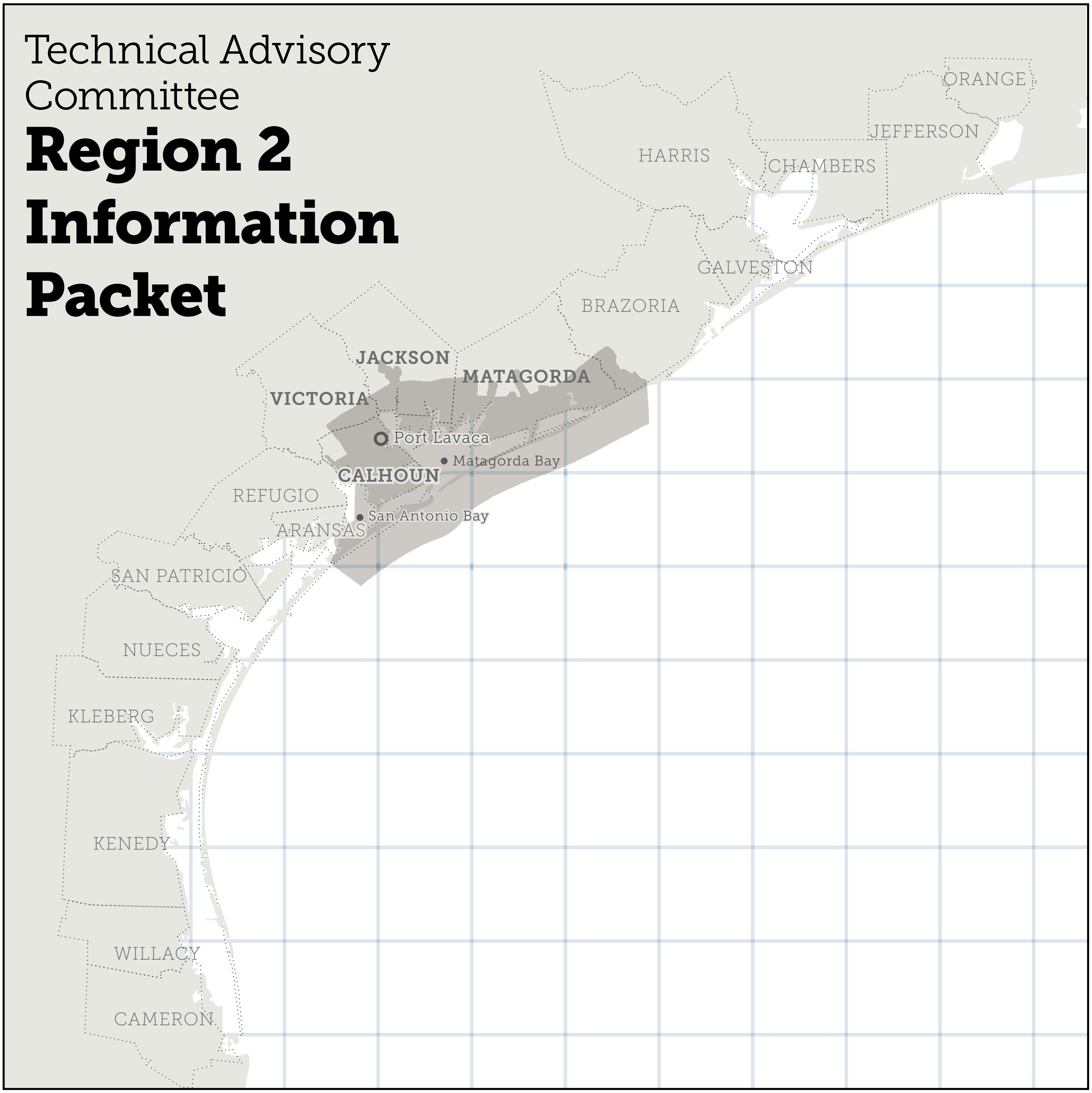
Todd Votteler, *Guadalupe-Blanco River Authority*
Helen Walters, *Texas A&M Galveston*
Micheal Walther, *Coastal Tech*
Len Waterworth, *Texas A&M Galveston*
Sherri Willey, *U.S. Army Corps of Engineers*
Deidre Williams, *Conrad Blucher Institute*
Tony Williams, *Texas General Land Office*
Scott Williams, *Texas Parks & Wildlife Department*
Rusty Woodburn, *Railroad Commission of Texas*
Woody Woodrow, *U.S. Fish & Wildlife Service*

Texas General Land Office

Texas General Land Office

Technical Advisory Committee
Region 2 Information Packet



Texas Coastal Resiliency Master Plan

Technical Advisory Committee Region 2 Information Packet Table of Contents

NOTES:

The Table of Contents for the Technical Advisory Committee Workbook has been included for your convenience here.

Region 2 Technical Advisory Committee Workbook Table of Contents

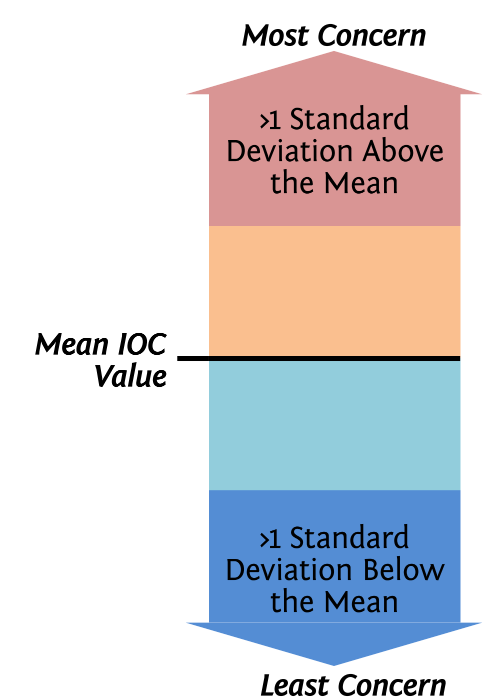
Project Type	Project Subtypes
Land Acquisitions	• Acquisitions • Conservation Easements • Fee Simple
Public Access & Improvements	• ADA Accessibility • Walkovers • Piers, Boat Ramps
Studies, Policies & Programs	• Erosion Response Plans • Structure Raising • Setbacks • Studies • Sediment Management
Shoreline Stabilization	• Seawall • Bulkhead • Revetment • Breakwater • Misc. Wave Break • Jetty • Groin
Flood Risk Reduction	• Levees • Flood Wall • Storm Surge Barrier • Road Elevation
Structure/Debris Removal	• Structures on Public's Easements • Abandoned Oil and/or Gas Wells • Abandoned Boats • Dock Pilings • Post Storm Cleanup • Plastics, Glass, Rubber, Metal • Obstacles
Habitat Creation & Restoration	• Marsh • Oyster Reef • Wetlands/Forested Wetlands • Barrier Islands • Coastal Prairies • Rookery Islands
Wildlife	• Fisheries • Birds • Oysters • Sea Turtles • Invasive Species
Environmental	• Fresh Water Inflow • Hydrologic Restoration
Beach Nourishment	• Bay • Gulf
Dune Restoration	• Dune

Issue(s) of Concern Addressed & Example Considerations

- **Altered, Lost, or Degraded Habitat - *ALDH***
  - » Seagrass
  - » Mangroves
  - » Coastal Marshes
  - » Forested Wetlands
  - » Coastal Prairies
  - » Invasive Species
  - » Future Projections of Loss
- **Gulf Beach Erosion and Dune Degradation - *GBEDD***
  - » Subsidence
  - » Sediment Deficit
  - » Impacts from Development
  - » Storm Impacts
  - » Erosion
  - » Sea Level Rise
- **Bay Shoreline Erosion - *BSE***
  - » Subsidence
  - » Sediment Deficit
  - » Impacts from Development
  - » Storm Impacts
  - » Erosion
  - » Sea Level Rise
- **Existing and Future Coastal Storm Surge Damage - *EFCSSD***
  - » Sea Level Rise
  - » Coastal Storms
  - » Impacts from Development
- **Coastal Flood Damage - *CFD***
  - » Rainfall
  - » Associated Riverine
  - » Nuisance Flooding
  - » Impacts from Development
- **Impacts on Water Quality and Quantity - *IWQQ***
  - » Freshwater Inflows
  - » Nutrients
  - » Water Pollution (Chemical)
  - » Sediment
  - » Saltwater Intrusion
  - » Nonpoint Source
  - » Hydrologic Connectivity
  - » Harmful Algal Blooms
  - » Oil Spills
- **Impacts on Coastal Resources - *ICR***
  - » Oysters
  - » Turtles
  - » Birds
  - » Fish
  - » Crabs
  - » Endangered Species
- **Abandoned or Derelict Vessels, Structures and Debris - *ADVSD***
  - » Obstructions to Public's Easement
  - » Abandoned Oil and/or Gas Wells
  - » Abandoned Boats
  - » Dock Pilings
  - » Post Storm Cleanup
  - » Obstacles
  - » Plastics, Glass, Rubber, Metal

Issue of Concern Categories

The Issues of Concern (IOC) categories were determined statistically based on the 2016 TAC survey results collected in May and June. The highest threshold represents all subregional IOC values that were at least one standard deviation above the average IOC value. The second highest threshold represents the remaining subregional IOC values above the mean IOC value. The third and fourth thresholds were determined in the same manner, but fall below the average IOC value.



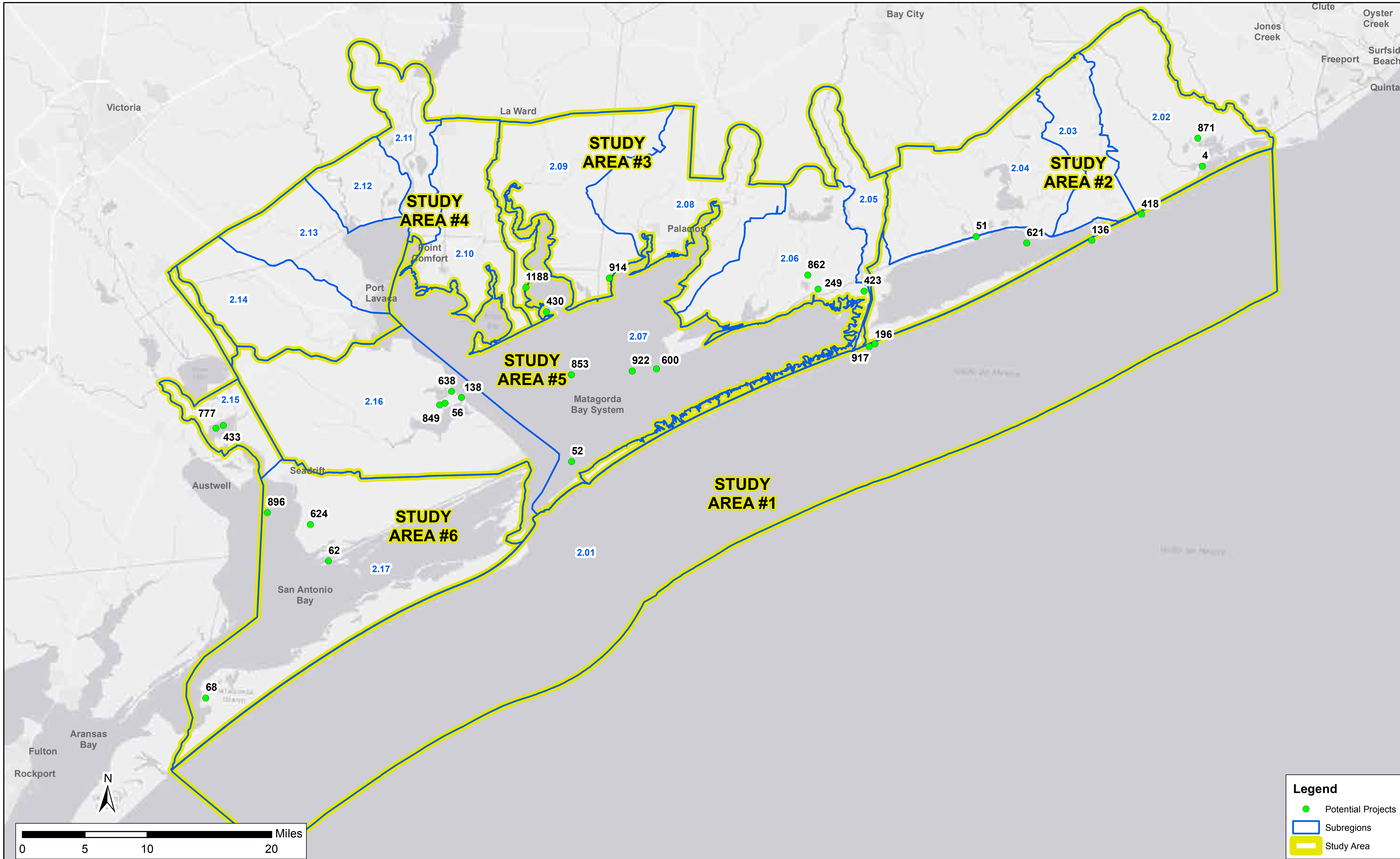
Definitions

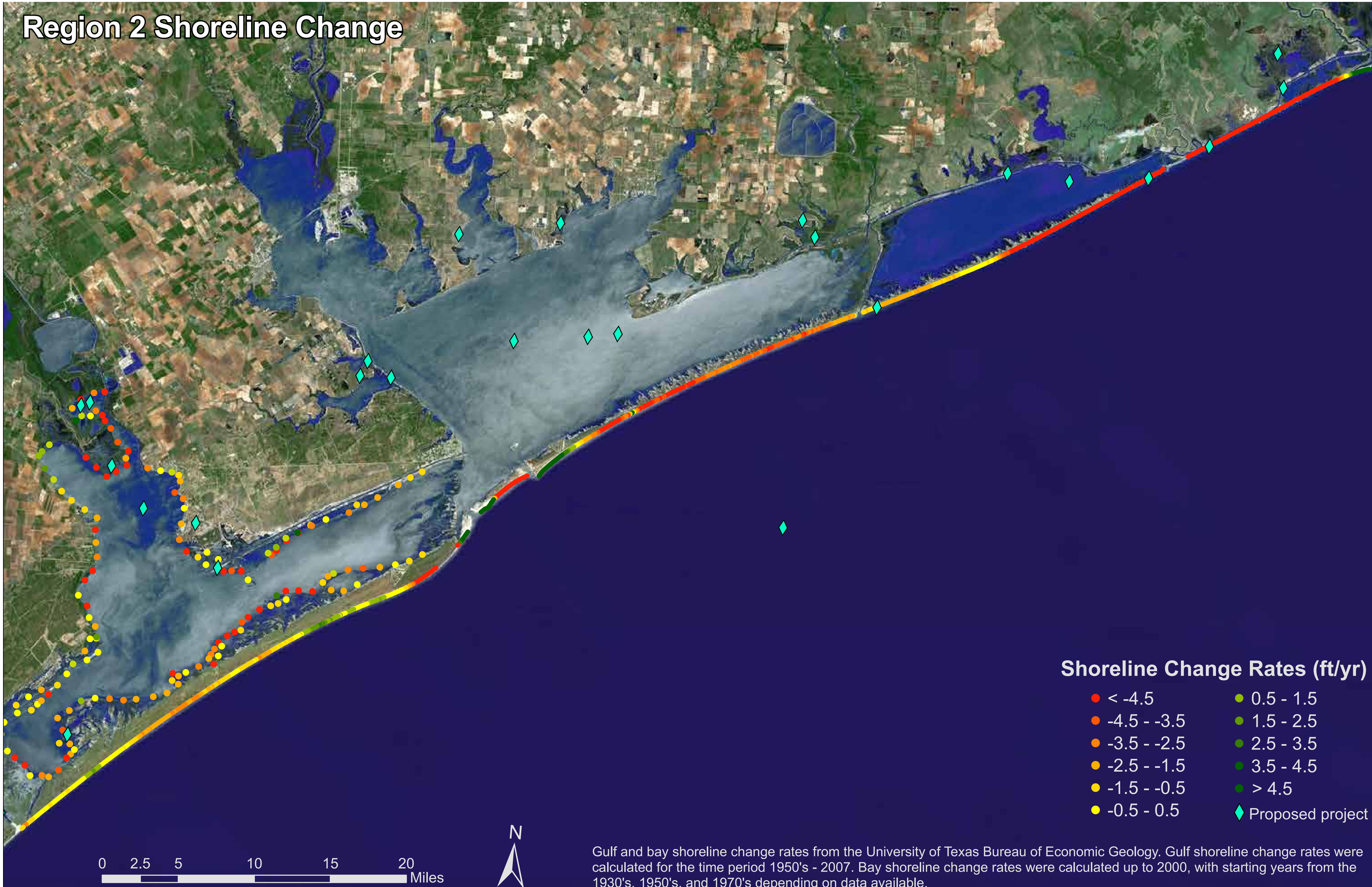
Priority: A program, project, policy, or course of action determined to be of particular significance and warranting prompt attention and action.

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.

Texas Coastal Resiliency Master Plan

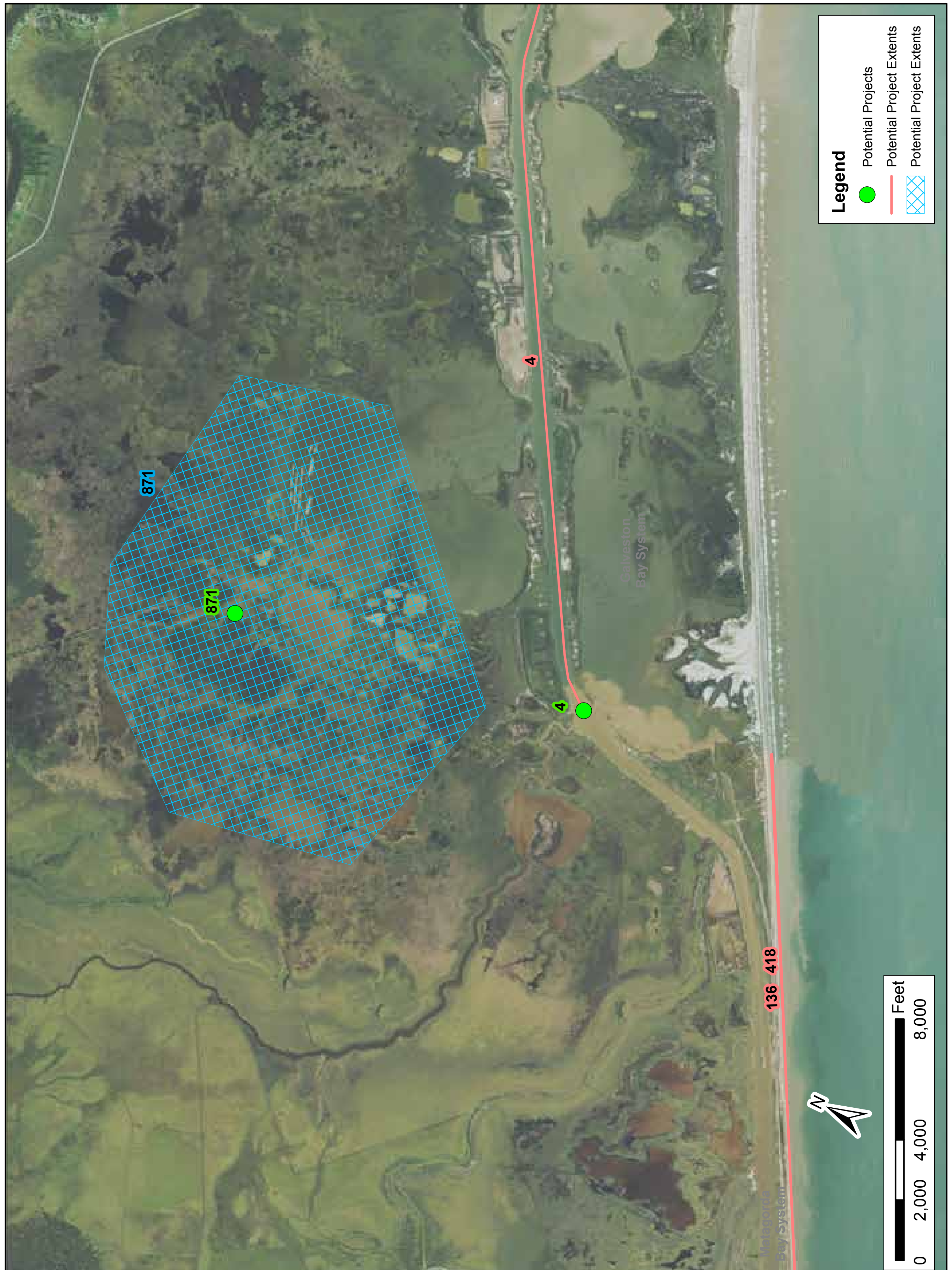
Region 2 Overview




Region 2 Shoreline Change
Shoreline Change Rates (ft/yr)
< -4.5
-4.5 - -3.5
-3.5 - -2.5
-2.5 - -1.5
-1.5 - -0.5
-0.5 - 0.5
0.5 - 1.5
1.5 - 2.5
2.5 - 3.5
3.5 - 4.5
> 4.5
Proposed project
0 2.5 5 10 15 20
Miles
N
Gulf and bay shoreline change rates from the University of Texas Bureau of Economic Geology. Gulf shoreline change rates were calculated for the time period 1950's - 2007. Bay shoreline change rates were calculated up to 2000, with starting years from the 1930's, 1950's, and 1970's depending on data available.

Region 2 Index Map

Map 2-A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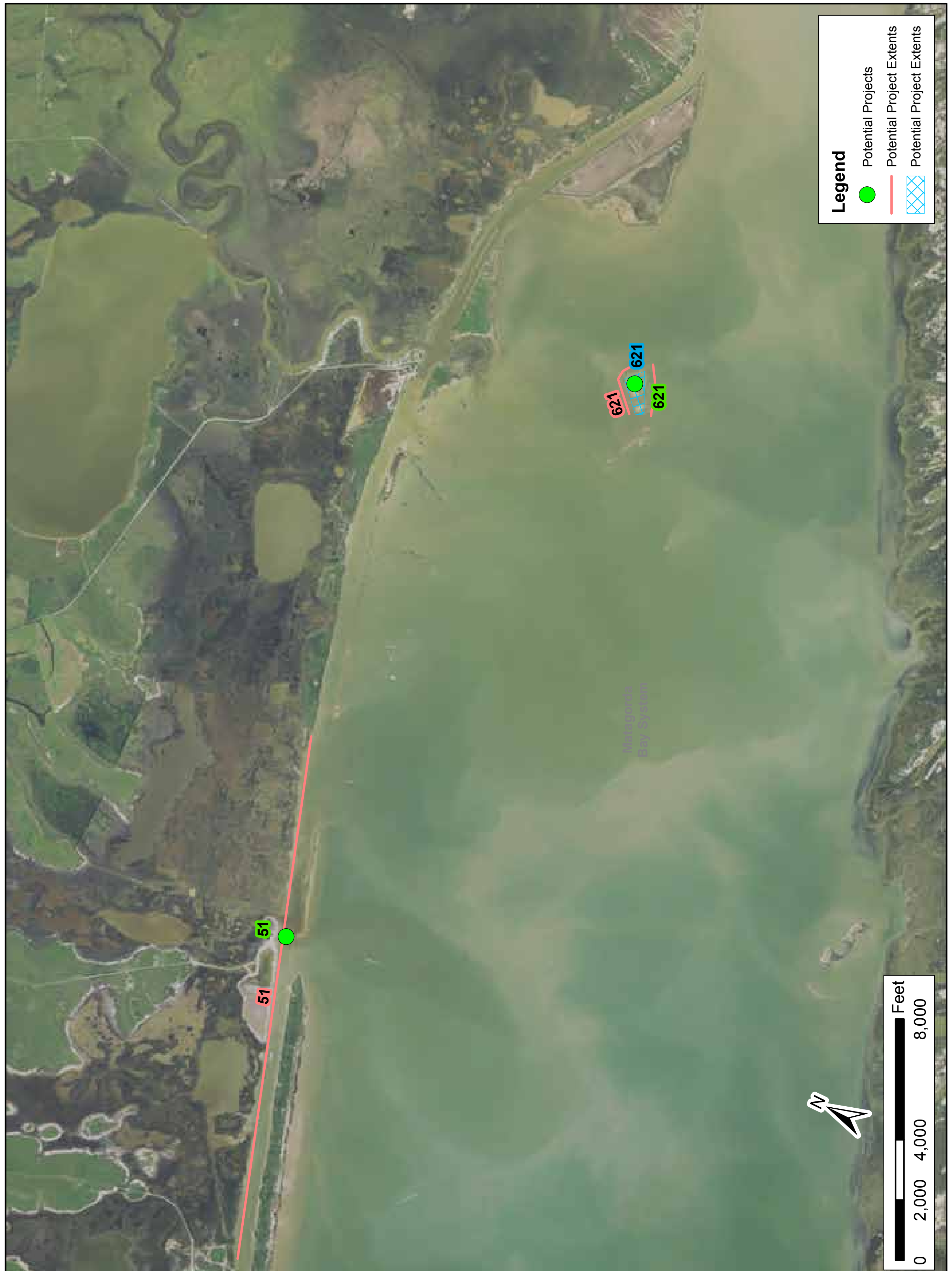
Potential Projects
Potential Project Extents
Potential Project Extents
871
4
418
136
Feet
0
2,000
4,000
8,000
N

Map 2-B

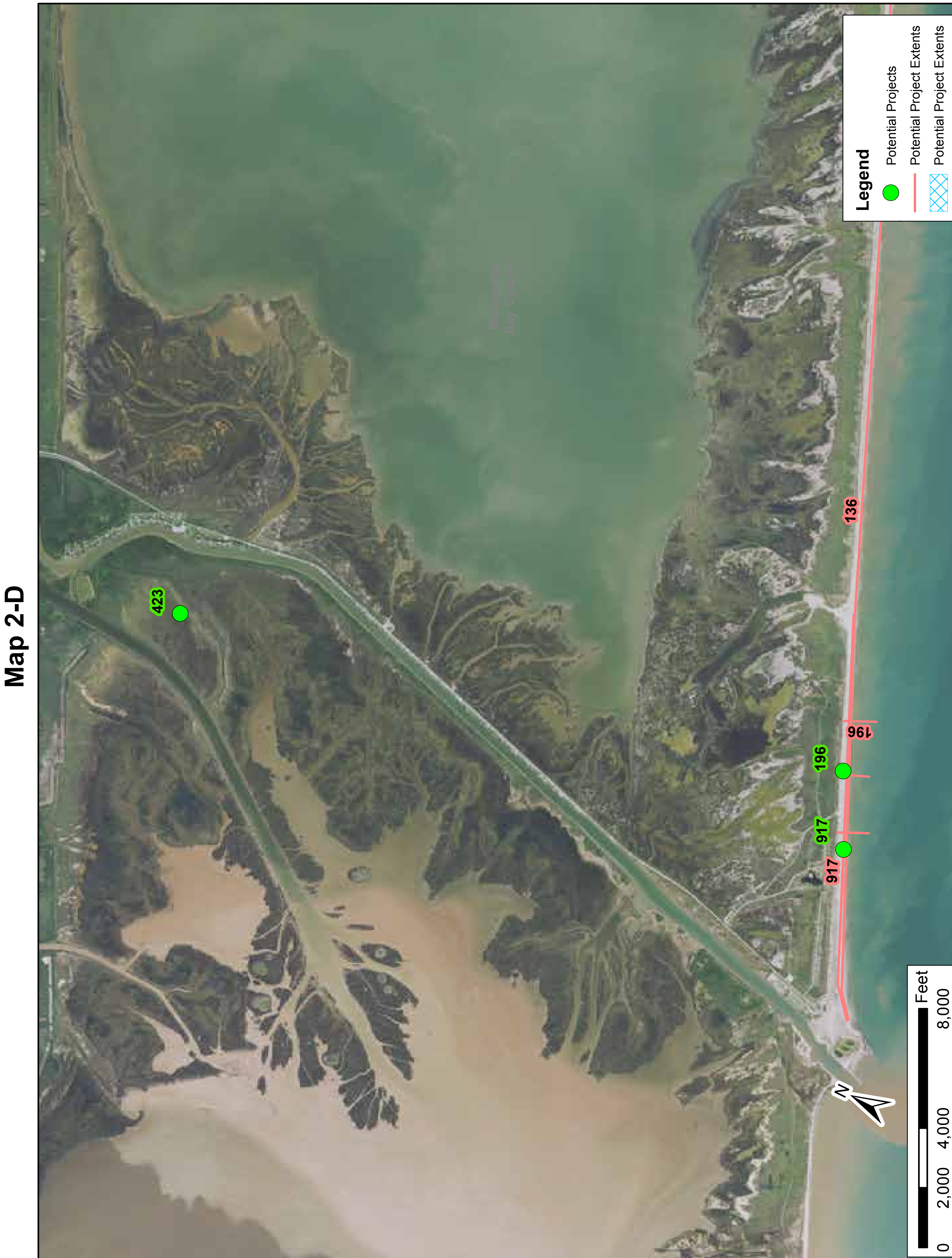

Legend
Potential Projects
Potential Project Extents
Potential Project Extents
418
136
Matagorda Bay System
Feet
0
2,000
4,000
8,000
N

Map 2-C



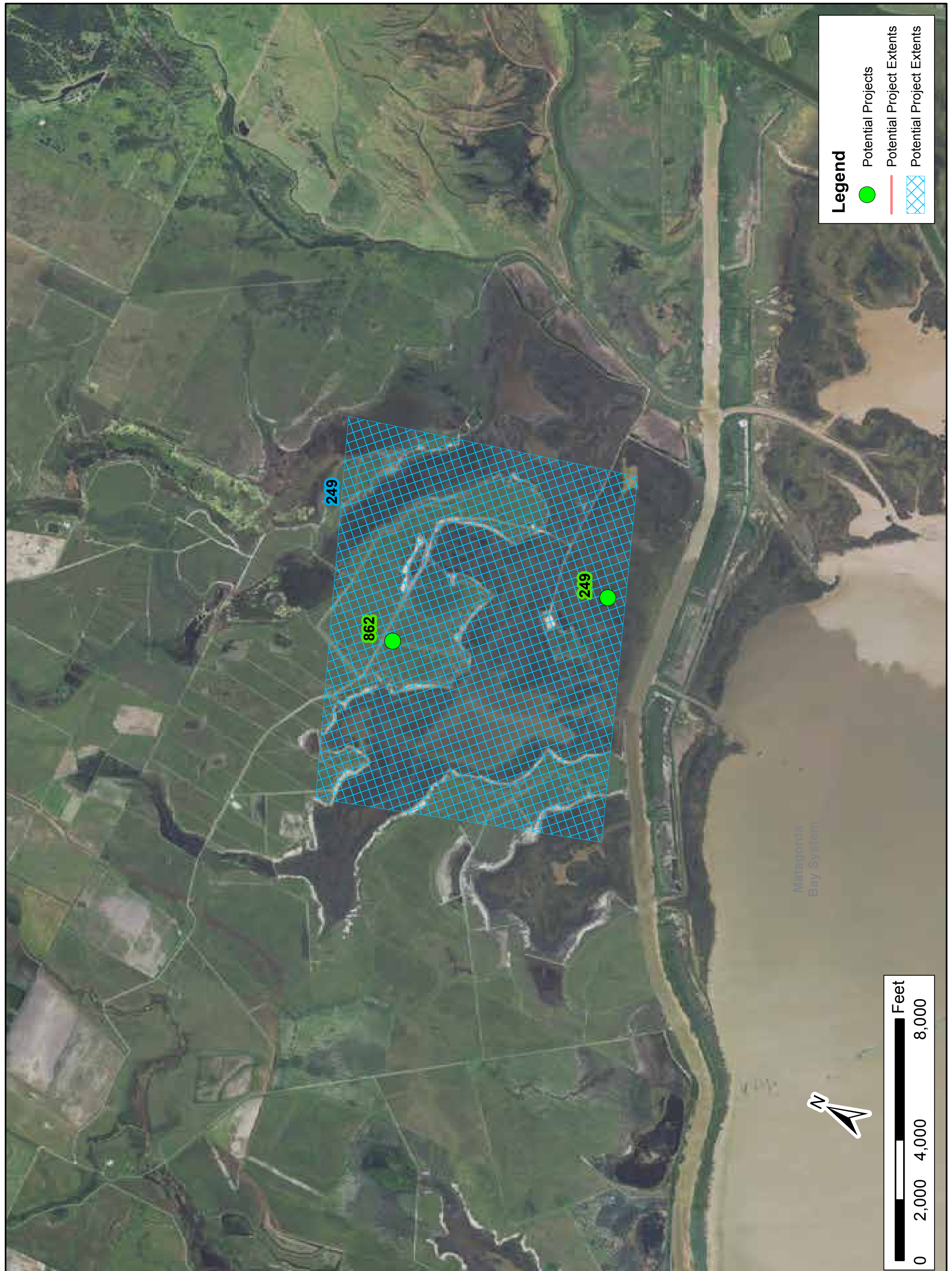
Legend
Potential Projects
Potential Project Extents
Potential Project Extents
621
621
621
51
51
N
Feet
0
2,000
4,000
8,000

Map 2-D



Legend
Potential Projects
Potential Project Extents
Potential Project Extents
136
196
196
917
917
423
N
Feet
0
2,000
4,000
8,000

Map 2-E


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
249
862
249
Matagorda Bay System
Feet
0
2,000
4,000
8,000
N

Map 2-F


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
914
914
430
430
1188
Matagorda Bay System
Feet
0
2,000
4,000
8,000
N

Map 2-G


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
600
922
853
Matagorda Bay System
0
2,000
4,000
8,000
Feet

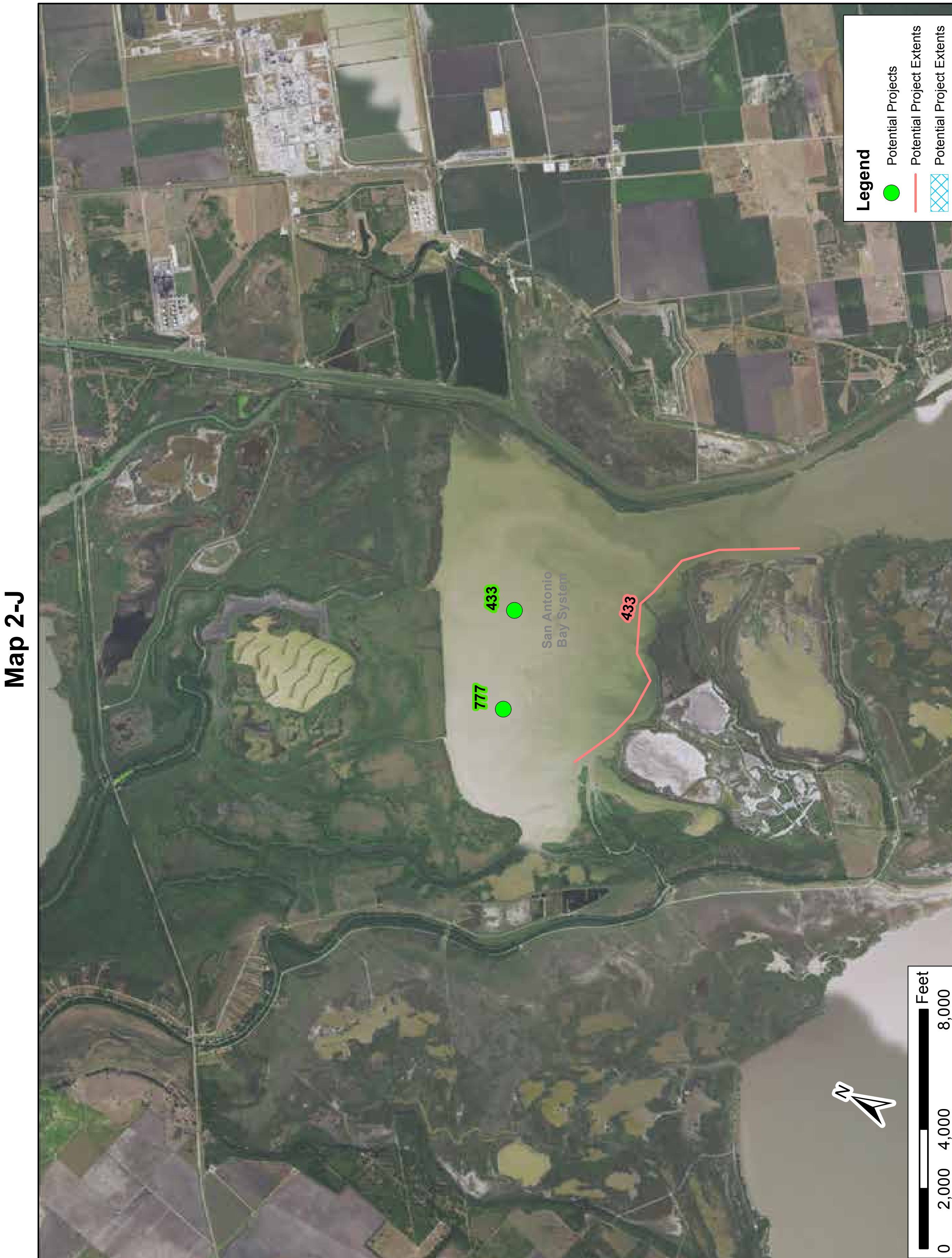
Map 2-H


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
52
52
138
Matagorda Bay System
Bay System
0
2,000
4,000
8,000
Feet

Map 2-I


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
638
138
638
138
56
849
Feet
0
2,000
4,000
8,000

Map 2-J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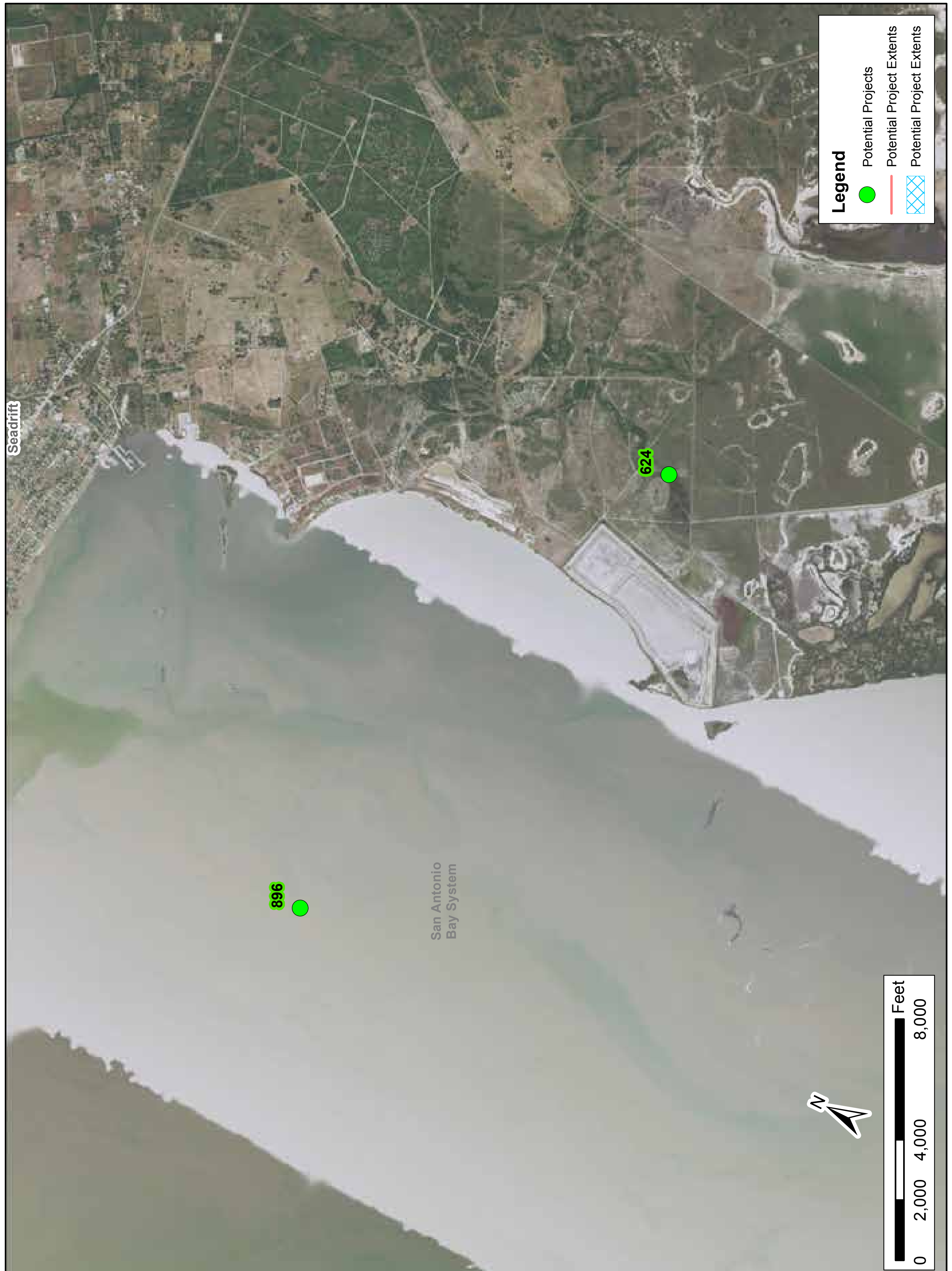
Potential Projects
Potential Project Extents
Potential Project Extents
433
433
777
San Antonio Bay System
Feet
0
2,000
4,000
8,000

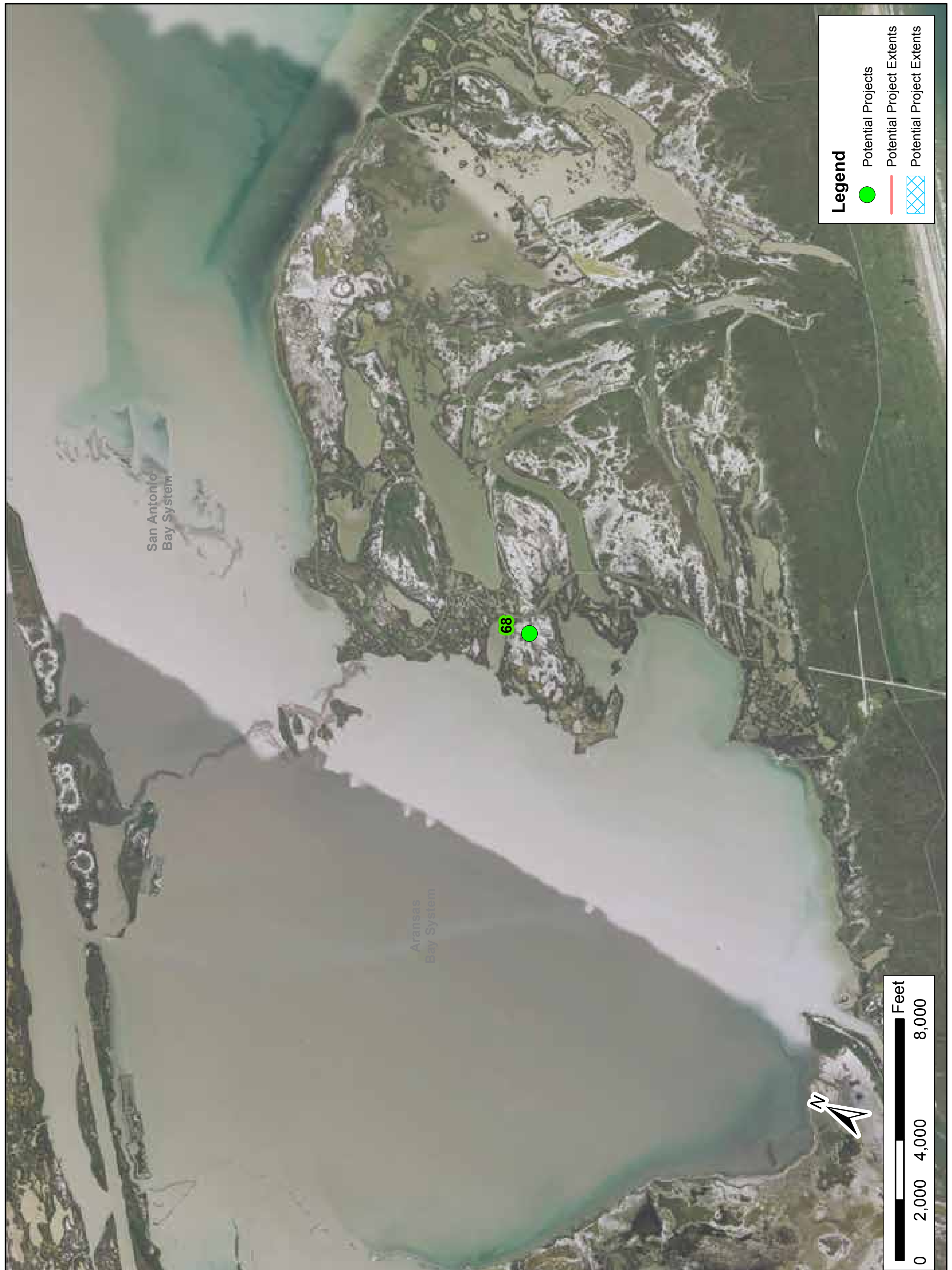
Map 2-K


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Seadrift
624
896
San Antonio Bay System
N
Feet
0
2,000
4,000
8,000

Map 2-L


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
624
62
San Antonio Bay System
N
Feet
0
2,000
4,000
8,000

Map 2-M



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Texas General Land Office

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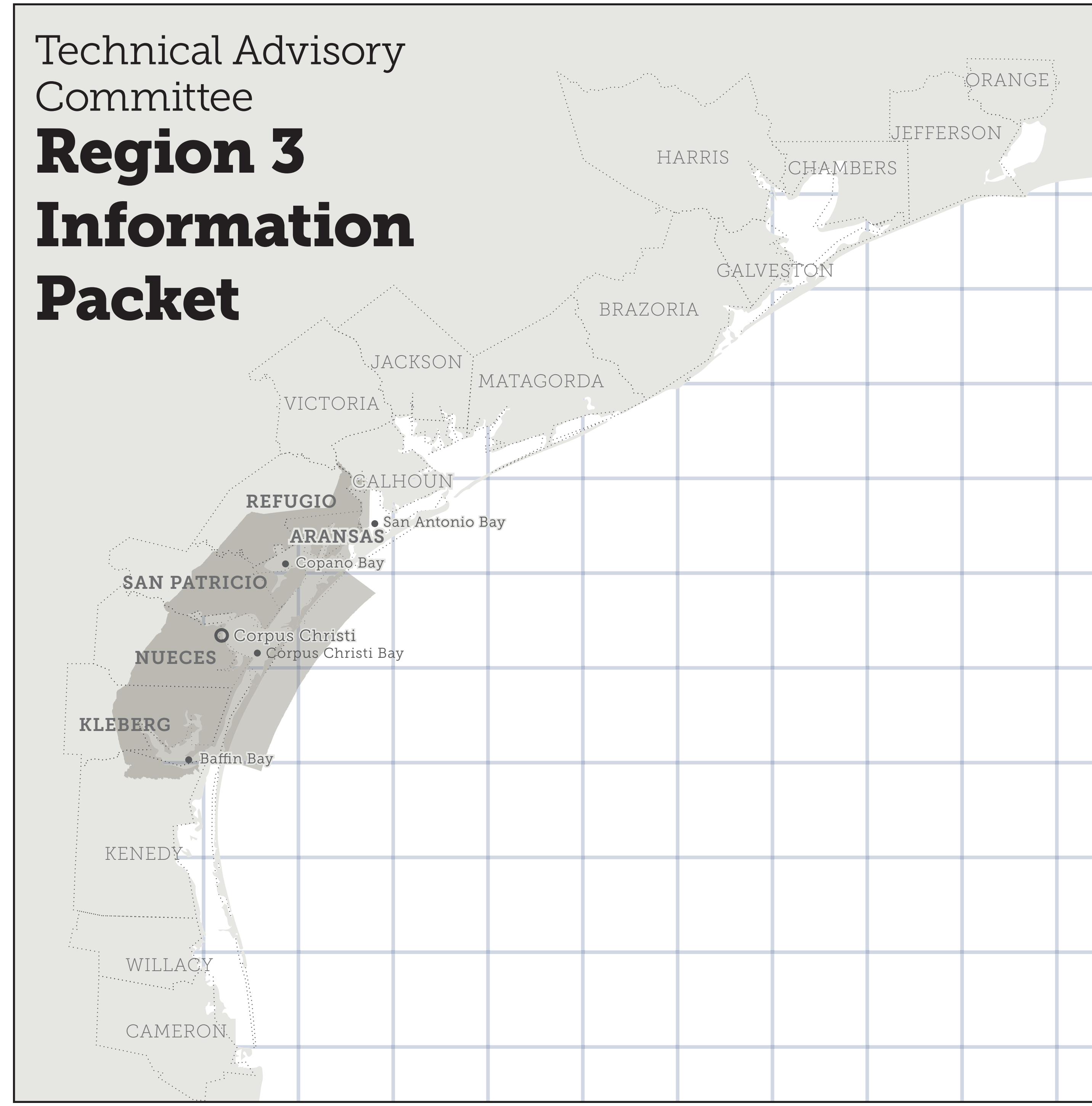
Texas General Land Office

Technical Advisory Committee

Region 3 Information Packet



Texas Coastal Resiliency Master Plan

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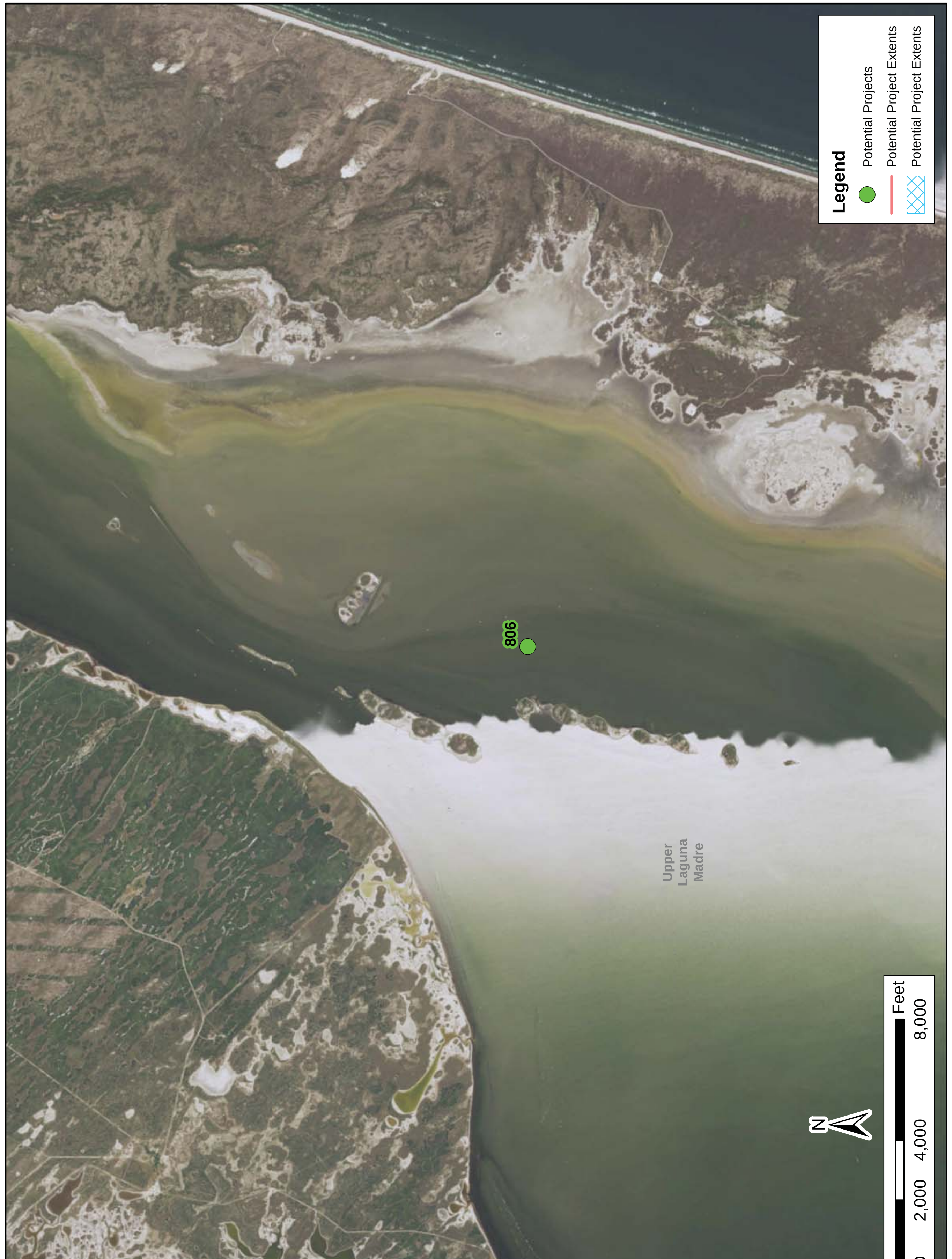
Map 3-K



Technical Advisory Committee Region 3 Information Packet Table of Contents

Meeting Agenda
July 12, 2016, 8:30 am – 5:00 pm
Harte Research Institute

8:30 am ....Welcome and Introductions

8:45 am ....Texas Coastal Resiliency Master Plan Overview (Presentation)
- Plan Goals and Objectives
- Plan Status
- Meeting Objectives

9:15 am ....Region 3 Overview (Handout)
- Issues of Concern
- Study Area and Potential Projects

Group Discussion by Study Area (Workbook)

9:30 am ....Study Area #1: Gulf Facing Beaches and Dunes

9:45 am ....Study Area #2: Aransas Bay

10:15 am *Break*

10:25 am...........Study Area #3: Copano Bay

10:55 am...........Project Gap Analysis Discussion

11:10 am ....Study Area #4: Corpus Christi Bay

12:10 pm...........Project Gap Analysis Discussion

Lunch Provided at 12:25 pm

1:00 pm ....Study Area #5: Nueces Bay

2:00 pm ....Study Area #6: Upper Laguna Madre

2:15 pm ....Project Gap Analysis Discussion

2:30 pm *Break*

2:45 pm ....Regionwide Study Area

3:45 pm ....Project Gap Analysis Discussion

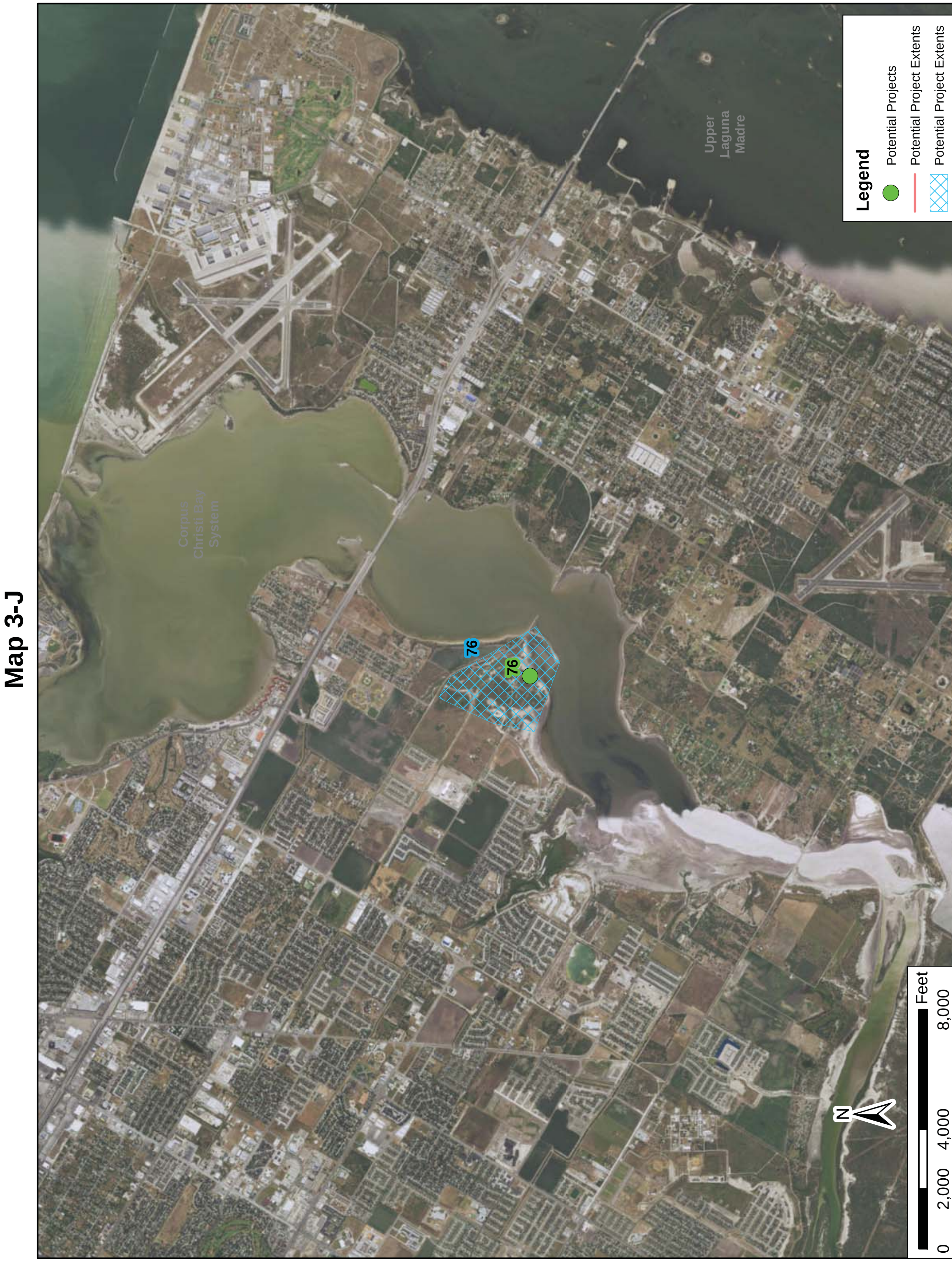
4:00 pm ....Summarize Group Findings

4:30 pm ....Conclusion: Next Steps

5:00 pm ....Adjourn (Turn in comment cards, workbooks, clickers, and badges)*

**Remember your parking validation tickets*

Map 3-J



Map 3-I

Texas Coastal Resiliency Master Plan

The Table of Contents for the Technical Advisory Committee Workbook has been included for your convenience here.

Region 3 Technical Advisory Committee Workbook Table of Contents

Project Type	Project Subtypes
Land Acquisitions	• Acquisitions • Conservation Easements • Fee Simple
Public Access & Improvements	• ADA Accessibility • Walkovers • Piers, Boat Ramps
Studies, Policies & Programs	• Erosion Response Plans • Structure Raising • Setbacks • Studies • Sediment Management
Shoreline Stabilization	• Seawall • Bulkhead • Revetment • Breakwater • Misc. Wave Break • Jetty • Groin
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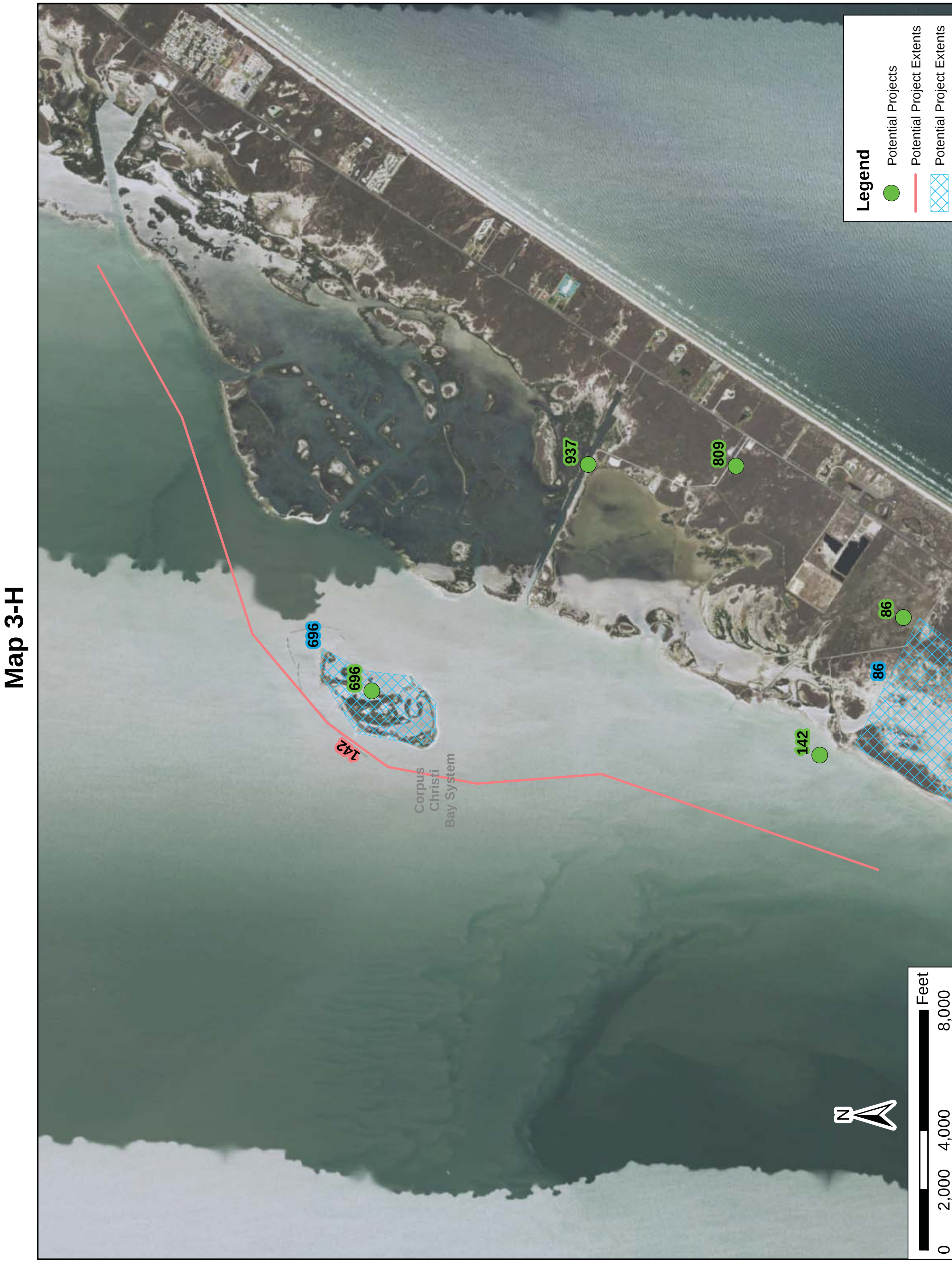
Wildlife	• Fisheries • Birds • Oysters • Sea Turtles • Invasive Species
Environmental	• Fresh Water Inflow • Hydrologic Restoration
Beach Nourishment	• Bay • Gulf
Dune Restoration	• Dune

Map 3-H



Map 3-G

Issue(s) of Concern Addressed & Example Considerations

- **Altered Degraded, or Lost Habitat - *ALDH***
  - Seagrass
  - Mangroves
  - Coastal Marshes
  - Forested Wetlands
  - Coastal Prairies
  - Invasive Species
  - Future Projections of Loss
- **Gulf Beach Erosion and Dune Degradation - *GBEDD***
  - Subsidence
  - Sediment Deficit
  - Impacts from Development
  - Storm Impacts
  - Erosion
  - Sea Level Rise
- **Bay Shoreline Erosion - *BSE***
  - Subsidence
  - Sediment Deficit
  - Impacts from Development
  - Storm Impacts
  - Erosion
  - Sea Level Rise
- **Existing and Future Coastal Storm Surge Damage - *EFCSSD***
  - Sea Level Rise
  - Coastal Storms
  - Impacts from Development
- **Coastal Flood Damage - *CFD***
  - Rainfall
  - Associated Riverine
  - Nuisance Flooding
  - Impacts from Development
- **Impacts on Water Quality and Quantity - *IWQQ***
  - Freshwater Inflows
  - Nutrients
  - Water Pollution (Chemical)
  - Sediment
  - Saltwater Intrusion
  - Nonpoint Source
  - Hydrologic Connectivity
  - Harmful Algal Blooms
  - Oil Spills
- **Impacts on Coastal Resources - *ICR***
  - Oysters
  - Turtles
  - Birds
  - Fish
  - Crabs
  - Endangered Species
- **Abandoned or Derelict Vessels, Structures and Debris - *ADVSD***
  - Obstructions to Public's Easement
  - Abandoned Oil and/or Gas Wells
  - Abandoned Boats
  - Dock Pilings
  - Post Storm Cleanup
  - Obstacles
  - Plastics, Glass, Rubber, Metal

Issue of Concern Categories

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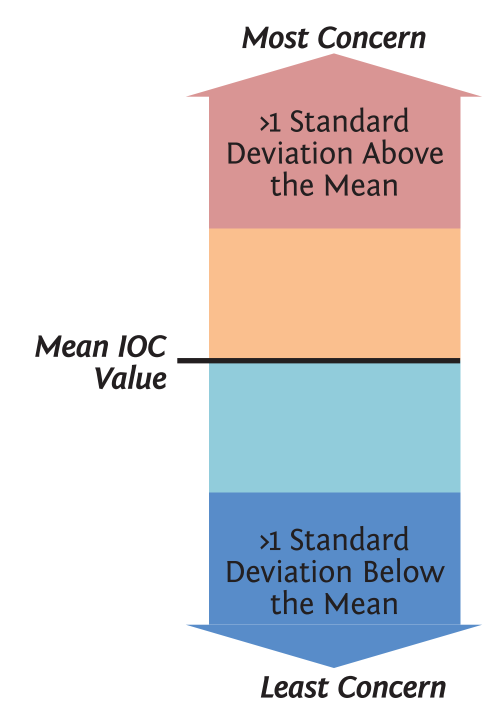
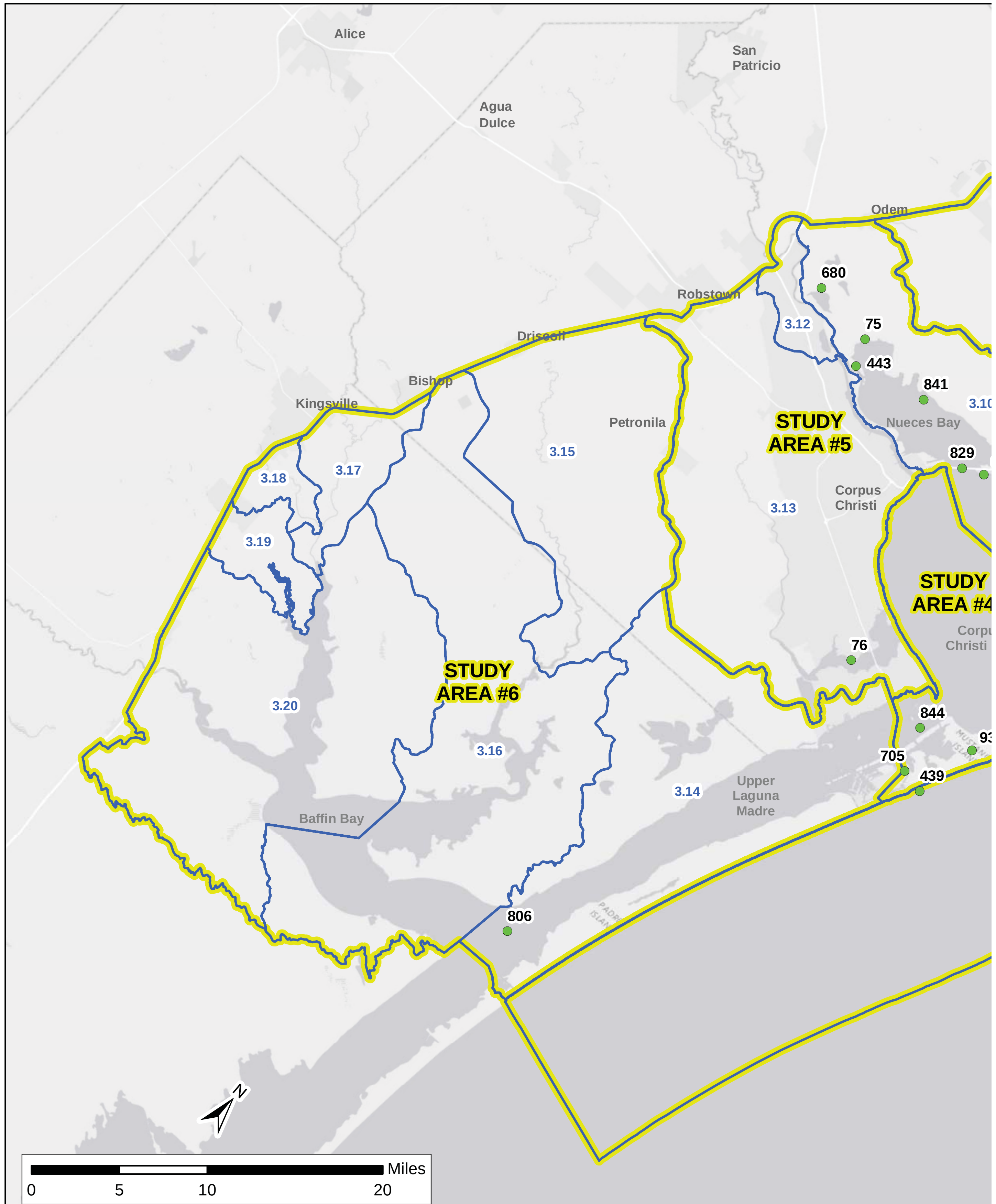


Definitions

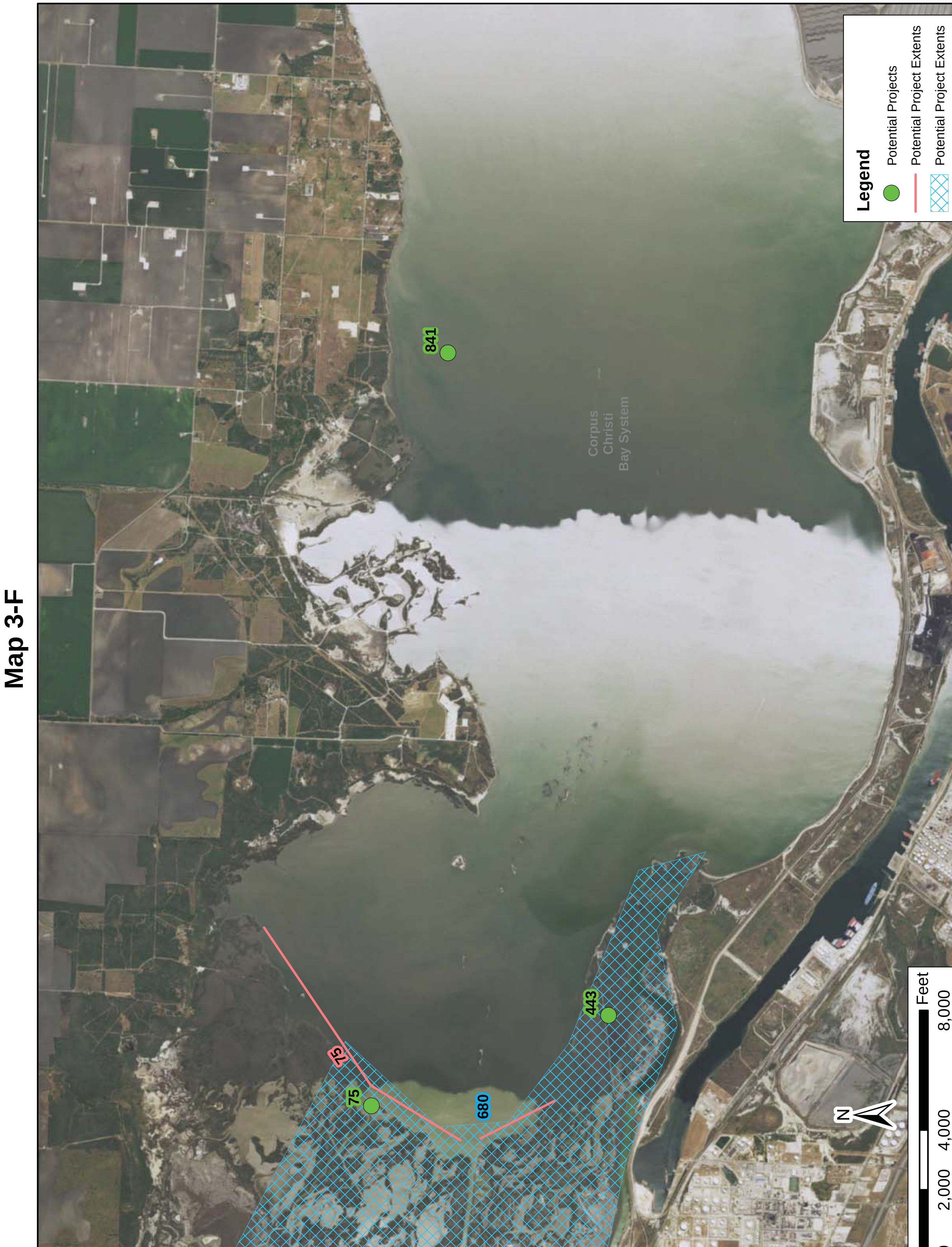
Priority: A program, project, policy, or course of action determined to be of particular significance and warranting prompt attention and action.

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.

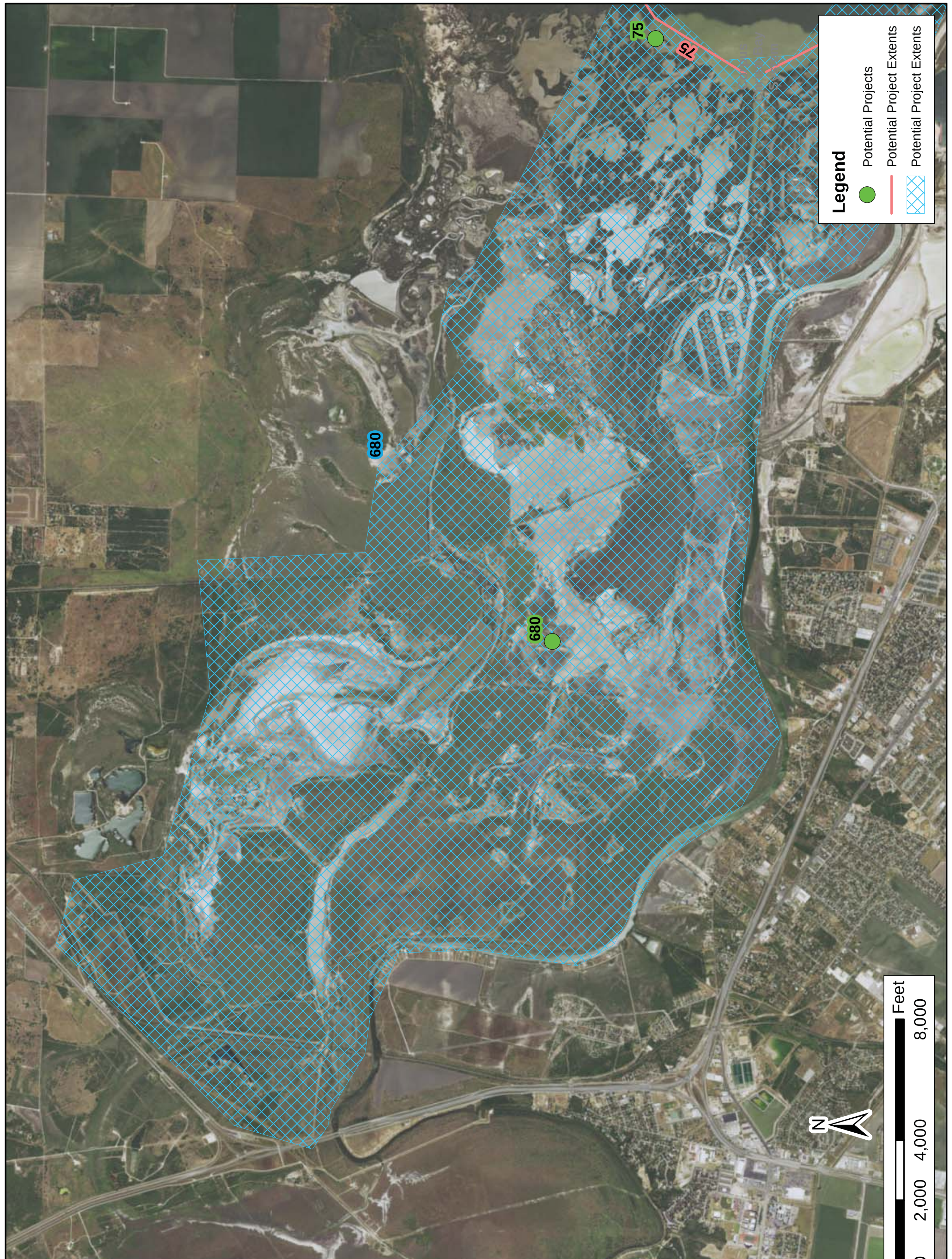
Region 3 O



Map 3-F



Map 3-E



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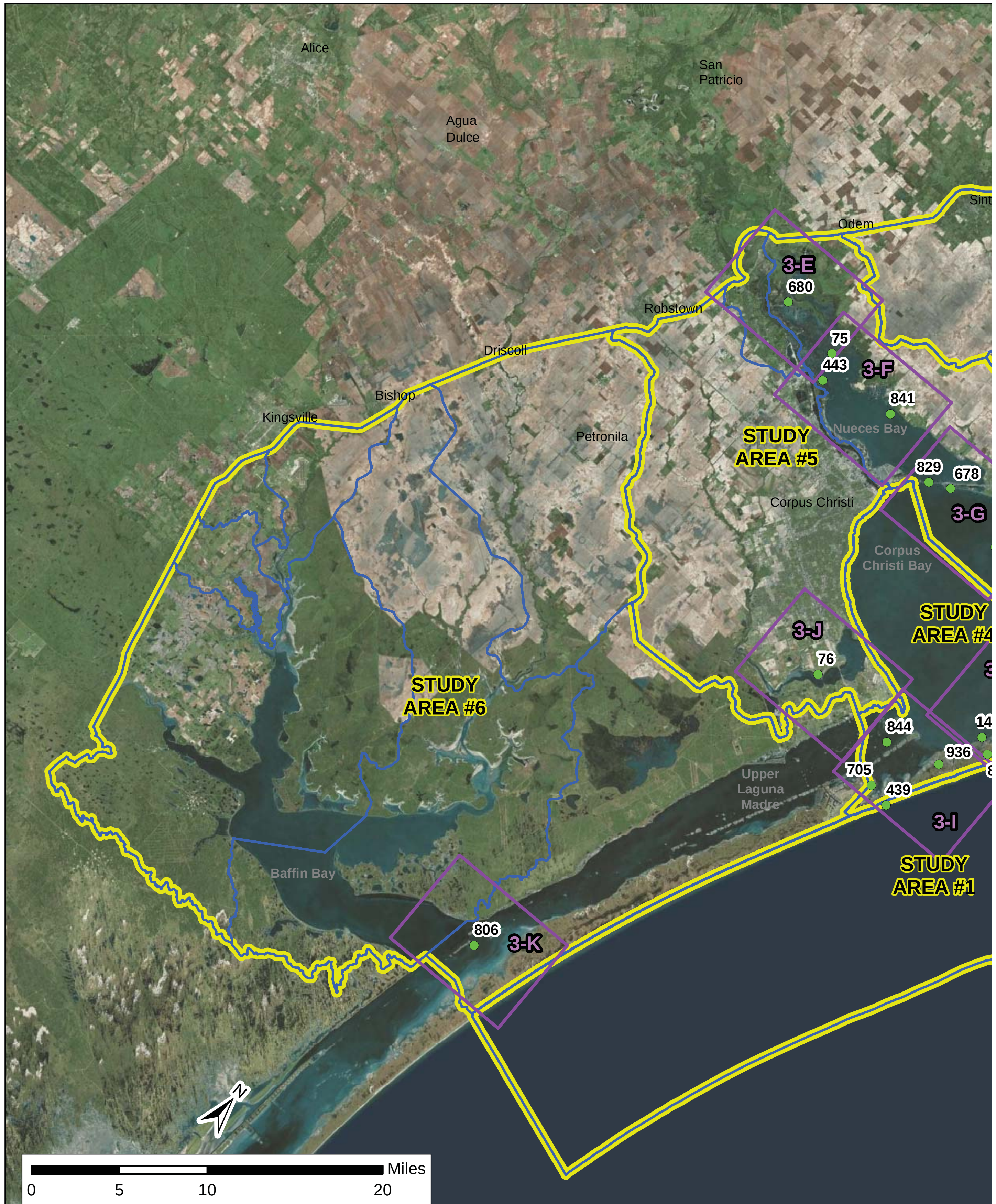
Region 3 Ir



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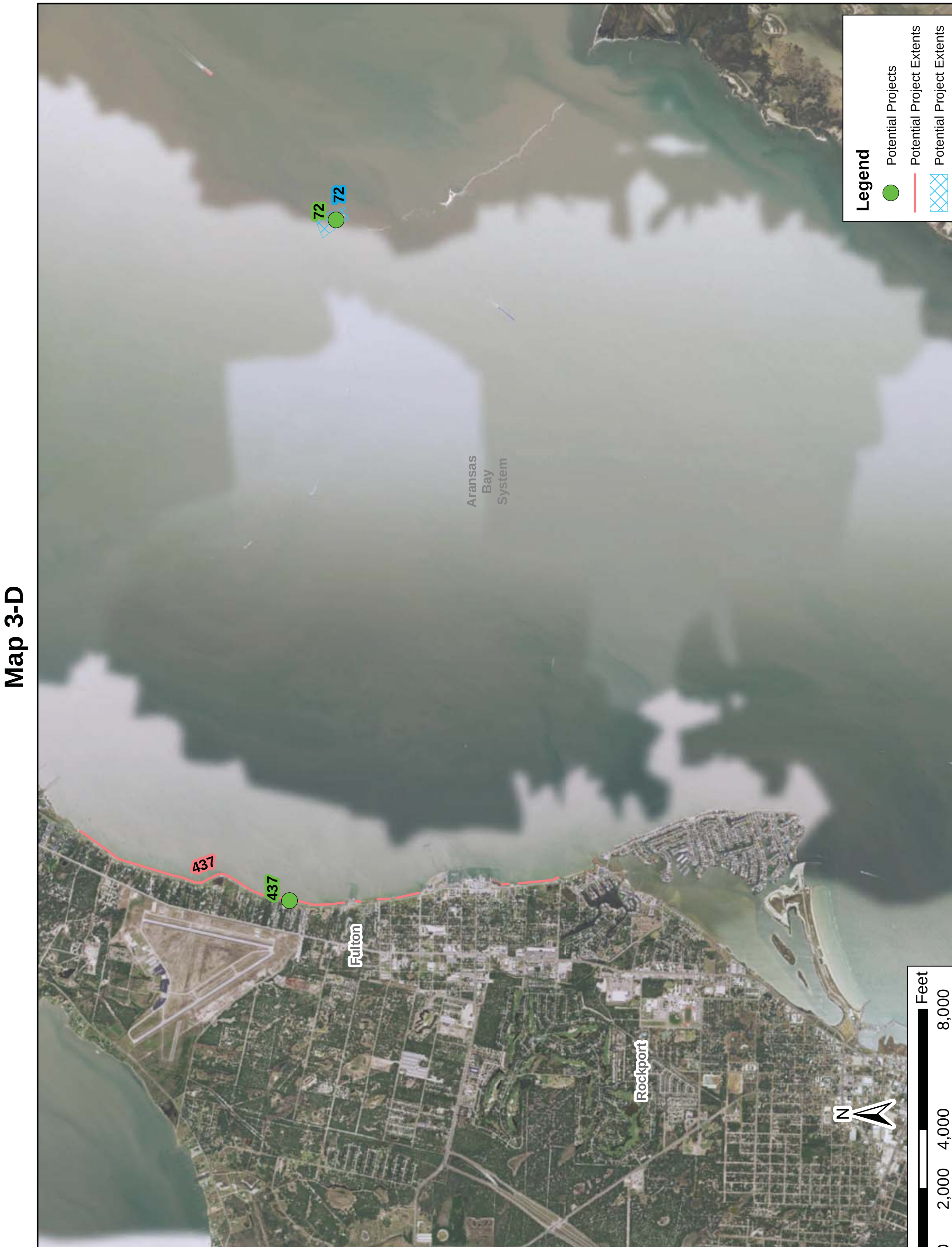

Map 3-C

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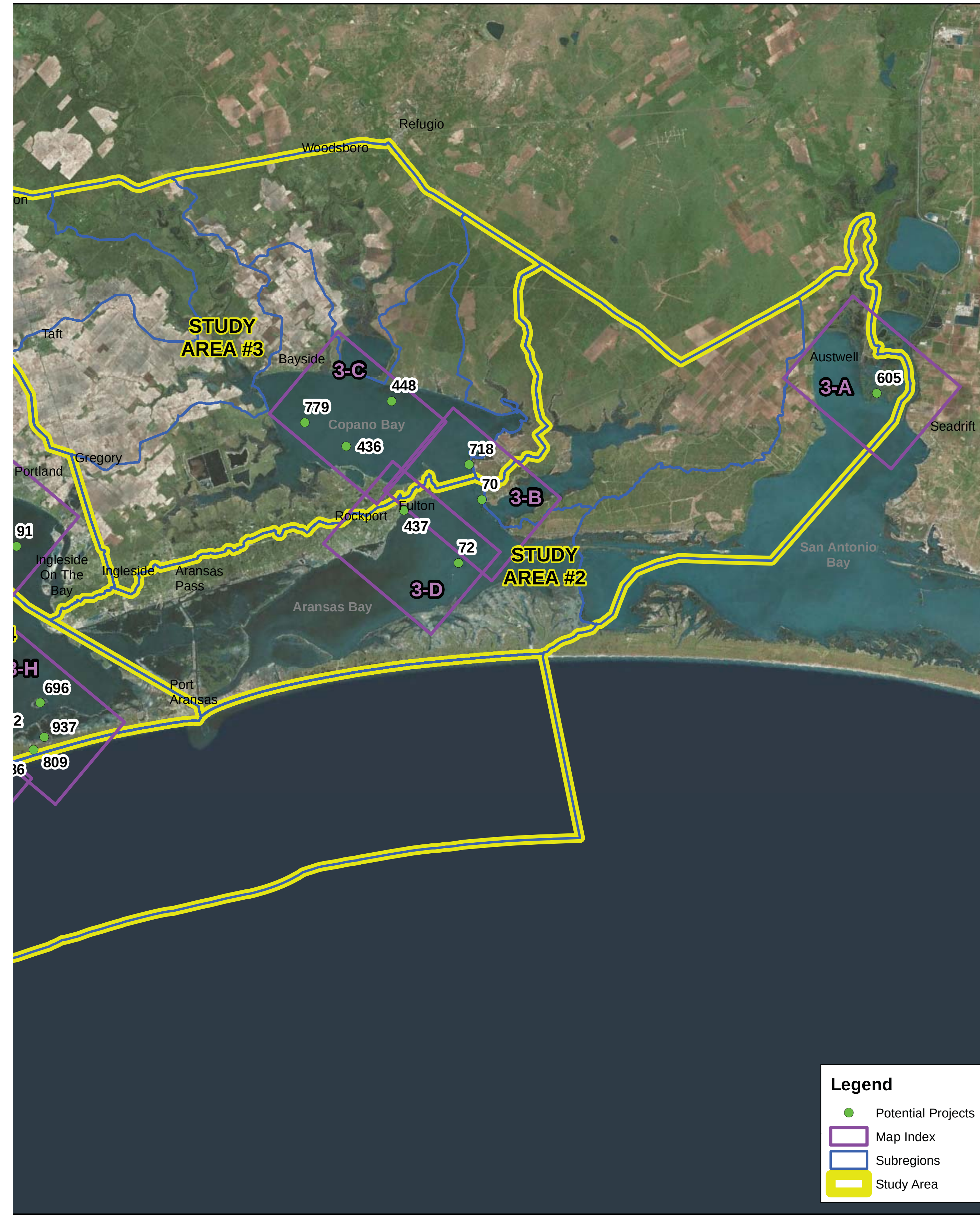
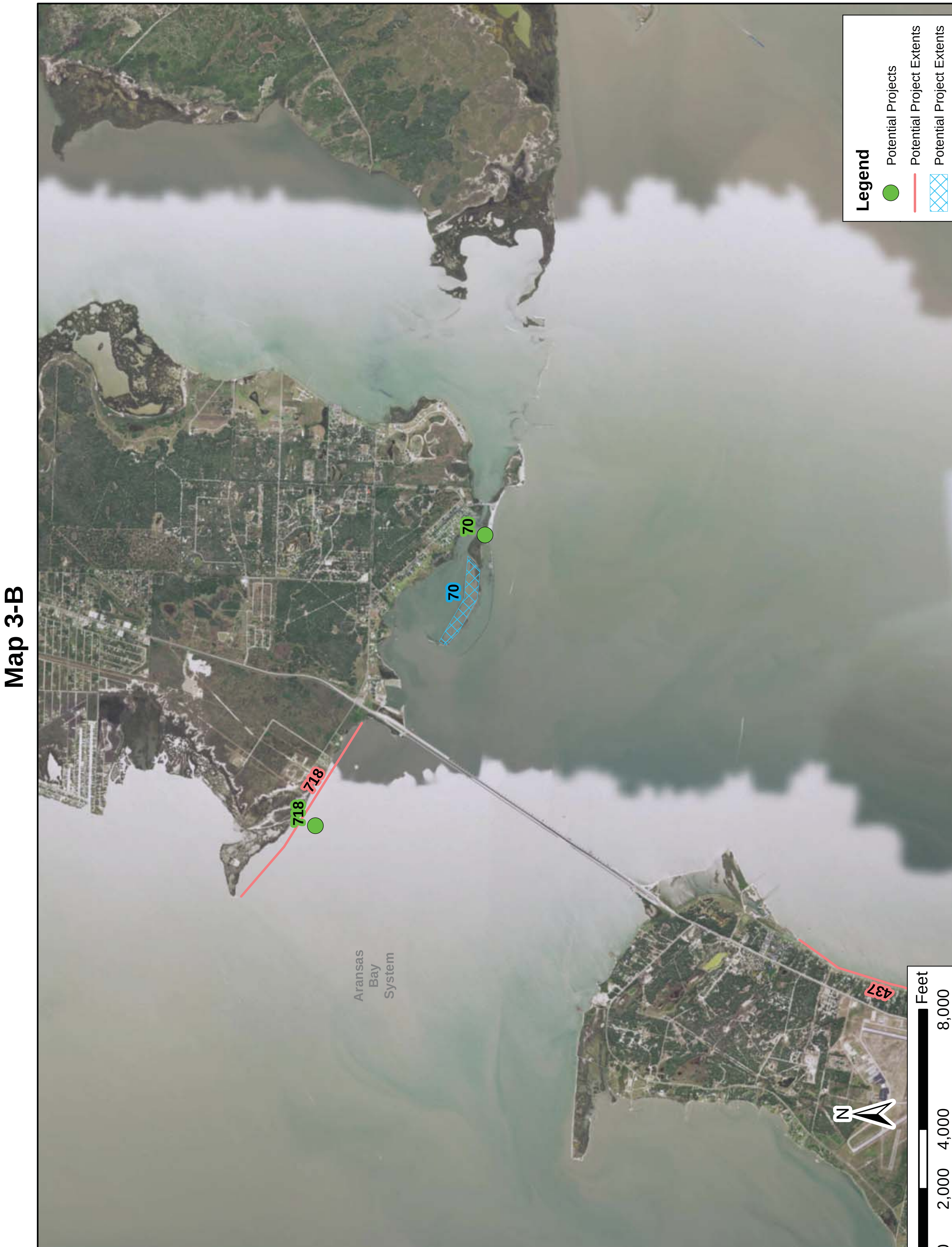


Map 3-A


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
605
605
605
San Antonio Bay System
Austwell
N
Feet
0
2,000
4,000
8,000

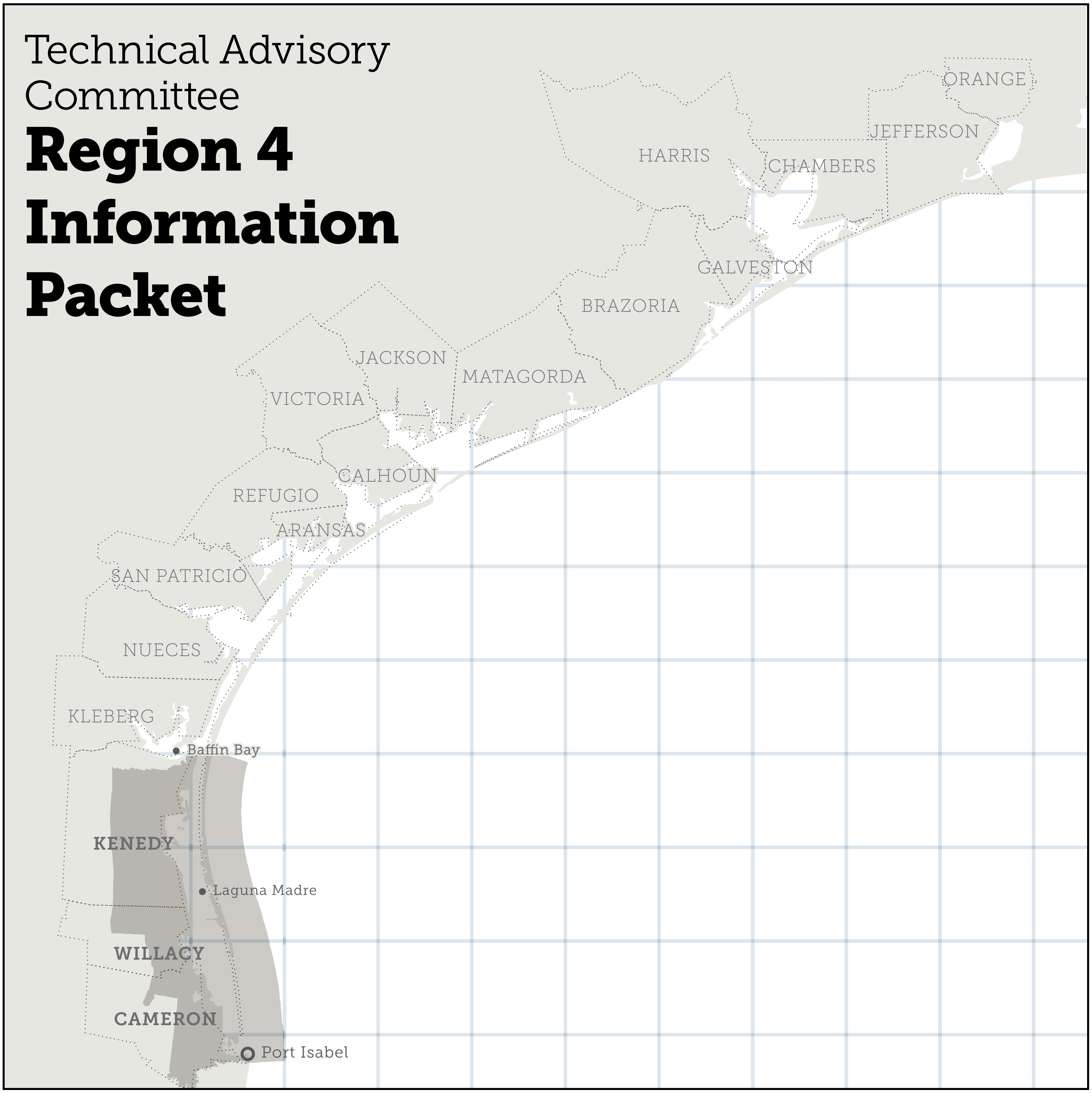
Map 3-B


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
70
70
718
718
437
Aransas Bay System
N
Feet
0
2,000
4,000
8,000

Texas General Land Office

Technical Advisory Committee

Region 4 Information Packet



Texas Coastal Resiliency Master Plan

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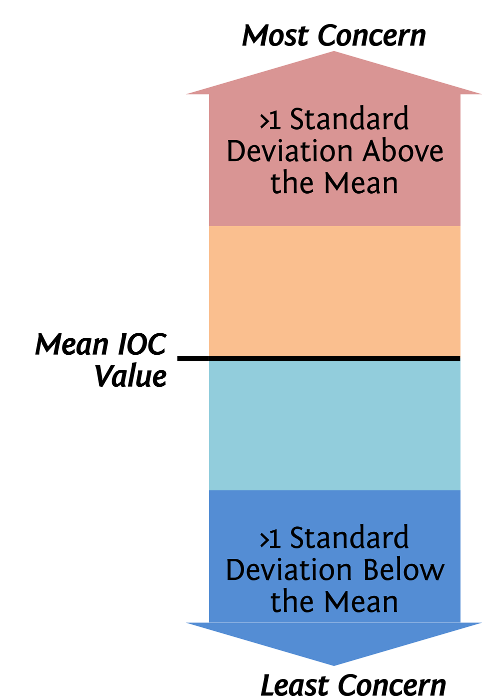
Issue of Concern Categories

The Issues of Concern (IOC) categories were determined statistically based on the 2016 TAC survey results collected in May and June. The highest threshold represents all subregional IOC values that were at least one standard deviation above the average IOC value. The second highest threshold represents the remaining subregional IOC values above the mean IOC value. The third and fourth thresholds were determined in the same manner, but fall below the average IOC value.



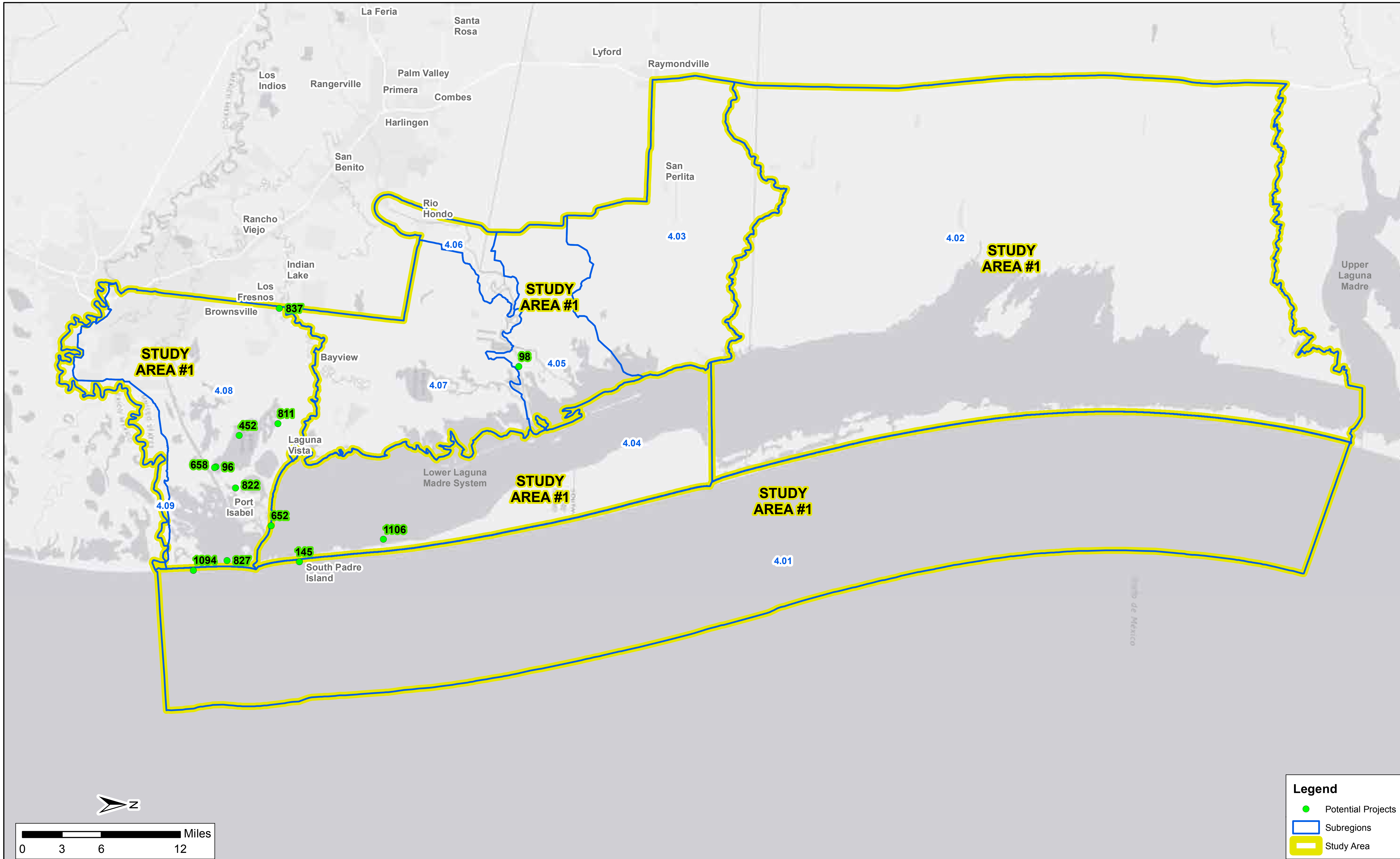
Definitions

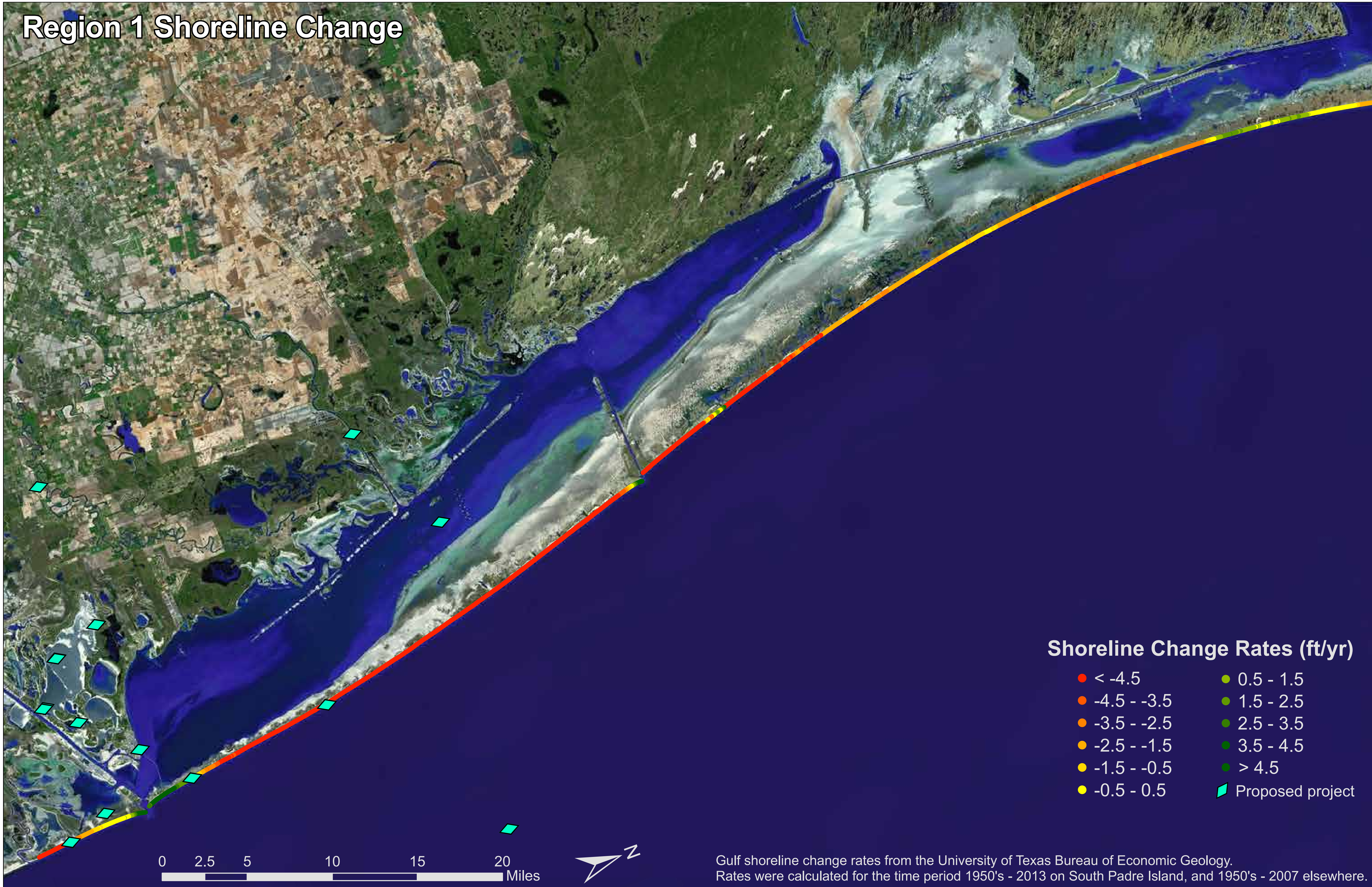
Priority: A program, project, policy, or course of action determined to be of particular significance and warranting prompt attention and action.

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.

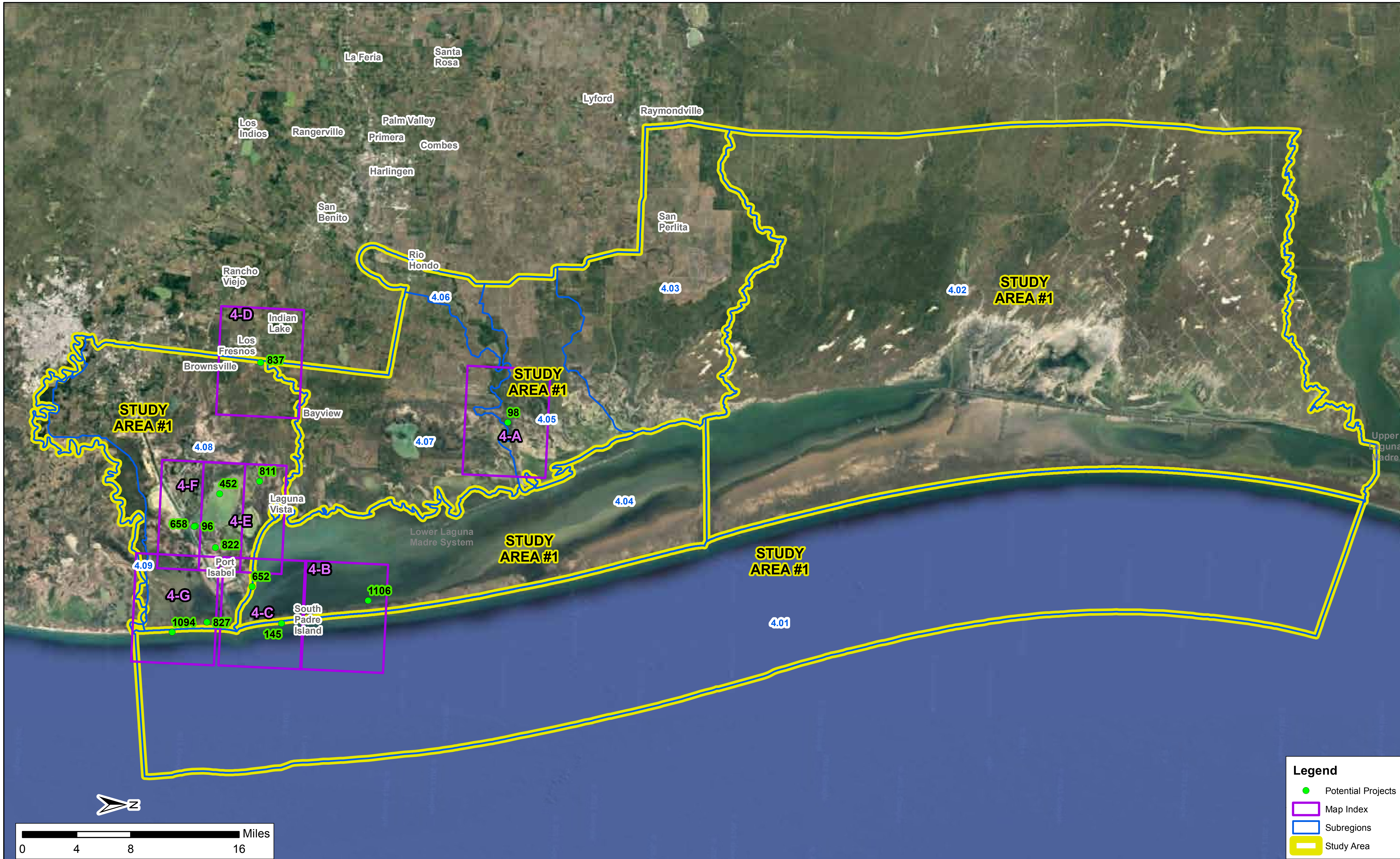
Texas Coastal Resiliency Master Plan

Region 4 Overview

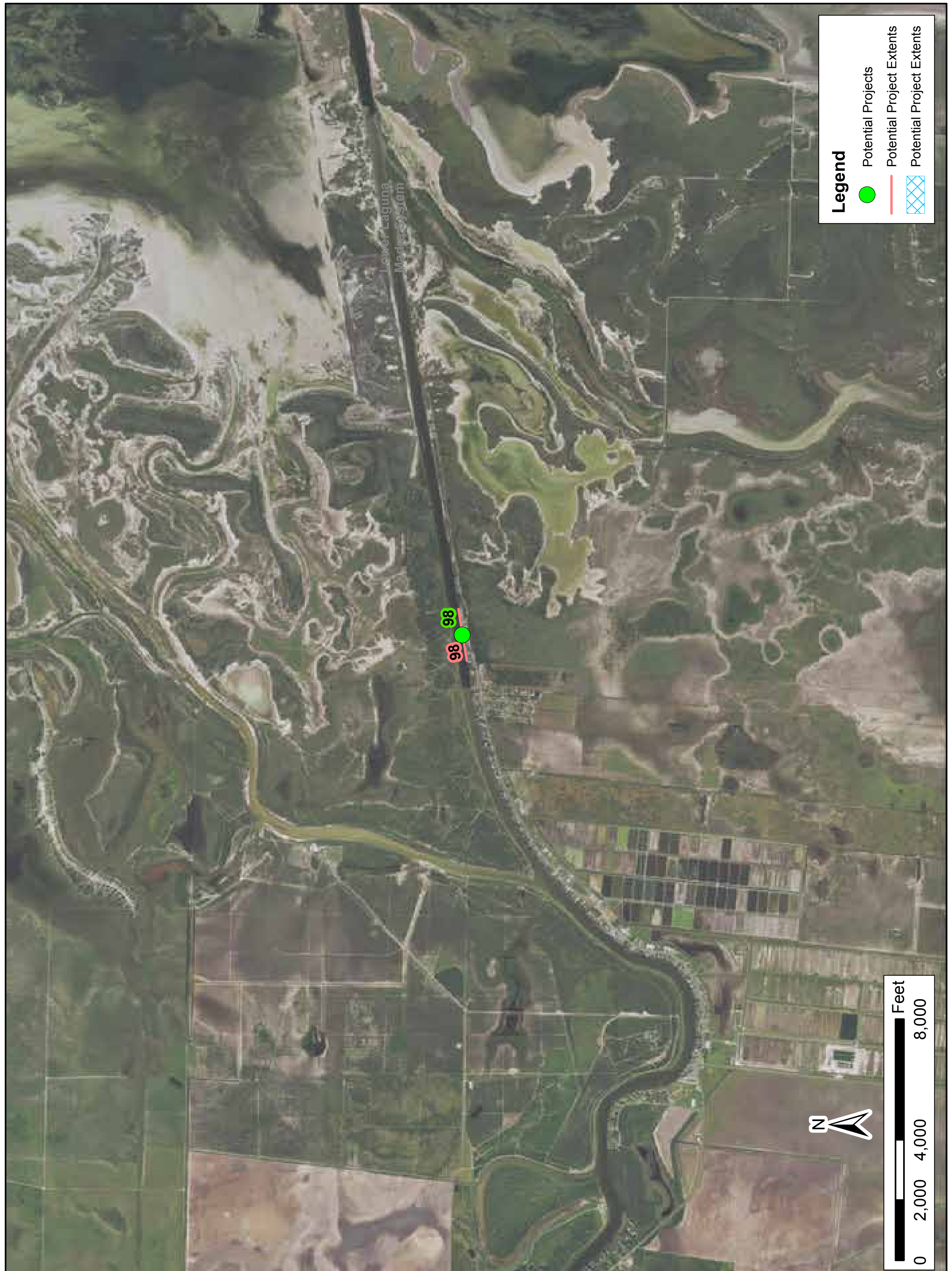



Region 1 Shoreline Change
Shoreline Change Rates (ft/yr)
< -4.5
-4.5 - -3.5
-3.5 - -2.5
-2.5 - -1.5
-1.5 - -0.5
-0.5 - 0.5
0.5 - 1.5
1.5 - 2.5
2.5 - 3.5
3.5 - 4.5
> 4.5
Proposed project
0
2.5
5
10
15
20
Miles
N
Gulf shoreline change rates from the University of Texas Bureau of Economic Geology.
Rates were calculated for the time period 1950's - 2013 on South Padre Island, and 1950's - 2007 elsewhere.

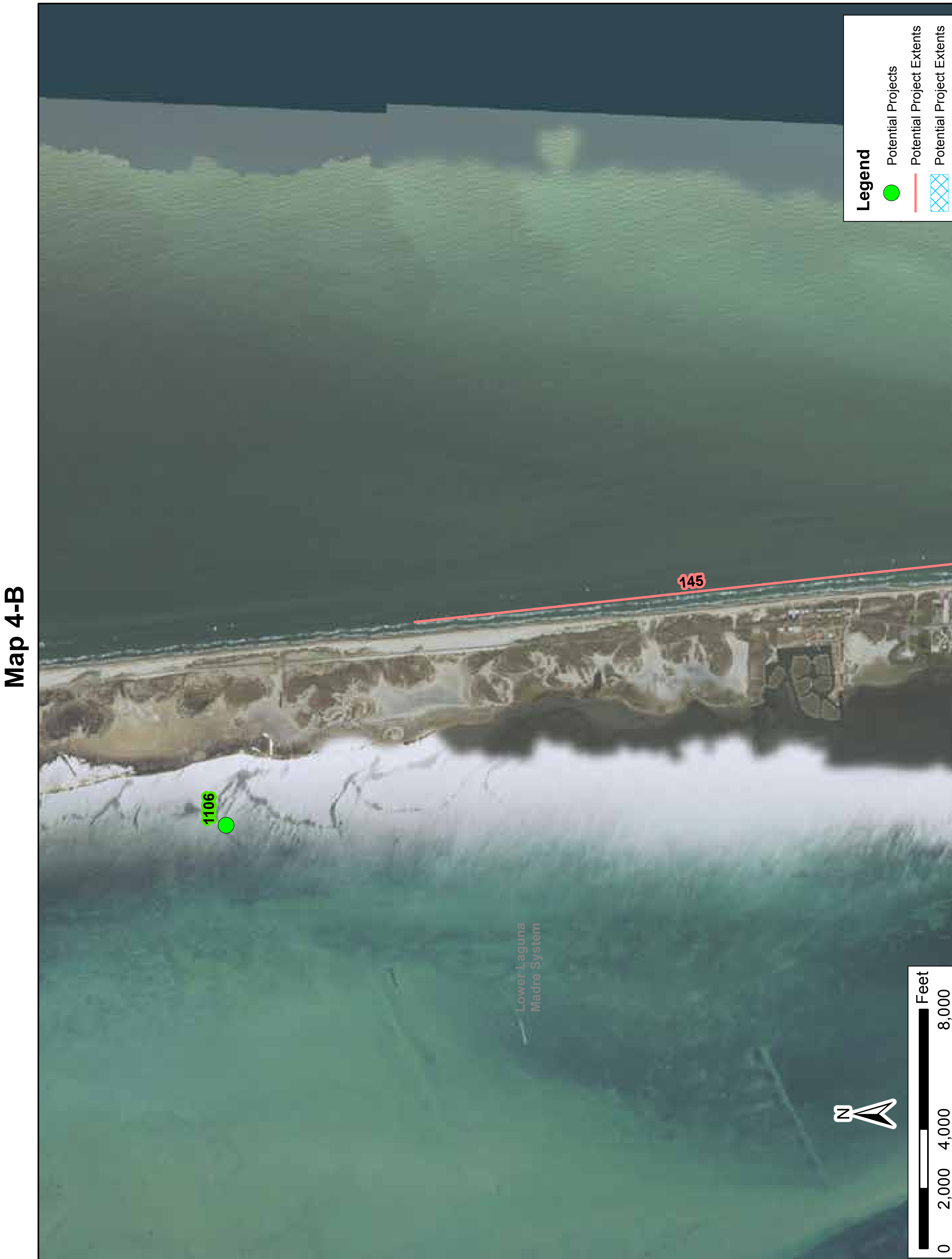
Region 4 Index Map



Map 4-A


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
98
98
Feet
0
2,000
4,000
8,000
N

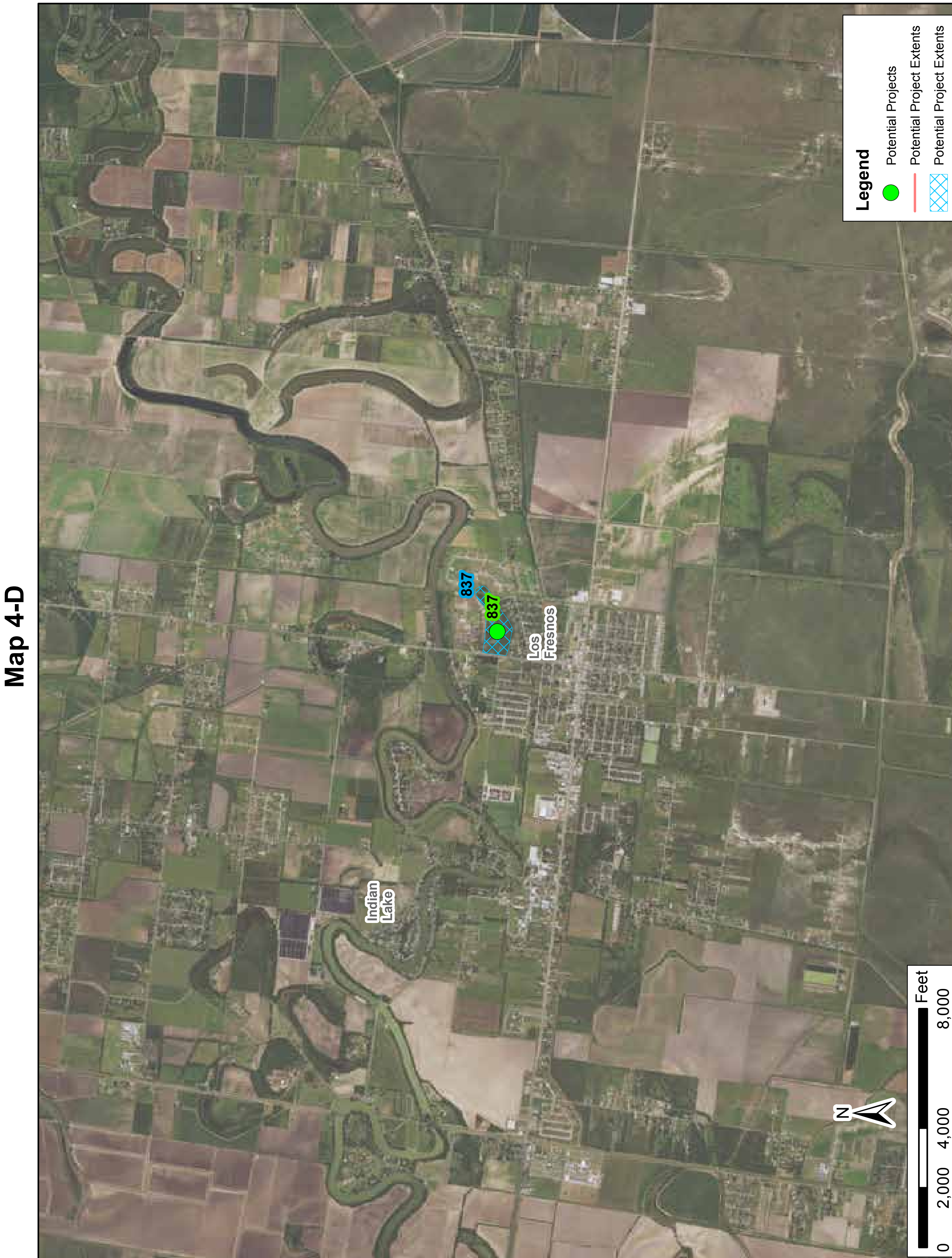
Map 4-B


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
145
1106
Lower Laguna
Madre System
Feet
0
2,000
4,000
8,000
N

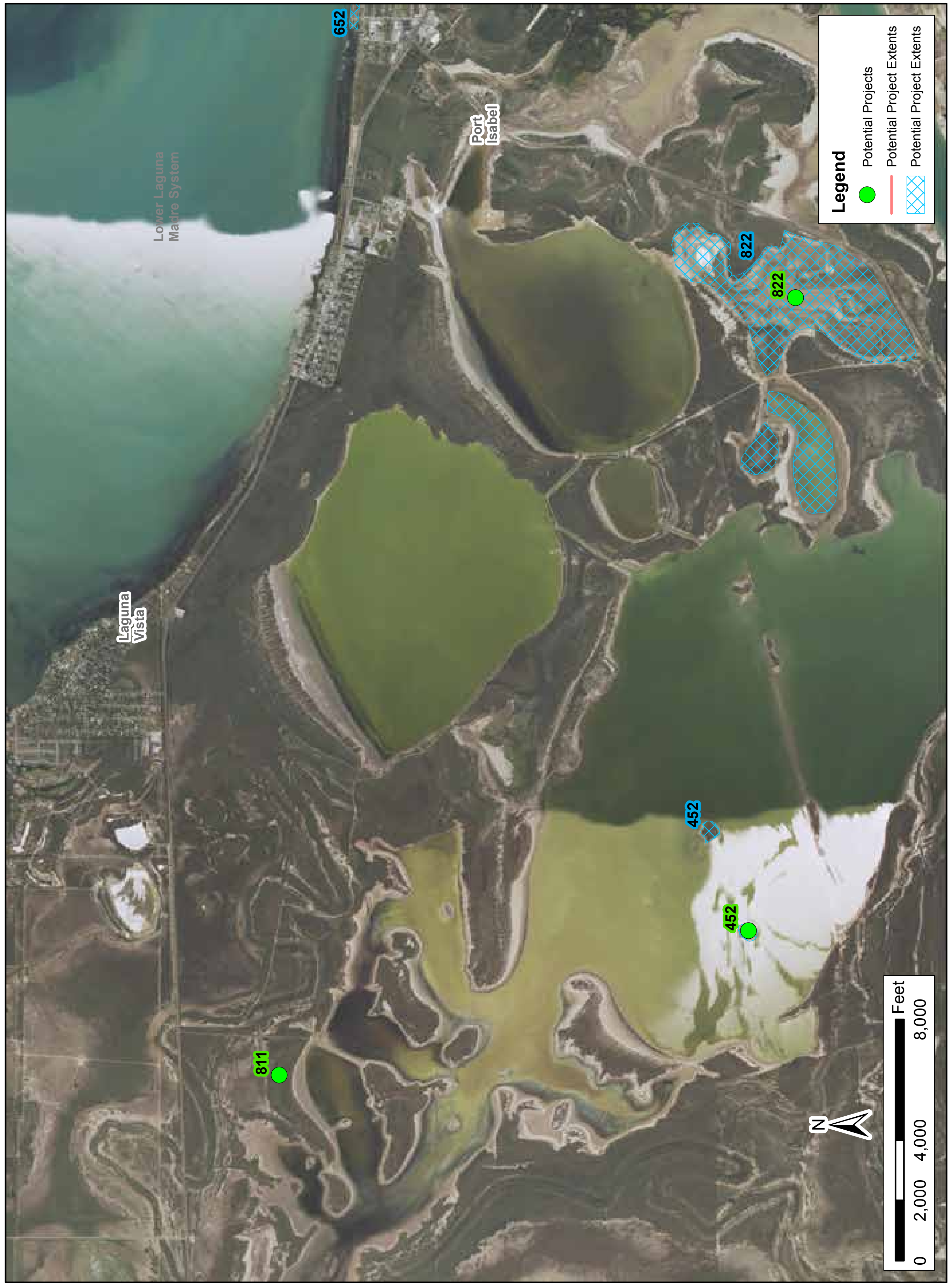
Map 4-C


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
145
652
South Padre Island
Port Isabel
Lower Laguna Madre System
N
Feet
0
2,000
4,000
8,000

Map 4-D


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
837
Los Fresnos
Indian Lake
N
Feet
0
2,000
4,000
8,000

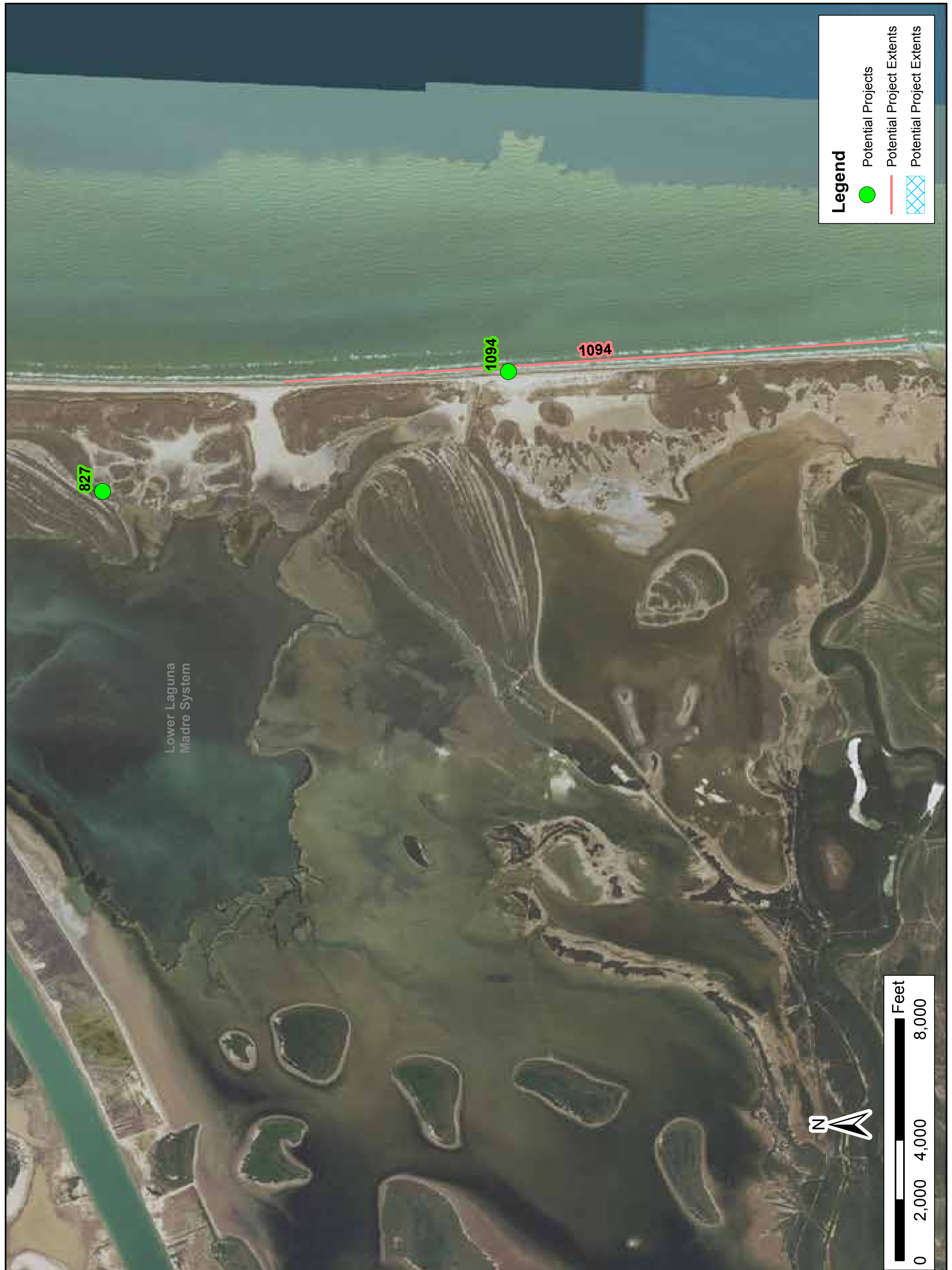
Map 4-E


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Port Isabel
Lower Laguna Madre System
Laguna Vista
652
822
822
452
452
811
Feet
0
2,000
4,000
8,000
N

Map 4-F


Legend
Potential Projects
Potential Project Extents
Potential Project Extents
Port Isabel
822
822
658
96
658
452
452
Feet
0
2,000
4,000
8,000
N

Map 4-G



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Tim Anderson, *U.S. Fish & Wildlife Service*
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Julianne Buzan, *Freese and Nichols*
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Carla Guthrie, *Texas Water Development Board*
Amanda Hackney, *Audubon Society*
Sara Halpin, *Gahagan & Bryant Associates, Inc.*
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Joshua Harper, *Texas Parks & Wildlife Department*
Eric Hartzell, *GrantWorks, Inc.*
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Rebecca Hensley, *Texas Parks & Wildlife Department*
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Cory Horan, *Texas Commission on Environmental Quality*
Aaron Horine, *Mott MacDonald*
John Huffman, *U.S. Fish & Wildlife Service*
Terry Hull, *INTERA, Inc.*
Eduardo Irigoyen, *U.S. Army Corps of Engineers*
John Jacob, *TX AgriLife Extension and Texas Sea Grant*
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Andy Jones, *The Conservation Fund*
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Mike Lee, *U.S. Geological Survey*
Chris Levitz, *AECOM*
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Tony Williams, *Texas General Land Office*
Scott Williams, *Texas Parks & Wildlife Department*
Rusty Woodburn, *Railroad Commission of Texas*
Woody Woodrow, *U.S. Fish & Wildlife Service*

NOTES:

NOTES:

Texas General Land Office

Appendix C. Project Cost Assessments

Cost Assessment Results

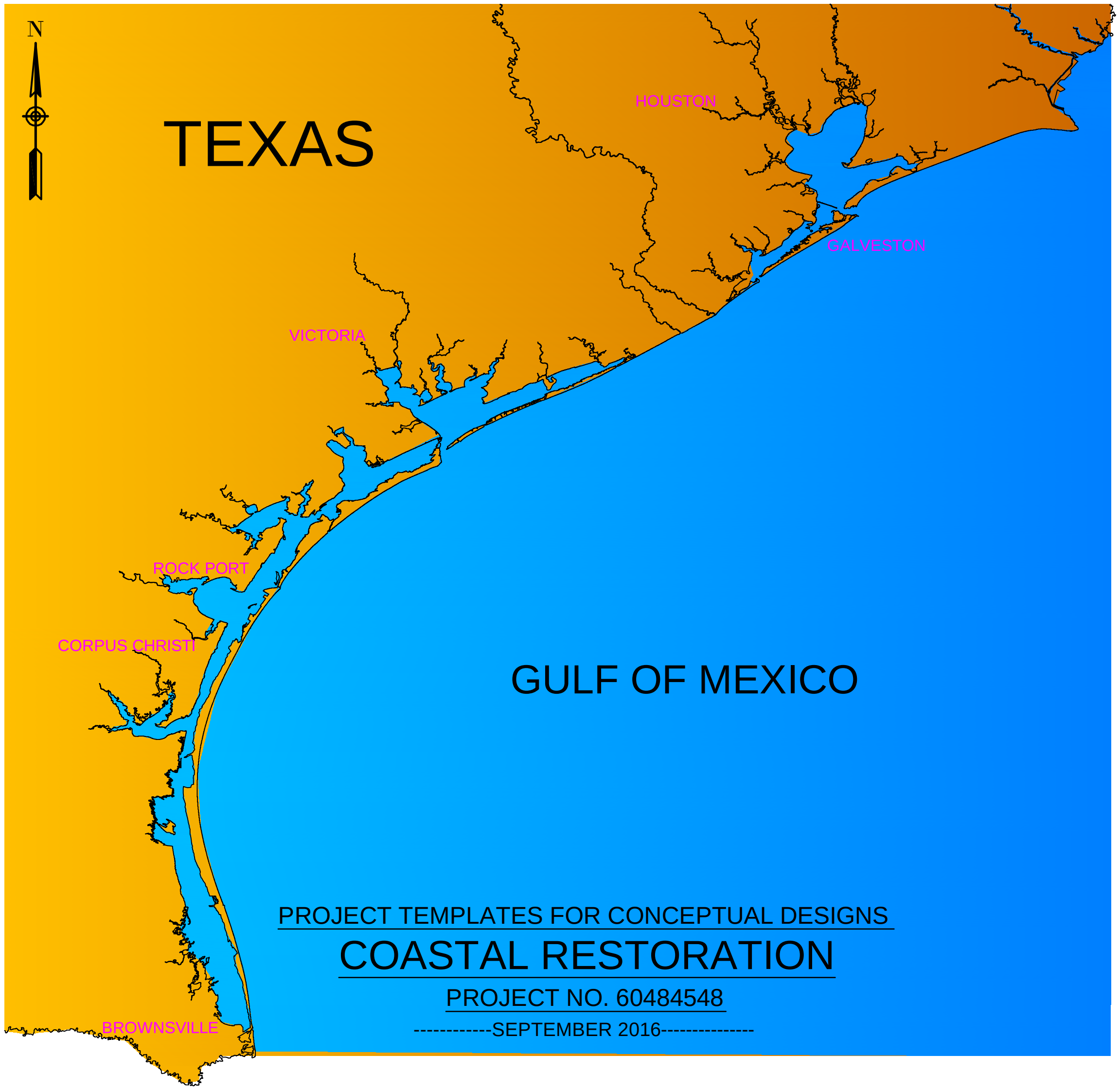
As described in Section 7 of the Report, the Team developed a standardized cost estimating process to allow for a consistent comparison of costs for all projects under consideration. Given that most projects were defined at a very high level, it was important to develop basic design templates and establish consistent assumptions for each project type. While projects under consideration were described with specific features (e.g., breakwaters, groins, beach nourishment), detailed design quantities were not typically provided.

Included in this appendix are 10 Project Templates for Conceptual Designs. These templates provide reasonable and uniform estimates of material quantities for all projects or a specific project types. Also included in this appendix are Subtype Specification Tables and Unit Costs; the primary factors in developing material quantities and costs for each project. All other fees, such as operations and maintenance costs, construction management, and engineering and design fees, were estimated as a percentage of total construction costs, as described in Section 7. An example project cost estimate for the Project 4, the Brazos River to Cedar Lake Creek Shoreline Protection, is provided below. A similar breakdown is provided for all projects in the Project Cost Summary Tables at the end of this appendix.

PROJ ID	PROJECT NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	MATERIAL COST
4	**Brazos River to Cedar Lake Creek Shoreline Protection**	**$50,176,200**	**Breakwater**	**$34,166,667**	**Marsh**	**$1,063,234**	**$35,229,901**
	100000 LF Breakwater		*tons of 250-lb class Stone*	*$33,333,333*	*CY Marsh Fill*	*$968,000*	
	100 ac Marsh		*SY Geotextile*	*$833,333*	*CY Stiff Clay*	*$95,234*	

MISCELLANEOUS	MISC COST	NOTES
Clearing & Grubbing	*$176,150*	*0.5% of Material Cost*
Mobilization & Demobilization	*$1,761,495*	*5% of Material Cost*
Estimated Construction Cost	*$37,167,545*	*Material Cost + Clearing & Grubbing + Mob. & Demob.*
Estimated Construction Cost + Contingency	*$44,601,054*	*+ 20% of Construction cost*
O&M	*$1,858,377*	*5% of Construction Cost*
CM	*$1,858,377*	*5% of Construction Cost*
E&D	*$1,858,377*	*5% of Construction Cost*
Total Cost	**$50,176,200**	

Project Templates for Conceptual Designs



PROJECT TEMPLATES FOR CONCEPTUAL DESIGNS

COASTAL RESTORATION

PROJECT NO. 60484548

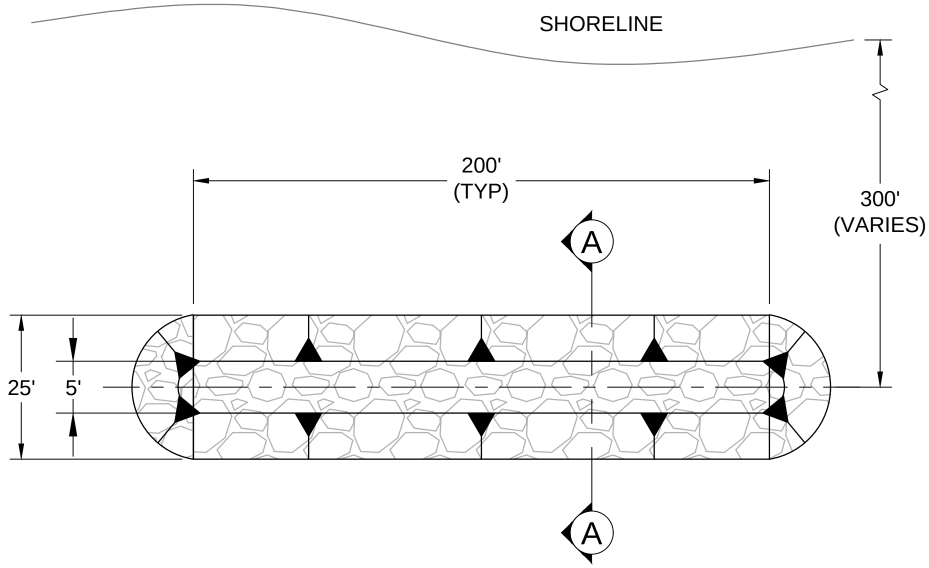
------------SEPTEMBER 2016---------------

Sheet Index

Sheet Number	Sheet Title
SHEET 01	COVER SHEET
SHEET 02	BREAKWATERS
SHEET 03	REVETMENTS
SHEET 04	MISC. SHORELINE STABILIZATION
SHEET 05	DUNE & BEACH RESTORATION
SHEET 06	GROINS
SHEET 07	MARSH CREATION
SHEET 08	ISLAND RESTORATION
SHEET 09	FLOOD RISK REDUCTION
SHEET 10	LIVING SHORELINES
SHEET 11	PUBLIC ACCESS

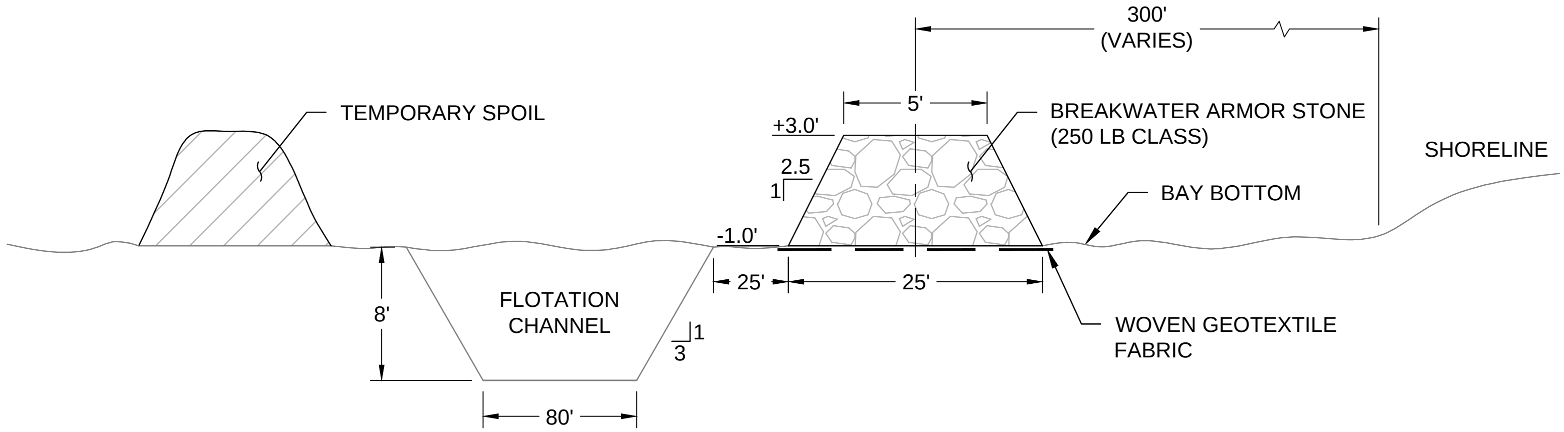
Last saved by: TAYLOR.NORDSTROM(2016-09-14) Last Plotted: 2016-09-14 Project Management Initials: Designer: Checked: Approved: ANSI A 8.5" x 11"
Filename: \\URSHOUSTON.US.IE.URS\HOUSTON\PROJECTS\WTR\60484548_COASTALRES\DWGS\ACAD\SUBTYPE_TEMPLATES\MARSH CREATION, RIDGE CREATION, & SHORELINE PROTECTION TYPICAL DETAILS.DWG

LEGEND
BREAKWATER ARMOR STONE
WOVEN GEOTEXTILE FABRIC
EXISTING BAY BOTTOM



BREAKWATER PLAN VIEW

N.T.S.



NOTE:

1. LOCAL, TEXAS ROCK SOURCE PREFERRED.
2. MEASURED TO PROVIDE PROTECTION FROM 3 FOOT WAVE.

BREAKWATER TYPICAL SECTION A-A

N.T.S.

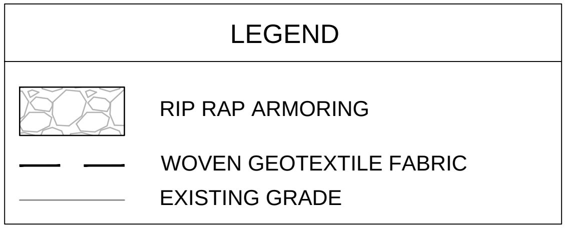
BREAKWATERS

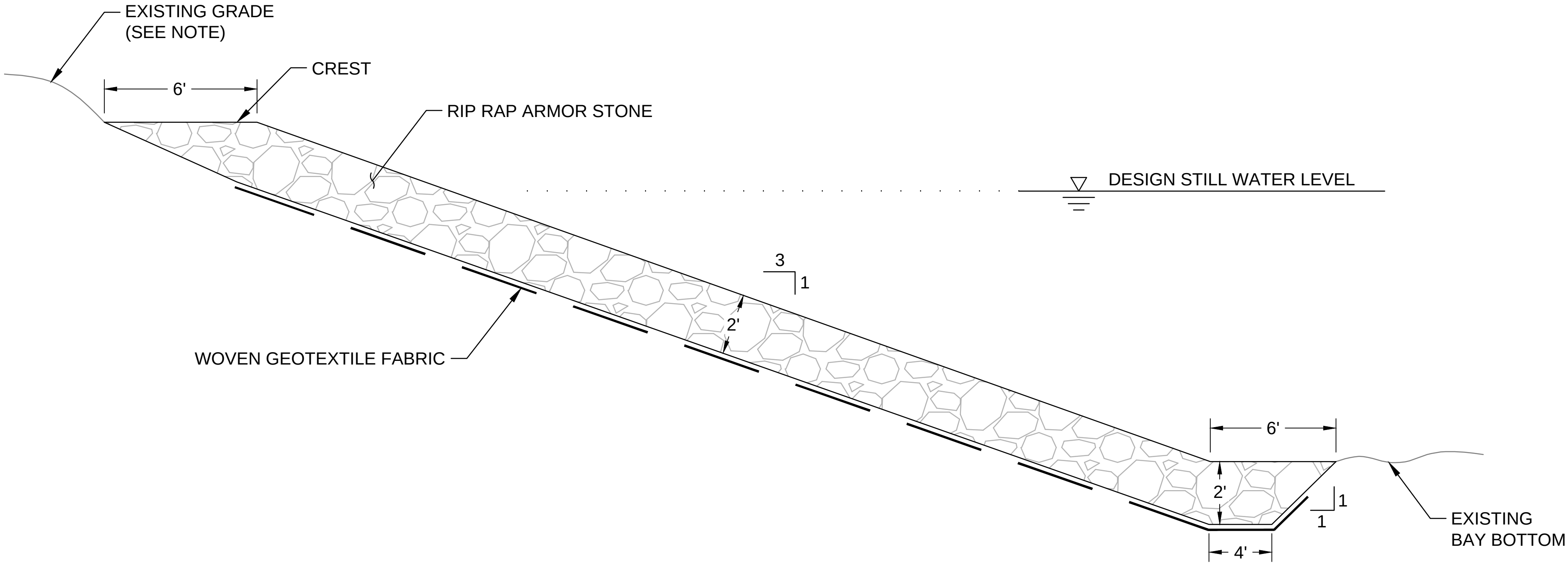
CLIENT NAME, SITE LOCATION

Project No. 60484548: 9/8/2016

AECOM

SHEET 02





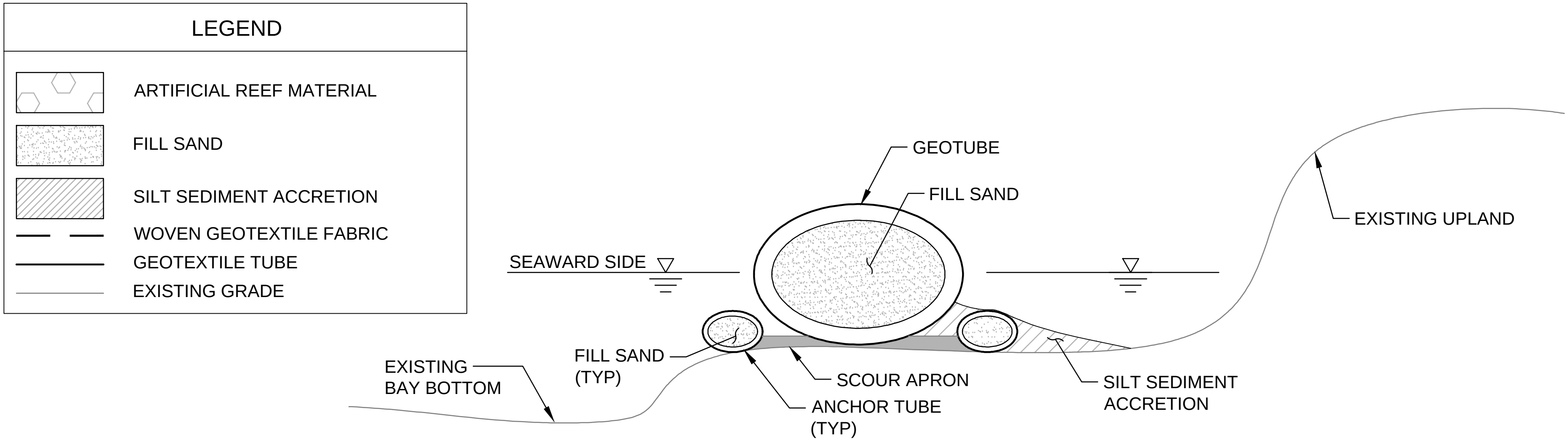
REVETMENT

N.T.S.

NOTE:

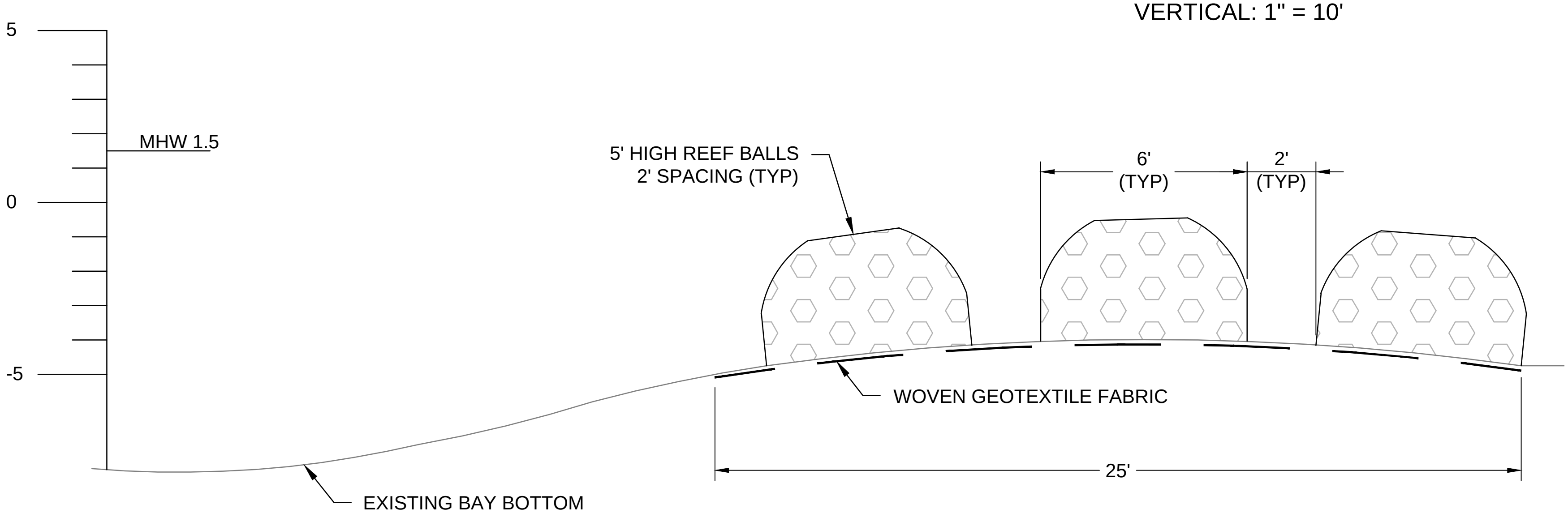
1. SOME EARTHWORK IS ASSUMED NECESSARY TO REGRADE EXISTING SURFACE.

2. LOCAL, TEXAS ROCK SOURCE PREFERRED.



SHORELINE PROTECTION FOR LAKES & BAYS

HORIZONTAL: 1" = 40'
VERTICAL: 1" = 10'



REEF BALLS

HORIZONTAL: 1" = 5'
VERTICAL: 1" = 5'

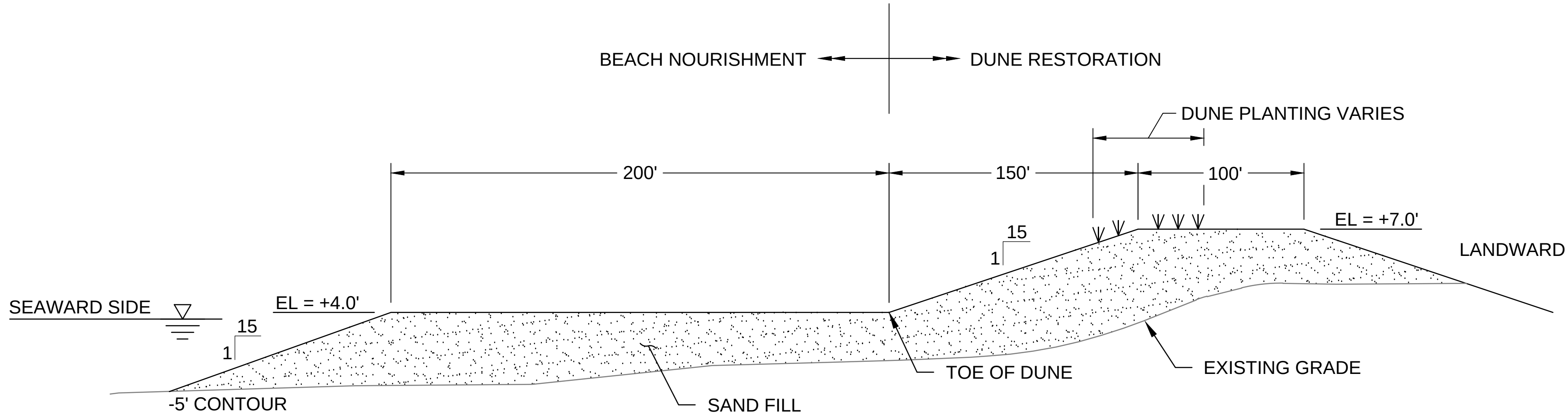
MISCELLANEOUS SHORELINE STABILIZATION
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

AECOM
SHEET 04

LEGEND

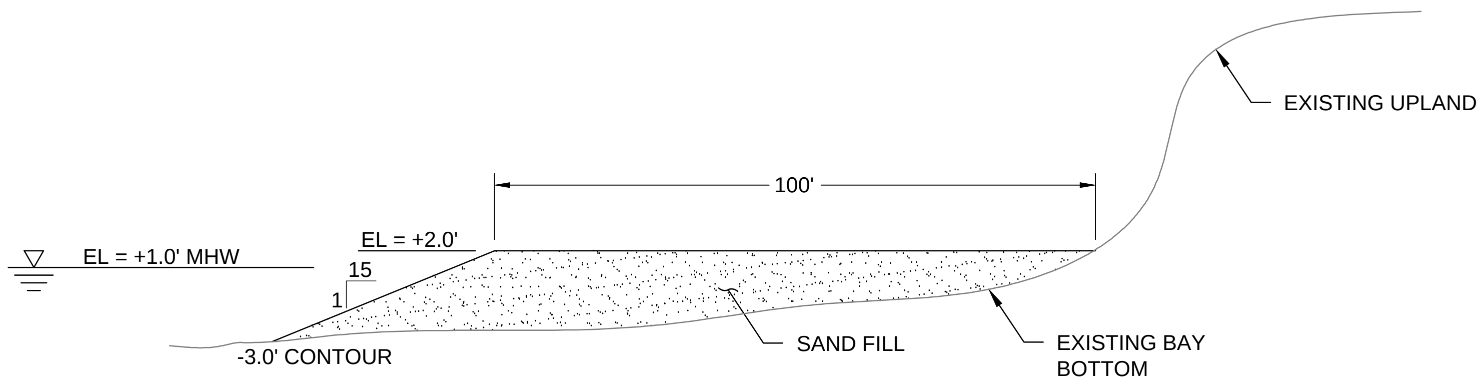
SAND FILL

EXISTING GRADE



GULF DUNE & BEACH NOURISHMENT TYPICAL SECTION

N.T.S.



BAY BEACH NOURISHMENT TYPICAL SECTION

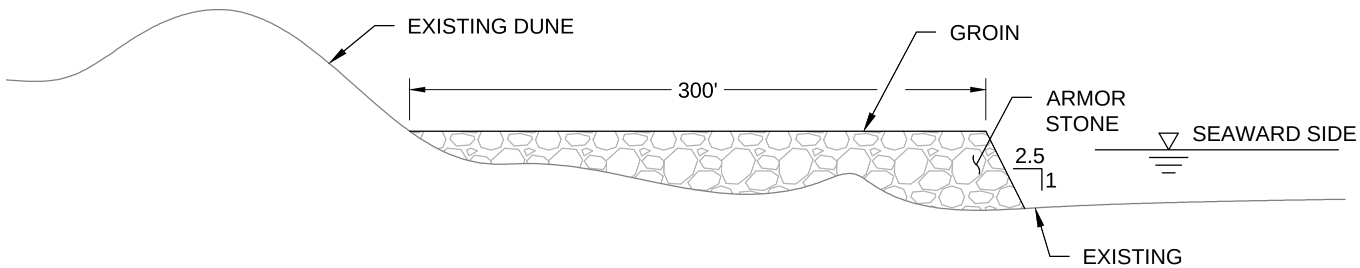
N.T.S.

DUNE & BEACH RESTORATION
CLIENT NAME, SITE LOCATION
Project No. 60484548: 9/8/2016

AECOM
SHEET 05

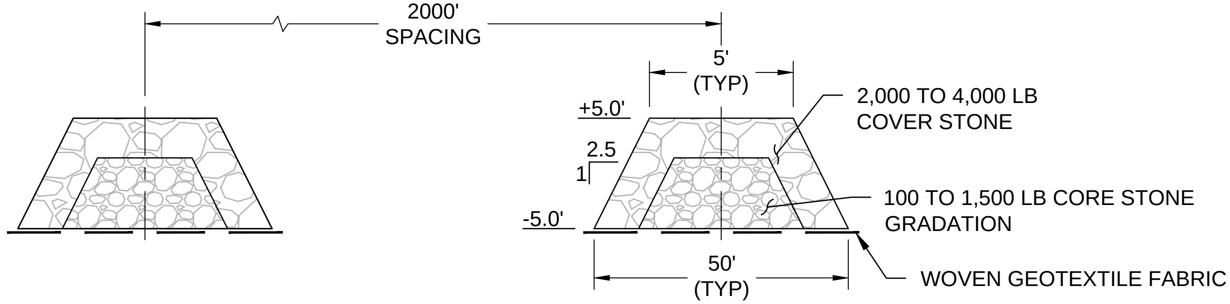
LEGEND

- GROIN COVER ARMOR STONE
- GROIN CORE STONE
- WOVEN GEOTEXTILE FABRIC
- EXISTING GRADE



GROIN PROFILE

N.T.S.



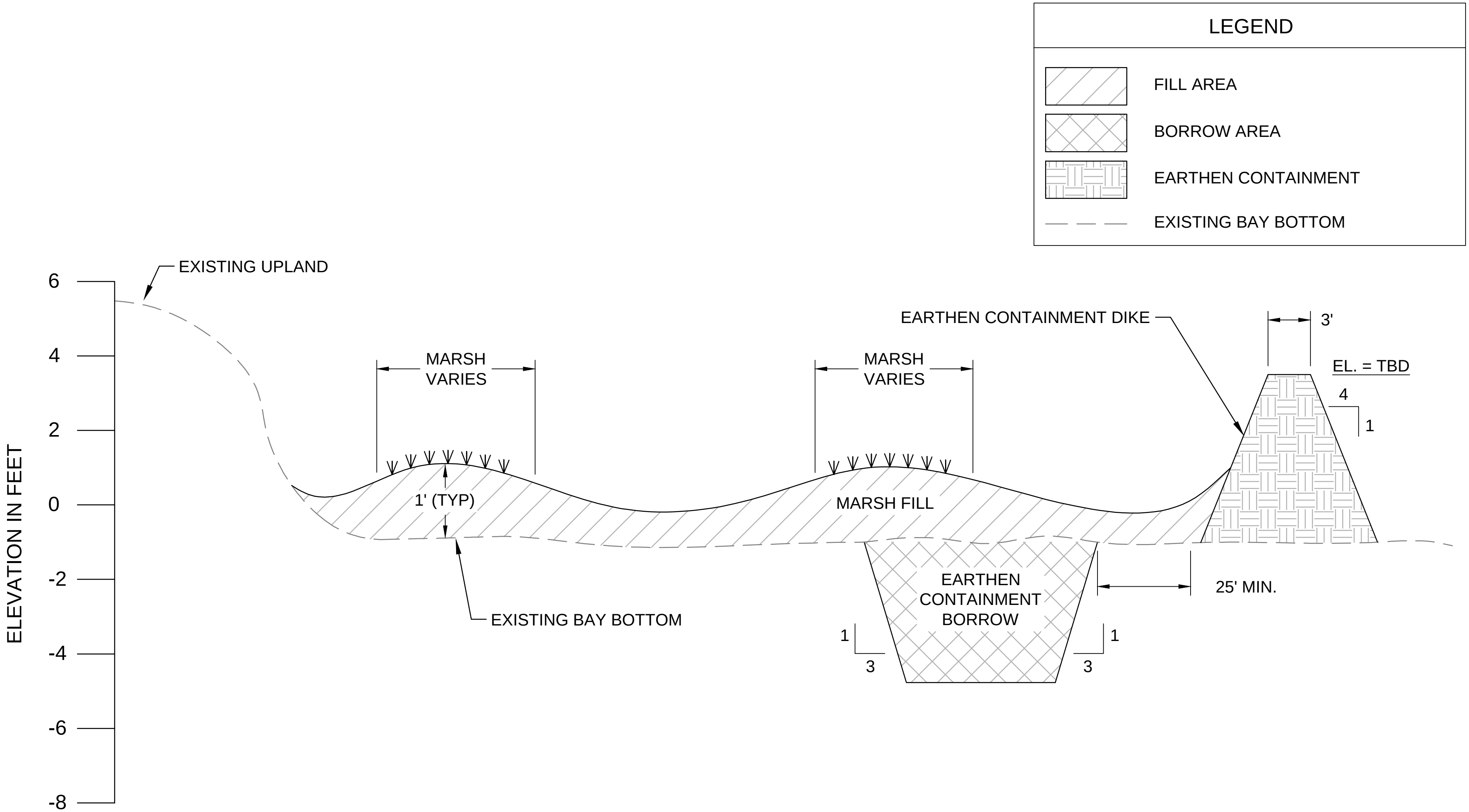
GROIN TYPICAL SECTION

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.



MARSH CREATION TYPICAL SECTION

HORIZONTAL: 1" = 40'
VERTICAL: 1" = 10'

NOTE:

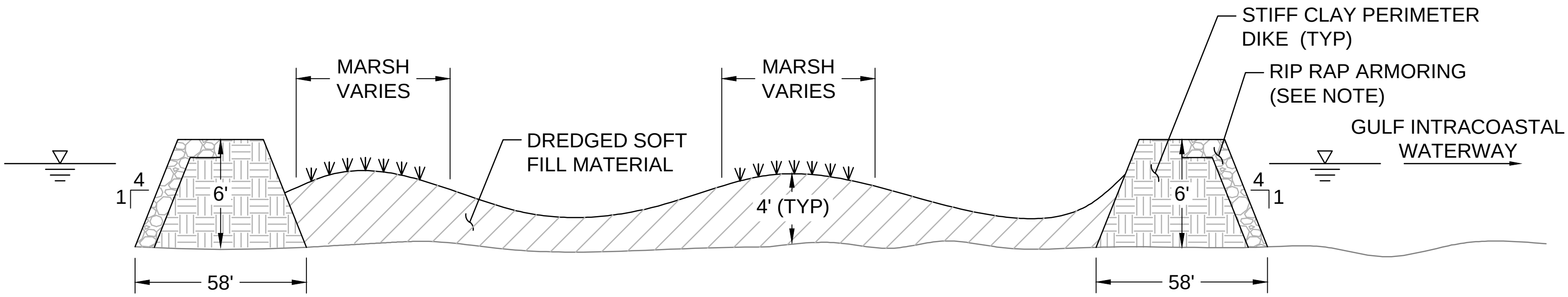
1. EARTHEN CONTAINMENT DIKE IS TO BE A TEMPORARY STRUCTURE TO HOLD THE MARSH FILL. THE SLOPES OF THIS DIKE ARE ACHIEVED BY NATURAL SETTLEMENT OF THE DREDGED MATERIAL. THE MATERIAL IS NOT PLACED IN LAYERS OR BENCHED.

NOTE:

1. RIPRAP ARMORING WILL BE ASSUMED ONLY FOR PROJECTS ESCHEWING ADDITIONAL SHORELINE PROTECTION MEASURES (e.g., BREAKWATERS).

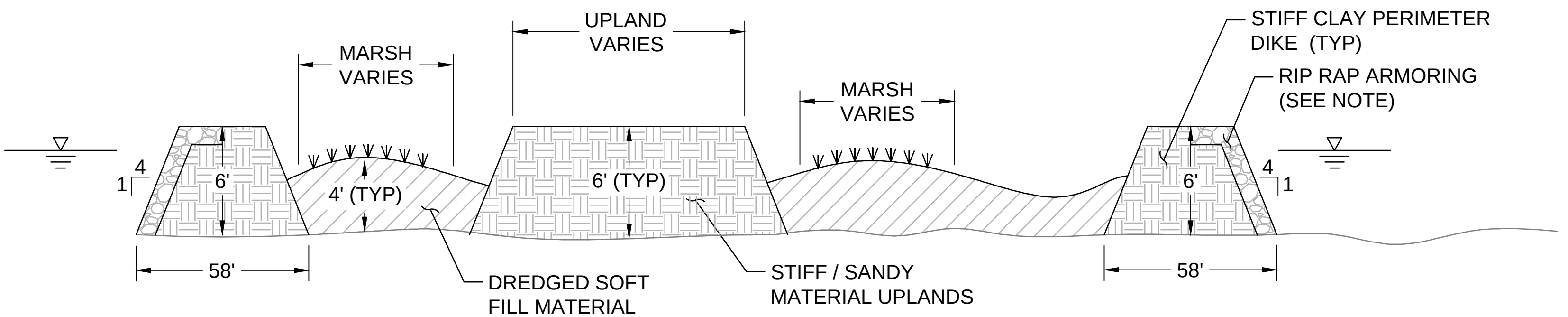
LEGEND

- MARSH FILL
- RIP RAP ARMORING
- DIKE & UPLAND FILL
- EXISTING GRADE



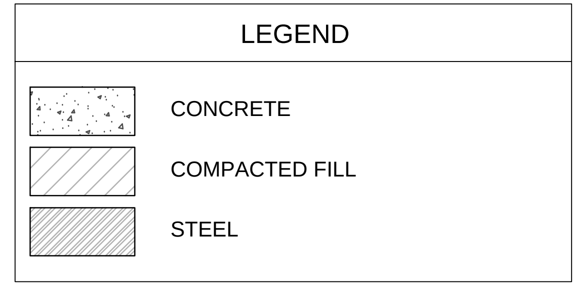
BARRIER ISLAND RESTORATION TYPICAL SECTION

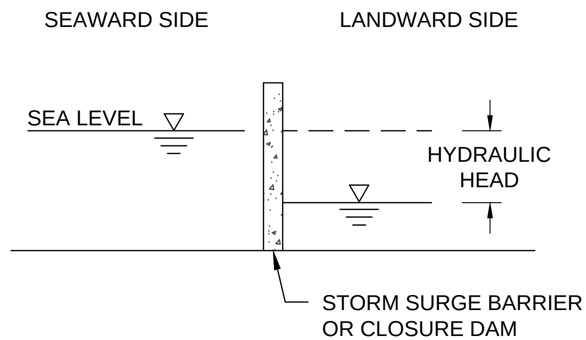
N.T.S.



ROOKERY ISLAND RESTORATION TYPICAL SECTION

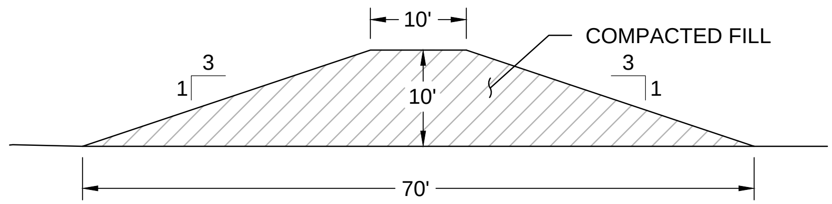
N.T.S.





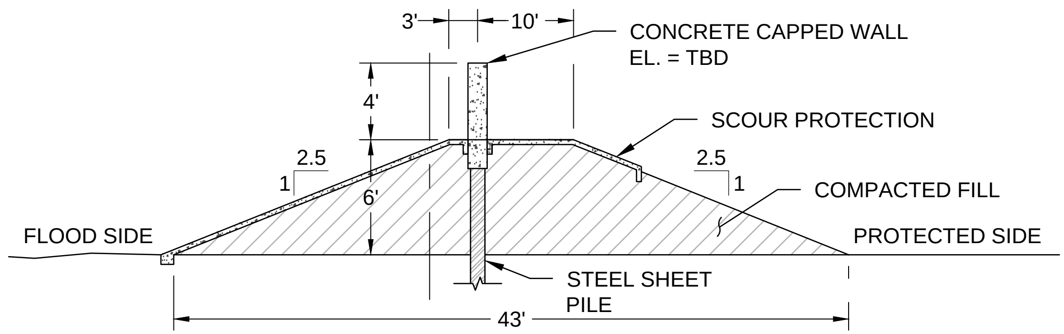
STORM SURGE BARRIER

N.T.S.



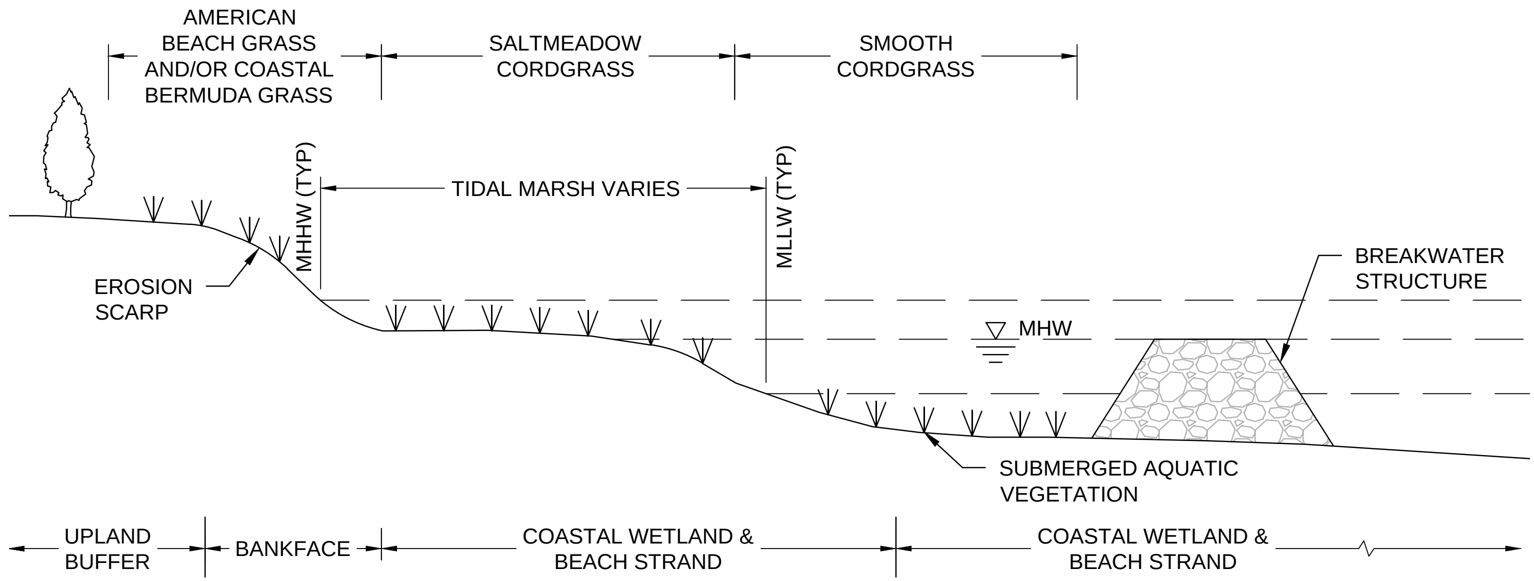
LEVEE

N.T.S.



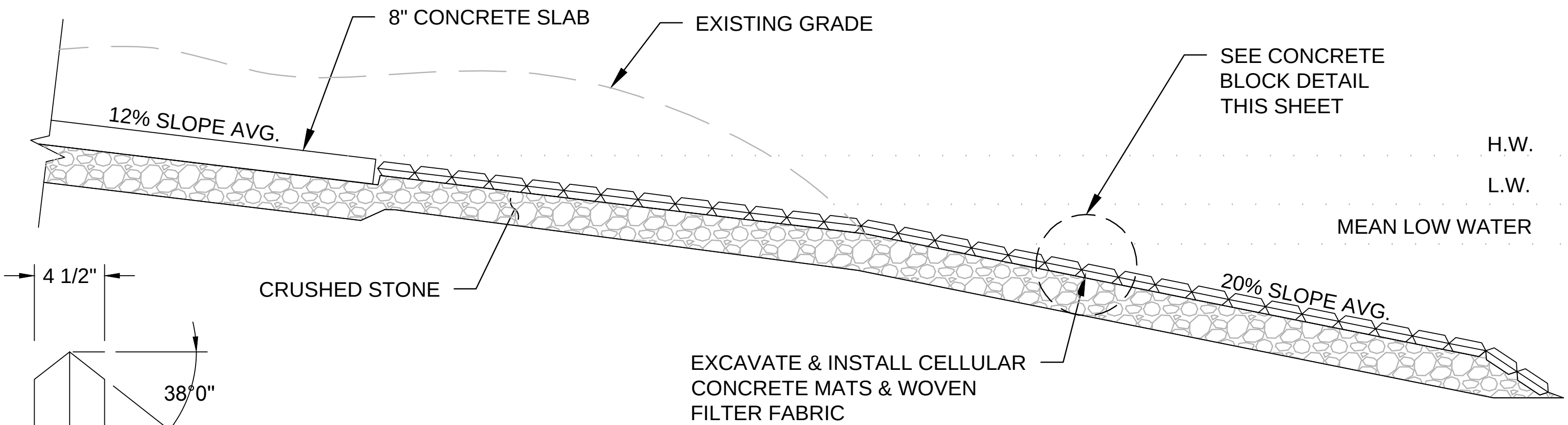
FLOOD WALL

N.T.S.



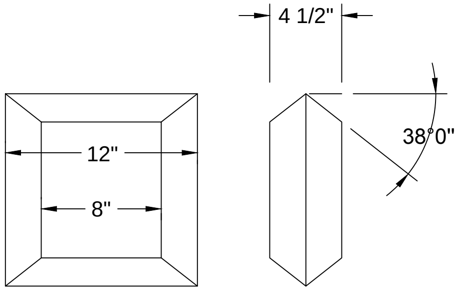
LIVING SHORELINE CONCEPT

N.T.S.



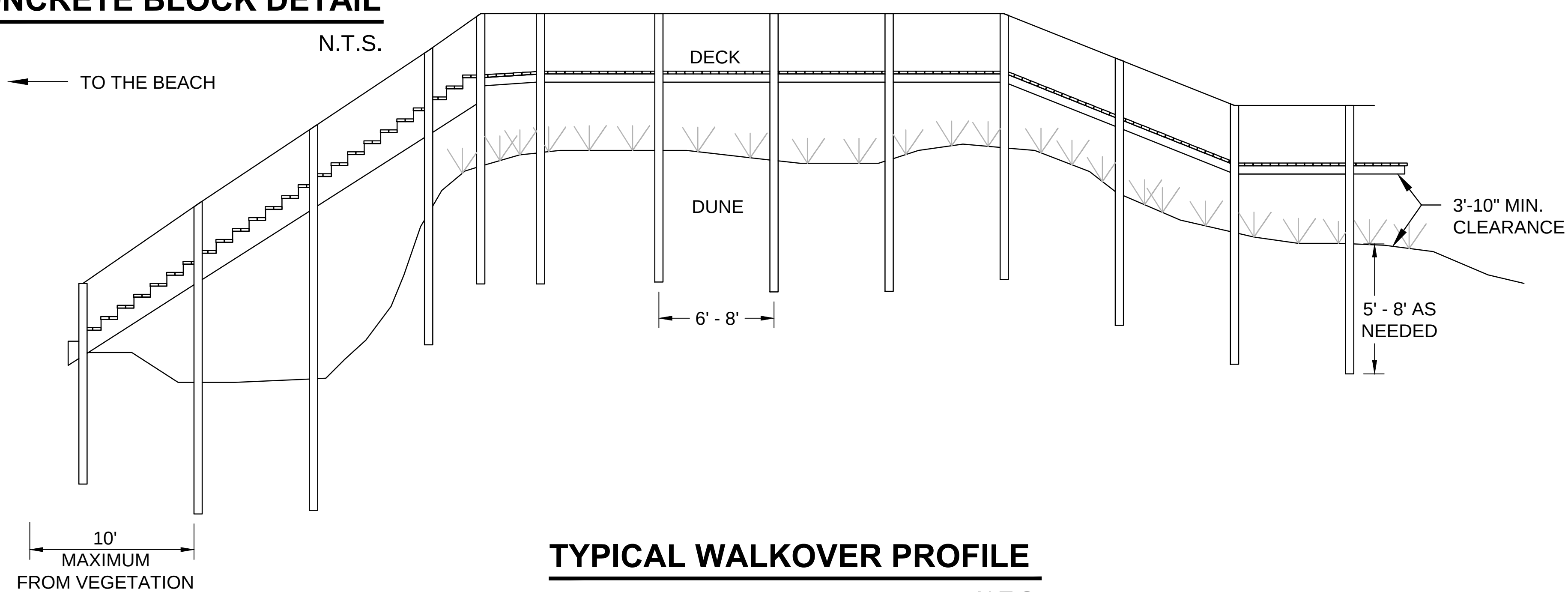
BOAT RAMP DETAIL

N.T.S.



CONCRETE BLOCK DETAIL

N.T.S.



TYPICAL WALKOVER PROFILE

N.T.S.

PUBLIC ACCESS

CLIENT NAME, SITE LOCATION

Project No. 60484548: 9/8/2016

AECOM

SHEET 11

Subtype Specifications and Unit Costs

Subtype Specifications

Unit Weight Assumptions	Value*	Units	
2000-lb Class Stone	1.60	tons/cy	~119 pcf
250-lb Class Stone	1.50	tons/cy	~111 pcf

* Denotes parameter that can be changed

	Revetment		Yield Units	Notes
	Toe			
	Top Width (ft)	6	*	
	Bottom Width (ft)	4	*	
	Height (ft)	2		
	Hypotenuse	5.7	*	
	Area (ft^2)	10		
	Crest + Revetment			
	Rip Rap Thickness (ft)	2	*	
	Side Slope (V:H)	0.33	*	
	Height (ft)	5	*	
	Length (ft)	15.81		
	Area (ft^2)	37.3		
	Cross Section Area (ft^2)	47.3		
Item 1 Geotextile	**Geotexile Width (yd)**	**5.27**	**SY Geotextile**	multiply by YD
Item 2 Riprap	**Riprap (yd^2*ton/yd^3)**	**7.88**	**tons of 250-lb Class Stone**	
Item 3 Earthwork	**Earthwork (yd^2)**	**1.73**	**CY Excavation**	*assumed 1/3 of revetment XS*

	Marsh		Yield Units	Notes
	Containment Dike			
	Side Slope (V:H)	0.25	*	
	Top Width (ft)	3	*	
	Height (ft)	2	*	
	Bottom Width (ft)	19		
	Cross Section Area (ft^2)	22		
	Marsh			
	Depth (ft)	1	*	
Item 1 Marsh Fill	**Marsh Fill Depth (yd)**	**0.33**	**CY Marsh Fill**	multiply by SY
Item 2 Cont. Dike	**Containment Fill (yd^2)**	**2**	**CY Stiff Clay**	multiply by YD
Item 3 Null	**Null**	**0**	**Null**	

	Misc. Wave Break		Yield Units	Notes
	Geotube			
	Height (ft)	5	*	
	Width (ft)	13	*	
	Cross Section Area (ft^2)	51	*assume ellipse*	
	Cirumference (ft)	30	*	
	Anchor Tubes			
	Height (ft)	1.5	*	
	Width (ft)	3.0	*	
	Cross Section Area (ft^2)	3.53	*assume ellipse*	
	Cirumference (ft)	7.27	*	
Item 1 Geotextile	**Getextile Circumference (yd)**	**12.3**	**SY Geotextile**	multiply by YD
Item 2 Geotube Fill	**Geotube Cross Section (yd^2)**	**6.1**	**CY Sludge**	
Item 3 Null	**Null**	**0.00**	**Null**	

	Breakwater		Yield Units	Notes
	Breakwater Cross Section			
	Top Width (ft)	5	*	
	Side Slope (V:H)	0.4	*	
	Height (ft)	4	*	
	Bottom Width (ft)	25		
	Cross Section Area (ft^2)	60		
Item 1 Stone	**Armor Stone (yd^2*tons/yd^3)**	**10**	**tons of 250-lb class Stone**	multiply by YD
Item 2 Geotextile	**Geotexilte Width (yd)**	**8.33**	**SY Geotextile**	
Item 3 Null	**Null**	**0**	**Null**	

	Gulf Beach Nourishment		Yield Units	Notes
	Gluf Beach Cross Section			
	Side Slope (V:H)	0.07	*	
	Dry Beach Width (ft)	200	*	
	Height (ft)	9	*	
	Bottom Width (ft)	470		
	Cross Section Area (ft^2)	1507.5	*assumed to be 1/2 of calculated trapezoid area*	
Item 1 Fill	**Cross Section Area (yd^2/yd)**	**167.5**	**CY Sand Fill**	multiply by YD
Item 2 Null		**0**	**Null**	
Item 3 Null		**0**	**Null**	

	Dune Restoration		Yield Units	Notes
	Dune Cross Section			
	Side Slope (ft/ft)	0.07	*	
	Top (ft)	100	*	
	Height (ft)	3	*	
	Bottom Width (ft)	190		
	Cross Section Area (ft^2)	217.50	*assumed to be 1/2 of calculated trapezoid area*	
Item 1 Fill	**Cross Section Area (yd^2)**	**24.17**	**CY Sand Fill**	multiply by YD
Item 2 Sand Fence	**Sand Fence (YD = length of proj)**	**1**	**YD Sand Fence**	
Item 3 Null	**Null**	**0**	**Null**	

	Barrier / Rookery Islands		Yield Units	Notes
	Perimeter Containment Dike			
	Side Slope (V:H)	0.25	*	
	Top Width (ft)	10	*	
	Height (ft)	6	*	
	Bottom Width (ft)	58		
	Dike Cross Section Area (ft^2)	204		
	Dike Cross Section with Armor (ft^2)	172		
	Rip Rap Armoring			
	Side Slope (V:H)	0.25		
	Top Width (ft)	8		
	Height (ft)	5		
	Bottom Width (ft)	48		
	Armoring Cross Section Area (ft^2)	32		
	Marsh Platform			
	Depth (ft)	4	** 1.25x for rookery islands (see unit cost)*	
Item 1 Marsh Fill	**Marsh Depth (yd)**	**1.33**	**CY Marsh Fill**	multiply by SY
Item 2 Cont. Dike	**Clay Core (SY)**	**19.11**	**CY Stiff Clay**	multiply by YD
Item 3 Cont. Dike	**Rip Rap Armoring (SY*tons/CY)**	**5.33**	**tons of 250-lb Class Stone**	multiply by YD

COMBINED BEACH / DUNE	**64**	**CY/LF**
GULF BEACH	**56**	**CY/LF**
BAY BEACH	**24**	**CY/LF**

Subtype Specifications

	Flood Wall		Yield Units	Notes
	Compacted Fill			
	Side Slope (V:H)	0.4	*	
	Top Width (ft)	13	*	
	Height (ft)	6	*	
	Bottom Width (ft)	43		
	Fill Cross Section Area (ft^2)	168		
	Wall			
	Height (ft)	20	*	
	Width (ft)	3	*	
	Wall Cross Section Area (ft^2)	60		
Item 1 Fill	Fill Cross Section Area (yd^2)	18.67	CY Stiff Clay	multiply by YD
Item 2 Wall	Wall Cross Section Area (yd^2)	6.67	CY Concrete	multiply by YD
Item 3 Null	Null	0	Null	

	Levee		Yield Units	Notes
	Compacted Fill			
	Side Slope (V:H)	0.33	*	
	Top Width (ft)	10	*	
	Height (ft)	10	*	
	Bottom Width (ft)	70		
	Cross Section Area (ft^2)	400		
Item 1 Levee Fill	Fill Cross Section (yd^2)	44.44	CY Stiff Clay	multiply by YD
Item 2 Null	Null	0	Null	
Item 3 Null	Null	0	Null	

	Groin		Yield Units	Notes
	Core			
	Top Width (ft)	2	*	
	Side Slope (V:H)	0.40	*	
	Height (ft)	6		
	Bottom Width (ft)	32	*	
	Core Cross Section (ft^2)	102		
	Cover Stone			
	Top Width (ft)	5	*	
	Side Slope (V:H)	0.40	*	
	Height (ft)	10	*	
	Bottom Width (ft)	55		
	Cover Cross Section (ft^2)	300		
	Cover-Core Area (ft^2)	198		
	Groin Length (ft)	300	*	
Item 1 250-lb Core Stone	Core Stone (tons)	1,700	tons of 250-lb Class Stone	multiply by EA
Item 2 2000-lb Cover Stone	Cover Stone (CY)	3520	tons of 2000-lb Class Stone	
Item 3 Geotextile	Geotexilte Area (SY)	1833	SY Geotextile	

	Hydrologic Restoration			
Item 1 HR	Hydrologic Restoration	1.00	HR	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Freshwater Inflows			
Item 1 FWI	Freshwater Inflows	1.00	FWI	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Jetty			
Item 1 Jetty	Jetty	1.00	Jetty	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Fee Simple			
Item 1 Fee Simple	Fee Simple	1.00	Fee Simple	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Bulkhead			
Item 1 Bulkhead	Bulkhead	1.00	YD Bulkhead	multiply by YD
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Studies			
Item 1 Study	Study	1.00	EA Study	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Cable Fence			
Item 1 Cable Fence	Cable Fence	1.00	YD Cable Fence	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Oyster Reef/Reef Habitat		Yield Units	Notes
Item 1 Oyster Reef	Recycled Concrete (yd*ac)	0.067	CY Recycled Concrete	multiply by SY/ac
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Storm Surge Barrier			
	Height	10	*	
	Width	10	*	
	Cross Section Area (ft^2)	100	*	
Item 1 Barrier	Concrete Fill (yd^2)	11.11	CY Concrete	multiply by yd
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Bay Beach Nourishment			
	Bay Beach Cross Section			
	Side Slope (V:H)	0.07	*	
	Dry Beach Width (ft)	100	*	
	Height (ft)	5	*	
	Bottom Width (ft)	250		
	Cross Section Area (ft^2)	656.25	*assumed to be 3/4 of calculated trapezoid area*	
Item 1 Fill	Cross Section Area (yd^3/yd)	72.92	CY Sand Fill	multiply by YD
Item 2 Null	Null	0	Null	
Item 3 Null	Null	0	Null	

	Aquistions			
	Price per ac	$ 7,500	*	
	Price per SY	$ 1.55		
Item 1 Land	Land = SY	1.00	SY Acquired	multiply by SY
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Conservation Easement			
	Price per ac	$ 3,000	*	
	Price per SY	$ 0.62		
Item 1 Land	Land = SY	1.00	SY Conserved	multiply by SY
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Plan			
Item 1 EA Plan	Plan	1.00	EA Plan	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Program			
Item 1 EA Program	Program	1.00	EA Program	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Wetlands/Forested Wetlands			
Item 1 Wetlands/Forested Wetlands	Wetlands/Forested Wetlands	1.00	W/FW	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Sediment Management Plan			
Item 1 Sediment Management Plan	Sediment Management Plan	1.00	EA Sed Man Plan	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Walkover			
Item 1 Walkover	Walkover	1.00	YD Walkover	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Abandoned Structures/Obstacles			
Item 1 Abandoned Structures/Obstacles	Abandoned Structures/Obstacles	1.00	EA Removal	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

	Small Plan			
Item 1 EA Small Plan	Small Plan	1.00	EA Small Plan	multiply by EA
Item 2 Null	Null	0.00	Null	
Item 3 Null	Null	0.00	Null	

Unit Costs

Subtype	Item 1	Item 1 Multiplier	Item 1 Units	Item 1 Cost	Item 2	Item 2 Multiplier	Item 2 Units	Item 2 Cost	Item 3	Item 3 Multiplier	Item 3 Units	Item 3 Cost
Shoreline Stabilization												
Revetment	Geotextile	5.27	SY Geotextile	$3	Riprap	7.88	tons of 250-lb Class Stone	$100	Earthwork	1.73	CY Excavation	$5
Breakwater	Stone	10.00	tons of 250-lb class Stone	$100	Geotextile	8.33	SY Geotextile	$3	Null	0.00	Null	$0
Misc. Wave Break	Geotextile	12.32	SY Geotextile	$3	Geotube Fill	6.07	CY Sludge	$90	Null	0.00	Null	$0
Jetty	Jetty	1.00	Jetty	$4,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Bulkhead	Bulkhead	1.00	YD Bulkhead	$233	Null	0.00	Null	$0	Null	0.00	Null	$0
Groin	250-lb Core Stone	1700.00	tons of 250-lb Class Stone	$100	2000-lb Cover Stone	3520.00	tons of 2000-lb Class Stone	$120	Geotextile	1833.33	SY Geotextile	$3
Flood Risk Reduction												
Levee	Levee Fill	44.44	CY Stiff Clay	$14	Null	0.00	Null	$0	Null	0.00	Null	$0
Flood Wall	Fill	18.67	CY Stiff Clay	$14	Wall	6.67	CY Concrete	$115	Null	0.00	Null	$0
Storm Surge Barrier	Barrier	11.11	CY Concrete	$115	Null	0.00	Null	$0	Null	0.00	Null	$0
Habitat												
Marsh	Marsh Fill	0.33	CY Marsh Fill	$6	Cont. Dike	2.44	CY Stiff Clay	$14	Null	0.00	Null	$0
Oyster Reef	Oyster Reef	0.067	CY Recycled Concrete	$250	Null	0.00	Null	$0	Null	0.00	Null	$0
Rookery Islands	Marsh Fill	1.67	CY Marsh Fill	$6	Cont. Dike	19.11	CY Stiff Clay	$14	Cont. Dike	5.33	tons of 250-lb Class Stone	$100
Barrier Islands	Marsh Fill	1.33	CY Marsh Fill	$6	Cont. Dike	19.11	CY Stiff Clay	$14	Cont. Dike	5.33	tons of 250-lb Class Stone	$100
Dune & Beach Nourishment												
Gulf	Fill	167.50	CY Sand Fill	$15	Null	0.00	Null	$0	Null	0.00	Null	$0
Dune	Fill	24.17	CY Sand Fill	$15	Sand Fence	1.00	YD Sand Fence	$2	Null	0.00	Null	$0
Bay	Fill	72.92	CY Sand Fill	$15	Null	0.00	Null	$0	Null	0.00	Null	$0
Land Acquisitions												
Acquisitions	Land	1.00	SY Acquired	$1.55	Null	0.00	Null	$0	Null	0.00	Null	$0
Fee Simple	Fee Simple	1.00	Fee Simple	$1.55	Null	0.00	Null	$0	Null	0.00	Null	$0
Conservation Easement	Land	1.00	SY Conserved	$1	Null	0.00	Null	$0	Null	0.00	Null	$0
Studies, Policies & Programs												
Plans	EA Plan	1.00	EA Plan	$1,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Small Plan	EA Small Plan	1.00	EA Small Plan	$500,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Studies	Study	1.00	EA Study	$200,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Sediment Management Plan	Sediment Management Plan	1.00	EA Sed Man Plan	$50,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Program	EA Program	1.00	EA Program	$5,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Environmental												
Hydrologic Restoration	HR	1.00	HR	$10,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Fresh Water Inflow	FWI	1.00	FWI	$5,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Wetlands/Forested Wetlands	Wetlands/Forested Wetlands	1.00	W/FW	$1,000,000	Null	0.00	Null	$0	Null	0.00	Null	$0
Public Access & Improvements												
Cable Fence	Cable Fence	1.00	YD Cable Fence	$2	Null	0.00	Null	$0	Null	0.00	Null	$0
Walkovers	Walkover	1.00	YD Walkover	$500	Null	0.00	Null	$0	Null	0.00	Null	$0
Structure/Debris Removal												
Abandoned Structures/Obstacles	Abandoned Structures/Obstacles	1.00	EA Removal	$1,500	Null	0.00	Null	$0	Null	0.00	Null	$0
Null	Null	0.00	Null	$0	Null	0.00	Null	$0	Null	0.00	Null	$0

Project Cost Summary Tables

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
4	**Brazos River to Cedar Lake Creek Shoreline Protection**	$ 50,176,200	**Breakwater**	$ 34,166,667	**Marsh**	$ 1,063,234	**Null**	$ -	*Clearing & Grubbing*	$ 176,150
			tons of 250-lb class Stone	$ 33,333,333	*CY Marsh Fill*	$ 968,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 1,761,495
	100000 LF Breakwater		*SY Geotextile*	$ 833,333	*CY Stiff Clay*	$ 95,234	*Null*	$ -	*Estimated Constuction Cost*	$ 37,167,545
	100 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 44,601,054
	0 Null Null								*O&M*	$ 1,858,377
									CM	$ 1,858,377
									E&D	$ 1,858,377
9	**Brazoria National Wildlife Refuge Shoreline Protection**	$ 26,590,900	**Marsh**	$ 5,480,987	**Revetment**	$ 13,189,148	**Null**	$ -	*Clearing & Grubbing*	$ 93,351
			CY Marsh Fill	$ 4,646,400	*SY Geotextile*	$ 256,672	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 933,507
	480 ac Marsh		*CY Stiff Clay*	$ 834,587	*tons of 250-lb Class Stone*	$ 12,791,767	*Null*	$ -	*Estimated Constuction Cost*	$ 19,696,992
	48700 LF Revetment		*Null*	$ -	*CY Excavation*	$ 140,709	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 23,636,390
	0 Null Null								*O&M*	$ 984,850
									CM	$ 984,850
									E&D	$ 984,850
10	**Christmas Bay Marsh Restoration**	$ 8,106,500	**Marsh**	$ 5,691,797	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 28,459
			CY Marsh Fill	$ 4,840,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 284,590
	500 ac Marsh		*CY Stiff Clay*	$ 851,797	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 6,004,845
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 7,205,814
	0 Null Null								*O&M*	$ 300,242
									CM	$ 300,242
									E&D	$ 300,242
11	**Follets Island Marshes**	$ 39,327,800	**Marsh**	$ 27,612,983	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 138,065
			CY Marsh Fill	$ 25,652,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 1,380,649
	2650 ac Marsh		*CY Stiff Clay*	$ 1,960,983	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 29,131,697
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 34,958,036
	0 Null Null								*O&M*	$ 1,456,585
									CM	$ 1,456,585
									E&D	$ 1,456,585
14	**Greens Lake Marsh Restoration**	$ 4,159,200	**Misc. Wave Break**	$ 349,687	**Marsh**	$ 2,570,578	**Null**	$ -	*Clearing & Grubbing*	$ 14,601
			SY Geotextile	$ 22,176	*CY Marsh Fill*	$ 2,420,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 146,013
	1800 LF Misc. Wave Break		*CY Sludge*	$ 327,511	*CY Stiff Clay*	$ 150,578	*Null*	$ -	*Estimated Constuction Cost*	$ 3,080,879
	250 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,697,055
	0 Null Null								*O&M*	$ 154,044
									CM	$ 154,044
									E&D	$ 154,044
15	**Chocolate Bay Habitat Restoration and Protection**	$ 70,313,900	**Misc. Wave Break**	$ 3,691,141	**Marsh**	$ 5,052,949	**Oyster Reef**	$ 40,625,000	*Clearing & Grubbing*	$ 246,845
			SY Geotextile	$ 234,080	*CY Marsh Fill*	$ 4,840,000	*CY Recycled Concrete*	$ 40,625,000	*Mobilization & Demobilizatoin*	$ 2,468,455
	19000 LF Misc. Wave Break		*CY Sludge*	$ 3,457,061	*CY Stiff Clay*	$ 212,949	*Null*	$ -	*Estimated Constuction Cost*	$ 52,084,390
	500 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 62,501,268
	500 ac Oyster Reef								*O&M*	$ 2,604,220
									CM	$ 2,604,220
									E&D	$ 2,604,220
19	**East Galveston Bay Ecosystem Oyster Reefs**	$ 15,043,600	**Oyster Reef**	$ 10,562,500	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 52,813
			CY Recycled Concrete	$ 10,562,500	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 528,125
	130 ac Oyster Reef		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 11,143,438
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 13,372,125
	0 Null Null								*O&M*	$ 557,172
									CM	$ 557,172
									E&D	$ 557,172
20	**Clear Creek Watershed Conservation**	$ 1,500,000	**Acquisitions**	$ 1,500,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			SY Acquired	$ 1,500,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	200 ac Acquisitions		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
21	**Galveston Bay Ecosystem Rookery Islands**	$ 63,422,500	**Breakwater**	$ 13,666,667	**Rookery Islands**	$ 30,863,779	**Null**	$ -	*Clearing & Grubbing*	$ 222,652
			tons of 250-lb class Stone	$ 13,333,333	*CY Marsh Fill*	$ 29,040,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,226,522
	40000 LF Breakwater		*SY Geotextile*	$ 333,333	*CY Stiff Clay*	$ 1,823,779	*Null*	$ -	*Estimated Constuction Cost*	$ 46,979,620
	600 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 56,375,545
	0 Null Null								*O&M*	$ 2,348,981
									CM	$ 2,348,981
									E&D	$ 2,348,981
24	**San Jacinto Battlefield Marsh Restoration**	$ 2,487,500	**Breakwater**	$ 683,333	**Marsh**	$ 1,063,234	**Null**	$ -	*Clearing & Grubbing*	$ 8,733
			tons of 250-lb class Stone	$ 666,667	*CY Marsh Fill*	$ 968,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 87,328
	2000 LF Breakwater		*SY Geotextile*	$ 16,667	*CY Stiff Clay*	$ 95,234	*Null*	$ -	*Estimated Constuction Cost*	$ 1,842,628
	100 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,211,154
	0 Null Null								*O&M*	$ 92,131
									CM	$ 92,131
									E&D	$ 92,131
25	**Burnet Bay Marsh Restoration**	$ 11,651,300	**Marsh**	$ 5,691,797	**Levee**	$ 2,488,889	**Null**	$ -	*Clearing & Grubbing*	$ 40,903
			CY Marsh Fill	$ 4,840,000	*CY Stiff Clay*	$ 2,488,889	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 409,034
	500 ac Marsh		*CY Stiff Clay*	$ 851,797	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 8,630,623
	12000 LF Levee		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 10,356,748
	0 Null Null								*O&M*	$ 431,531
									CM	$ 431,531
									E&D	$ 431,531
27	**East Bay North Shoreline (Smith Point to Anahuac NWR)**	$ 57,567,000	**Breakwater**	$ 40,419,167	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 202,096
			tons of 250-lb class Stone	$ 39,433,333	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,020,958
	118300 LF Breakwater		*SY Geotextile*	$ 985,833	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 42,642,221
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 51,170,665
	0 Null Null								*O&M*	$ 2,132,111
									CM	$ 2,132,111
									E&D	$ 2,132,111
28	**East Bay and GIWW Marsh Restoration and Protection**	$ 22,919,700	**Breakwater**	$ 16,092,500	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 80,463
			tons of 250-lb class Stone	$ 15,700,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 804,625
	47100 LF Breakwater		*SY Geotextile*	$ 392,500	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 16,977,588
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 20,373,105
	0 Null Null								*O&M*	$ 848,879
									CM	$ 848,879
									E&D	$ 848,879

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
29	**Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)**	$ 79,362,500	**Breakwater**	$ 16,400,000	**Marsh**	$ 39,322,311	**Null**	$ -	*Clearing & Grubbing*	$ 278,612
			tons of 250-lb class Stone	$ 16,000,000	*CY Marsh Fill*	$ 38,720,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,786,116
	48000 LF Breakwater		*SY Geotextile*	$ 400,000	*CY Stiff Clay*	$ 602,311	*Null*	$ -	*Estimated Constuction Cost*	$ 58,787,038
	4000 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 70,544,446
	0 Null Null								*O&M*	$ 2,939,352
									CM	$ 2,939,352
									E&D	$ 2,939,352
30	**McFaddin National Wildlife Refuge at Willow Lake**	$ 5,153,800	**Breakwater**	$ 2,050,000	**Marsh**	$ 1,568,637	**Null**	$ -	*Clearing & Grubbing*	$ 18,093
			tons of 250-lb class Stone	$ 2,000,000	*CY Marsh Fill*	$ 1,452,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 180,932
	6000 LF Breakwater		*SY Geotextile*	$ 50,000	*CY Stiff Clay*	$ 116,637	*Null*	$ -	*Estimated Constuction Cost*	$ 3,817,662
	150 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 4,581,194
	0 Null Null								*O&M*	$ 190,883
									CM	$ 190,883
									E&D	$ 190,883
35	**McFaddin National Wildlife Refuge Shoreline Protection**	$ 145,658,600	**Gulf**	$ 88,440,000	**Dune**	$ 12,830,400	**Wetlands/Forested Wetlands**	$ 1,000,000	*Clearing & Grubbing*	$ 511,352
			CY Sand Fill	$ 88,440,000	*CY Sand Fill*	$ 12,760,000	*W/FW*	$ 1,000,000	*Mobilization & Demobilizatoin*	$ 5,113,520
	105600 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 70,400	*Null*	$ -	*Estimated Constuction Cost*	$ 107,895,272
	105600 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 129,474,326
	1 EA Wetlands/Forested Wetlands								*O&M*	$ 5,394,764
									CM	$ 5,394,764
									E&D	$ 5,394,764
36	**Sea Rim State Park Dune Restoration and Protection**	$ 6,184,400	**Wetlands/Forested Wetlands**	$ 1,000,000	**Walkovers**	$ 1,000	**Dune**	$ 3,341,250	*Clearing & Grubbing*	$ 21,711
			W/FW	$ 1,000,000	*YD Walkover*	$ 1,000	*CY Sand Fill*	$ 3,322,917	*Mobilization & Demobilizatoin*	$ 217,113
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*YD Sand Fence*	$ 18,333	*Estimated Constuction Cost*	$ 4,581,074
	2 EA Walkovers		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 5,497,289
	27500 LF Dune								*O&M*	$ 229,054
									CM	$ 229,054
									E&D	$ 229,054
41	**Texas Chenier Plain Refuge Complex**	$ 487,500,000	**Acquisitions**	$ 487,500,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			SY Acquired	$ 487,500,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	65000 ac Acquisitions		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
44	**Trinity - San Jacinto Estuary Fresh Water Inflows**	$ 7,121,300	**Fresh Water Inflow**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 25,000
			FWI	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 250,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,275,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,330,000
	0 Null Null								*O&M*	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
45	**Galveston Bay Debris Removal**	$ 2,100	**Abandoned Structures/Obstacles**	$ 1,500	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 8
			EA Removal	$ 1,500	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 75
	1 EA Abandoned Structures/Obstacles		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,583
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,899
	0 Null Null								*O&M*	$ 79
									CM	$ 79
									E&D	$ 79
51	**Boggy Cut GIWW Protection**	$ 8,445,900	**Breakwater**	$ 3,587,500	**Marsh**	$ 236,190	**Acquisitions**	$ 3,000,000	*Clearing & Grubbing*	$ 19,118
			tons of 250-lb class Stone	$ 3,500,000	*CY Marsh Fill*	$ 193,600	*SY Acquired*	$ 3,000,000	*Mobilization & Demobilizatoin*	$ 191,184
	10500 LF Breakwater		*SY Geotextile*	$ 87,500	*CY Stiff Clay*	$ 42,590	*Null*	$ -	*Estimated Constuction Cost*	$ 4,033,993
	20 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 4,840,791
	20 ac Acquisitions								*O&M*	$ 201,700
									CM	$ 201,700
									E&D	$ 201,700
52	**Restoration of Chester's Island**	$ 3,478,900	**Misc. Wave Break**	$ 582,812	**Rookery Islands**	$ 1,859,809	**Null**	$ -	*Clearing & Grubbing*	$ 12,213
			SY Geotextile	$ 36,960	*CY Marsh Fill*	$ 1,452,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 122,131
	3000 LF Misc. Wave Break		*CY Sludge*	$ 545,852	*CY Stiff Clay*	$ 407,809	*Null*	$ -	*Estimated Constuction Cost*	$ 2,576,965
	30 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,092,358
	0 Null Null								*O&M*	$ 128,848
									CM	$ 128,848
									E&D	$ 128,848
52	**Restoration of Chester's Island**	$ 3,478,900	**Misc. Wave Break**	$ 582,812	**Rookery Islands**	$ 1,859,809	**Null**	$ -	*Clearing & Grubbing*	$ 12,213
			SY Geotextile	$ 36,960	*CY Marsh Fill*	$ 1,452,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 122,131
	3000 LF Misc. Wave Break		*CY Sludge*	$ 545,852	*CY Stiff Clay*	$ 407,809	*Null*	$ -	*Estimated Constuction Cost*	$ 2,576,965
	30 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,092,358
	0 Null Null								*O&M*	$ 128,848
									CM	$ 128,848
									E&D	$ 128,848
56	**Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition**	$ 27,224,300	**Acquisitions**	$ 25,800,000	**Wetlands/Forested Wetlands**	$ 1,000,000	**Null**	$ -	*Clearing & Grubbing*	$ 5,000
			SY Acquired	$ 25,800,000	*W/FW*	$ 1,000,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 50,000
	3440 ac Acquisitions		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,055,000
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,266,000
	0 Null Null								*O&M*	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
62	**Welder Flats Wildlife Management Area**	$ 7,263,700	**Breakwater**	$ 4,100,000	**Wetlands/Forested Wetlands**	$ 1,000,000	**Null**	$ -	*Clearing & Grubbing*	$ 25,500
			tons of 250-lb class Stone	$ 4,000,000	*W/FW*	$ 1,000,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 255,000
	12000 LF Breakwater		*SY Geotextile*	$ 100,000	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,380,500
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,456,600
	0 Null Null								*O&M*	$ 269,025
									CM	$ 269,025
									E&D	$ 269,025
70	**Goose Island State Park Habitat Restoration and Protection**	$ 1,946,500	**Breakwater**	$ 1,366,667	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 6,833
			tons of 250-lb class Stone	$ 1,333,333	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 68,333
	4000 LF Breakwater		*SY Geotextile*	$ 33,333	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,441,833
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,730,200
	0 Null Null								*O&M*	$ 72,092
									CM	$ 72,092
									E&D	$ 72,092

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
72	Long Reef Shoreline Stabilization and Habitat Protection	$ 1,915,200	Misc. Wave Break	$ 388,541	Rookery Islands	$ 956,187	Null	$ -	Clearing & Grubbing	$ 6,724
			SY Geotextile	$ 24,640	CY Marsh Fill	$ 677,600	Null	$ -	Mobilization & Demobilizatoin	$ 67,236
	2000 LF Misc. Wave Break		CY Sludge	$ 363,901	CY Stiff Clay	$ 278,587	Null	$ -	Estimated Constuction Cost	$ 1,418,688
	14 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,702,426
	0 Null Null								O&M	$ 70,934
									CM	$ 70,934
									E&D	$ 70,934
75	Nueces River Delta Shoreline Stabilization	$ 5,138,700	Breakwater	$ 3,608,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 18,040
			tons of 250-lb class Stone	$ 3,520,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 180,400
	10560 LF Breakwater		SY Geotextile	$ 88,000	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 3,806,440
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 4,567,728
	0 Null Null								O&M	$ 190,322
									CM	$ 190,322
									E&D	$ 190,322
76	Oso Bay Marsh Habitat Creation	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
86	Mustang Island State Park Acquisition	$ 5,625,000	Acquisitions	$ 5,625,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 5,625,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	750 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
91	Coastal Bend Conservation Easements	$ 450,000,000	Conservation Easement	$ 450,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Conserved	$ 450,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	150000 ac Conservation Easement		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
96	Laguna Atascosa NWR- Bahia Grande- Intertidal Wetlands Hydrologic Restoration	$ 7,121,300	Fresh Water Inflow	$ 5,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 25,000
			FWI	$ 5,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 250,000
	1 EA Fresh Water Inflow		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 5,275,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,330,000
	0 Null Null								O&M	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
98	Adolph Thomae Jr. County Park - Phase 3	$ 188,300	Bulkhead	$ 132,222	Null	$ -	Null	$ -	Clearing & Grubbing	$ 661
			YD Bulkhead	$ 132,222	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 6,611
	1700 LF Bulkhead		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 139,494
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 167,393
	0 Null Null								O&M	$ 6,975
									CM	$ 6,975
									E&D	$ 6,975
107	Construction of Artificial Reefs in Texas Nearshore Waters of the Gulf of Mexico	$ 57,860,200	Oyster Reef	$ 40,625,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 203,125
			CY Recycled Concrete	$ 40,625,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 2,031,250
	500 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 42,859,375
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 51,431,250
	0 Null Null								O&M	$ 2,142,969
									CM	$ 2,142,969
									E&D	$ 2,142,969
112	Treasure Island Nourishment Project	$ 3,339,900	Gulf	$ 2,345,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 11,725
			CY Sand Fill	$ 2,345,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 117,250
	2800 LF Gulf		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 2,473,975
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 2,968,770
	0 Null Null								O&M	$ 123,699
									CM	$ 123,699
									E&D	$ 123,699
127	Bolivar Peninsula Bay Shoreline Wetland Restoration	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
131	Galveston Bay Shoreline (Dickinson Bay to Virginia Point)	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
132	Village of Surfside Beach Nourishment and Dune Restoration	$ 28,819,600	Gulf	$ 17,671,250	Dune	$ 2,563,650	Null	$ -	Clearing & Grubbing	$ 101,175
			CY Sand Fill	$ 17,671,250	CY Sand Fill	$ 2,549,583	Null	$ -	Mobilization & Demobilizatoin	$ 1,011,745
	21100 LF Gulf		Null	$ -	YD Sand Fence	$ 14,067	Null	$ -	Estimated Constuction Cost	$ 21,347,820
	21100 LF Dune		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 25,617,383
	0 Null Null								O&M	$ 1,067,391
									CM	$ 1,067,391
									E&D	$ 1,067,391
133	Gulf Shoreline from Quintana Beach to FM 1495	$ 19,804,900	Gulf	$ 12,143,750	Dune	$ 1,761,750	Null	$ -	Clearing & Grubbing	$ 69,528
			CY Sand Fill	$ 12,143,750	CY Sand Fill	$ 1,752,083	Null	$ -	Mobilization & Demobilizatoin	$ 695,275
	14500 LF Gulf		Null	$ -	YD Sand Fence	$ 9,667	Null	$ -	Estimated Constuction Cost	$ 14,670,303
	14500 LF Dune		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 17,604,363
	0 Null Null								O&M	$ 733,515
									CM	$ 733,515
									E&D	$ 733,515

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
136	**Dune/Beach Restoration from Sargent Beach to the Colorado River**	**$ 232,195,500**	**Dune**	**$ 20,655,000**	**Gulf**	**$ 142,375,000**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 815,150*
			CY Sand Fill	*$ 20,541,667*	*CY Sand Fill*	*$ 142,375,000*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 8,151,500*
	170000 LF Dune		*YD Sand Fence*	*$ 113,333*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 171,996,650*
	170000 LF Gulf		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 206,395,980*
	0 Null Null								*O&M*	*$ 8,599,833*
									CM	*$ 8,599,833*
									E&D	*$ 8,599,833*
138	**Bay Shoreline from Magnolia Beach to Port O'Connor**	**$ 23,493,500**	**Groin**	**$ 1,195,800**	**Revetment**	**$ 14,299,528**	**Wetlands/Forested Wetlands**	**$ 1,000,000**	*Clearing & Grubbing*	*$ 82,477*
			tons of 250-lb Class Stone	*$ 340,000*	*SY Geotextile*	*$ 278,280*	*W/FW*	*$ 1,000,000*	*Mobilization & Demobilizatoin*	*$ 824,766*
	2 EA Groin		*tons of 2000-lb Class Stone*	*$ 844,800*	*tons of 250-lb Class Stone*	*$ 13,868,692*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 17,402,571*
	52800 LF Revetment		*SY Geotextile*	*$ 11,000.00*	*CY Excavation*	*$ 152,555.61*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 20,883,085*
	1 EA Wetlands/Forested Wetlands								*O&M*	*$ 870,129*
									CM	*$ 870,129*
									E&D	*$ 870,129*
142	**Mustang Island Bay Shoreline Protection and Marsh Restoration**	**$ 24,379,600**	**Breakwater**	**$ 14,896,667**	**Marsh**	**$ 2,220,840**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 85,588*
			tons of 250-lb class Stone	*$ 14,533,333*	*CY Marsh Fill*	*$ 2,081,200*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 855,875*
	43600 LF Breakwater		*SY Geotextile*	*$ 363,333*	*CY Stiff Clay*	*$ 139,640*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 18,058,970*
	215 ac Marsh		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 21,670,764*
	0 Null Null								*O&M*	*$ 902,948*
									CM	*$ 902,948*
									E&D	*$ 902,948*
145	**Town of South Padre Island Gulf Shoreline**	**$ 58,731,800**	**Gulf**	**$ 36,012,500**	**Dune**	**$ 5,224,500**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 206,185*
			CY Sand Fill	*$ 36,012,500*	*CY Sand Fill*	*$ 5,195,833*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 2,061,850*
	43000 LF Gulf		*Null*	*$ -*	*YD Sand Fence*	*$ 28,667*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 43,505,035*
	43000 LF Dune		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 52,206,042*
	0 Null Null								*O&M*	*$ 2,175,252*
									CM	*$ 2,175,252*
									E&D	*$ 2,175,252*
173	**Placement Areas 62 & 63 Dredged Material Placement and Marsh Restoration**	**$ 8,106,500**	**Marsh**	**$ 5,691,797**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 28,459*
			CY Marsh Fill	*$ 4,840,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 284,590*
	500 ac Marsh		*CY Stiff Clay*	*$ 851,797*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 6,004,845*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 7,205,814*
	0 Null Null								*O&M*	*$ 300,242*
									CM	*$ 300,242*
									E&D	*$ 300,242*
177	**GIWW Barrier Island Restoration**	**$ 3,114,900**	**Barrier Islands**	**$ 2,187,025**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 10,935*
			CY Marsh Fill	*$ 193,600*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 109,351*
	5 ac Barrier Islands		*CY Stiff Clay*	*$ 665,950*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 2,307,312*
	0 Null Null		*tons of 250-lb Class Stone*	*$ 1,327,475.13*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 2,768,774*
	0 Null Null								*O&M*	*$ 115,366*
									CM	*$ 115,366*
									E&D	*$ 115,366*
180	**Deer Island and Jigsaw Island Restoration**	**$ 21,343,200**	**Breakwater**	**$ 1,708,333**	**Rookery Islands**	**$ 13,277,244**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 74,928*
			tons of 250-lb class Stone	*$ 1,666,667*	*CY Marsh Fill*	*$ 12,100,000*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 749,279*
	5000 LF Breakwater		*SY Geotextile*	*$ 41,667*	*CY Stiff Clay*	*$ 1,177,244*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 15,809,785*
	250 ac Rookery Islands		*Null*	*$ -*	*tons of 250-lb Class Stone*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 18,971,741*
	0 Null Null								*O&M*	*$ 790,489*
									CM	*$ 790,489*
									E&D	*$ 790,489*
181	**West Galveston Bay Living Shoreline**	**$ 1,045,100**	**Breakwater**	**$ 444,167**	**Marsh**	**$ 289,617**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 3,669*
			tons of 250-lb class Stone	*$ 433,333*	*CY Marsh Fill*	*$ 242,000*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 36,689*
	1300 LF Breakwater		*SY Geotextile*	*$ 10,833*	*CY Stiff Clay*	*$ 47,617*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 774,142*
	25 ac Marsh		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 928,970*
	0 Null Null								*O&M*	*$ 38,707*
									CM	*$ 38,707*
									E&D	*$ 38,707*
196	**Matagorda Peninsula Groin System**	**$ 7,325,900**	**Groin**	**$ 1,793,700**	**Gulf**	**$ 3,350,000**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 25,719*
			tons of 250-lb Class Stone	*$ 510,000*	*CY Sand Fill*	*$ 3,350,000*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 257,185*
	3 EA Groin		*tons of 2000-lb Class Stone*	*$ 1,267,200*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 5,426,604*
	4000 LF Gulf		*SY Geotextile*	*$ 16,500.00*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 6,511,924*
	0 Null Null								*O&M*	*$ 271,330*
									CM	*$ 271,330*
									E&D	*$ 271,330*
220	**Armand Prairie Land Acquisition**	**$ 9,750,000**	**Acquisitions**	**$ 9,750,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ -*
			SY Acquired	*$ 9,750,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ -*
	1300 ac Acquisitions		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ -*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ -*
	0 Null Null								*O&M*	*$ -*
									CM	*$ -*
									E&D	*$ -*
232	**Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation**	**$ 9,600,000**	**Conservation Easement**	**$ 9,600,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ -*
			SY Conserved	*$ 9,600,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ -*
	3200 ac Conservation Easement		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ -*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ -*
	0 Null Null								*O&M*	*$ -*
									CM	*$ -*
									E&D	*$ -*
240	**Coastal Heritage Preserve – Phase 4**	**$ 6,300,000**	**Acquisitions**	**$ 6,300,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ -*
			SY Acquired	*$ 6,300,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ -*
	840 ac Acquisitions		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ -*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ -*
	0 Null Null								*O&M*	*$ -*
									CM	*$ -*
									E&D	*$ -*
241	**Sweetwater Preserve Expansion**	**$ 2,062,500**	**Acquisitions**	**$ 2,062,500**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ -*
			SY Acquired	*$ 2,062,500*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ -*
	275 ac Acquisitions		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ -*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ -*
	0 Null Null								*O&M*	*$ -*
									CM	*$ -*
									E&D	*$ -*

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
252	**Bolivar Beach and Dune Restoration**	$ 72,117,200	**Gulf**	$ 44,220,000	**Dune**	$ 6,415,200	**Null**	$ -	*Clearing & Grubbing*	$ 253,176
			CY Sand Fill	$ 44,220,000	*CY Sand Fill*	$ 6,380,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,531,760
	52800 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 35,200	*Null*	$ -	*Estimated Constuction Cost*	$ 53,420,136
	52800 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 64,104,163
	0 Null Null								*O&M*	$ 2,671,007
									CM	$ 2,671,007
									E&D	$ 2,671,007
261	**East End Lagoon Nature Park & Preserve**	$ 2,040,000	**Conservation Easement**	$ 2,040,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			SY Conserved	$ 2,040,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	680 ac Conservation Easement		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
304	**Dune Restoration and Beach Nourishment, Sabine Pass to High Island**	$ 252,683,300	**Gulf**	$ 154,937,500	**Dune**	$ 22,477,500	**Null**	$ -	*Clearing & Grubbing*	$ 887,075
			CY Sand Fill	$ 154,937,500	*CY Sand Fill*	$ 22,354,167	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 8,870,750
	185000 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 123,333	*Null*	$ -	*Estimated Constuction Cost*	$ 187,172,825
	185000 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 224,607,390
	0 Null Null								*O&M*	$ 9,358,641
									CM	$ 9,358,641
									E&D	$ 9,358,641
305	**Dune Restoration and Beach Nourishment, High Island to Galveston East Jetty**	$ 183,161,300	**Gulf**	$ 112,308,750	**Dune**	$ 16,293,150	**Null**	$ -	*Clearing & Grubbing*	$ 643,010
			CY Sand Fill	$ 112,308,750	*CY Sand Fill*	$ 16,203,750	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 6,430,095
	134100 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 89,400	*Null*	$ -	*Estimated Constuction Cost*	$ 135,675,005
	134100 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 162,810,005
	0 Null Null								*O&M*	$ 6,783,750
									CM	$ 6,783,750
									E&D	$ 6,783,750
307	**Dune Restoration and Beach Nourishment, West Galveston Island**	$ 132,692,900	**Gulf**	$ 81,363,125	**Dune**	$ 11,803,725	**Null**	$ -	*Clearing & Grubbing*	$ 465,834
			CY Sand Fill	$ 81,363,125	*CY Sand Fill*	$ 11,738,958	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 4,658,343
	97150 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 64,767	*Null*	$ -	*Estimated Constuction Cost*	$ 98,291,027
	97150 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 117,949,232
	0 Null Null								*O&M*	$ 4,914,551
									CM	$ 4,914,551
									E&D	$ 4,914,551
308	**Dune Restoration and Beach Nourishment, San Luis Pass to Surfside**	$ 73,619,600	**Gulf**	$ 45,141,250	**Dune**	$ 6,548,850	**Null**	$ -	*Clearing & Grubbing*	$ 258,451
			CY Sand Fill	$ 45,141,250	*CY Sand Fill*	$ 6,512,917	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,584,505
	53900 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 35,933	*Null*	$ -	*Estimated Constuction Cost*	$ 54,533,056
	53900 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 65,439,667
	0 Null Null								*O&M*	$ 2,726,653
									CM	$ 2,726,653
									E&D	$ 2,726,653
309	**Dune Restoration and Beach Nourishment, Surfside to Brazos River**	$ 13,658,600	**Gulf**	$ 8,375,000	**Dune**	$ 1,215,000	**Null**	$ -	*Clearing & Grubbing*	$ 47,950
			CY Sand Fill	$ 8,375,000	*CY Sand Fill*	$ 1,208,333	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 479,500
	10000 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 6,667	*Null*	$ -	*Estimated Constuction Cost*	$ 10,117,450
	10000 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 12,140,940
	0 Null Null								*O&M*	$ 505,873
									CM	$ 505,873
									E&D	$ 505,873
310	**Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel**	$ 45,483,000	**Gulf**	$ 27,888,750	**Dune**	$ 4,045,950	**Null**	$ -	*Clearing & Grubbing*	$ 159,674
			CY Sand Fill	$ 27,888,750	*CY Sand Fill*	$ 4,023,750	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 1,596,735
	33300 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 22,200	*Null*	$ -	*Estimated Constuction Cost*	$ 33,691,109
	33300 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 40,429,330
	0 Null Null								*O&M*	$ 1,684,555
									CM	$ 1,684,555
									E&D	$ 1,684,555
311	**Erosion Control Structures, Sabine Pass to High Island**	$ 241,116,600	**Groin**	$ 1,793,700	**Gulf**	$ 167,500,000	**Null**	$ -	*Clearing & Grubbing*	$ 846,469
			tons of 250-lb Class Stone	$ 510,000	*CY Sand Fill*	$ 167,500,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 8,464,685
	3 EA Groin		*tons of 2000-lb Class Stone*	$ 1,267,200	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 178,604,854
	200000 LF Gulf		*SY Geotextile*	$ 16,500.00	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 214,325,824
	0 Null Null								*O&M*	$ 8,930,243
									CM	$ 8,930,243
									E&D	$ 8,930,243
314	**Erosion Control Structures, West Galveston Island to San Luis Pass**	$ 121,835,600	**Groin**	$ 1,793,700	**Gulf**	$ 83,750,000	**Null**	$ -	*Clearing & Grubbing*	$ 427,719
			tons of 250-lb Class Stone	$ 510,000	*CY Sand Fill*	$ 83,750,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 4,277,185
	3 EA Groin		*tons of 2000-lb Class Stone*	$ 1,267,200	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 90,248,604
	100000 LF Gulf		*SY Geotextile*	$ 16,500.00	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 108,298,324
	0 Null Null								*O&M*	$ 4,512,430
									CM	$ 4,512,430
									E&D	$ 4,512,430
315	**Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel**	$ 89,971,000	**Groin**	$ 1,195,800	**Gulf**	$ 61,975,000	**Null**	$ -	*Clearing & Grubbing*	$ 315,854
			tons of 250-lb Class Stone	$ 340,000	*CY Sand Fill*	$ 61,975,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 3,158,540
	2 EA Groin		*tons of 2000-lb Class Stone*	$ 844,800	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 66,645,194
	74000 LF Gulf		*SY Geotextile*	$ 11,000.00	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 79,974,233
	0 Null Null								*O&M*	$ 3,332,260
									CM	$ 3,332,260
									E&D	$ 3,332,260
318	**Groin at State Highway 332**	$ 2,760,100	**Groin**	$ 597,900	**Gulf**	$ 1,340,000	**Null**	$ -	*Clearing & Grubbing*	$ 9,690
			tons of 250-lb Class Stone	$ 170,000	*CY Sand Fill*	$ 1,340,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 96,895
	1 EA Groin		*tons of 2000-lb Class Stone*	$ 422,400	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 2,044,485
	1600 LF Gulf		*SY Geotextile*	$ 5,500.00	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,453,381
	0 Null Null								*O&M*	$ 102,224
									CM	$ 102,224
									E&D	$ 102,224
320	**GIWW Barrier Island Restoration, Old River and Hickory Coves**	$ 10,622,900	**Barrier Islands**	$ 4,041,919	**Breakwater**	$ 3,416,667	**Null**	$ -	*Clearing & Grubbing*	$ 37,293
			CY Marsh Fill	$ 1,936,000	*tons of 250-lb class Stone*	$ 3,333,333	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 372,929
	50 ac Barrier Islands		*CY Stiff Clay*	$ 2,105,919	*SY Geotextile*	$ 83,333	*Null*	$ -	*Estimated Constuction Cost*	$ 7,868,808
	10000 LF Breakwater		*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 9,442,569
	0 Null Null								*O&M*	$ 393,440
									CM	$ 393,440
									E&D	$ 393,440

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
322	GIWW Barrier Island Restoration, North Pleasure Island	$ 3,443,300	Barrier Islands	$ 1,734,259	Breakwater	$ 683,333	Null	$ -	Clearing & Grubbing	$ 12,088
			CY Marsh Fill	$ 580,800	tons of 250-lb class Stone	$ 666,667	Null	$ -	Mobilization & Demobilizatoin	$ 120,880
	15 ac Barrier Islands		CY Stiff Clay	$ 1,153,459	SY Geotextile	$ 16,667	Null	$ -	Estimated Constuction Cost	$ 2,550,560
	2000 LF Breakwater		tons of 250-lb Class Stone	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 3,060,672
	0 Null Null								O&M	$ 127,528
									CM	$ 127,528
									E&D	$ 127,528
324	GIWW Barrier Island Restoration, Bolivar Peninsula, Galveston County	$ 38,535,900	Barrier Islands	$ 27,057,005	Null	$ -	Null	$ -	Clearing & Grubbing	$ 135,285
			CY Marsh Fill	$ 11,616,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 1,352,850
	300 ac Barrier Islands		CY Stiff Clay	$ 5,158,427	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 28,545,140
	0 Null Null		tons of 250-lb Class Stone	$ 10,282,578.15	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 34,254,168
	0 Null Null								O&M	$ 1,427,257
									CM	$ 1,427,257
									E&D	$ 1,427,257
327	GIWW Barrier Island Restoration, West Bay 1, Galveston County	$ 17,003,400	Revetment	$ 5,118,581	Levee	$ 3,920,000	Barrier Islands	$ 2,899,930	Clearing & Grubbing	$ 59,693
			SY Geotextile	$ 99,612	CY Stiff Clay	$ 3,920,000	CY Marsh Fill	$ 2,323,200	Mobilization & Demobilizatoin	$ 596,926
	18900 LF Revetment		tons of 250-lb Class Stone	$ 4,964,361	Null	$ -	CY Stiff Clay	$ 576,730	Estimated Constuction Cost	$ 12,595,129
	18900 LF Levee		CY Excavation	$ 54,607.97	Null	$ -	tons of 250-lb Class Stone	$ -	Estimated Construction Cost + Contingecny	$ 15,114,154
	60 ac Barrier Islands								O&M	$ 629,756
									CM	$ 629,756
									E&D	$ 629,756
328	GIWW Barrier Island Restoration, West Bay 2, Galveston County	$ 6,414,400	Revetment	$ 2,058,265	Levee	$ 1,576,296	Barrier Islands	$ 869,165	Clearing & Grubbing	$ 22,519
			SY Geotextile	$ 40,056	CY Stiff Clay	$ 1,576,296	CY Marsh Fill	$ 580,800	Mobilization & Demobilizatoin	$ 225,186
	7600 LF Revetment		tons of 250-lb Class Stone	$ 1,996,251	Null	$ -	CY Stiff Clay	$ 288,365	Estimated Constuction Cost	$ 4,751,431
	7600 LF Levee		CY Excavation	$ 21,958.76	Null	$ -	tons of 250-lb Class Stone	$ -	Estimated Construction Cost + Contingecny	$ 5,701,718
	15 ac Barrier Islands								O&M	$ 237,572
									CM	$ 237,572
									E&D	$ 237,572
330	GIWW Barrier Island Restoration, West Bay, Brazoria County	$ 30,528,700	Revetment	$ 9,045,535	Levee	$ 6,927,407	Barrier Islands	$ 5,462,019	Clearing & Grubbing	$ 107,175
			SY Geotextile	$ 176,033	CY Stiff Clay	$ 6,927,407	CY Marsh Fill	$ 4,646,400	Mobilization & Demobilizatoin	$ 1,071,748
	33400 LF Revetment		tons of 250-lb Class Stone	$ 8,772,998	Null	$ -	CY Stiff Clay	$ 815,619	Estimated Constuction Cost	$ 22,613,884
	33400 LF Levee		CY Excavation	$ 96,502.98	Null	$ -	tons of 250-lb Class Stone	$ -	Estimated Construction Cost + Contingecny	$ 27,136,660
	120 ac Barrier Islands								O&M	$ 1,130,694
									CM	$ 1,130,694
									E&D	$ 1,130,694
337	Marsh Restoration, Old River Cove	$ 18,569,200	Marsh	$ 13,037,884	Null	$ -	Null	$ -	Clearing & Grubbing	$ 65,189
			CY Marsh Fill	$ 11,712,800	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 651,894
	1210 ac Marsh		CY Stiff Clay	$ 1,325,084	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 13,754,968
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 16,505,962
	0 Null Null								O&M	$ 687,748
									CM	$ 687,748
									E&D	$ 687,748
340	Marsh Restoration, Pepper Grove Cove, Galveston County	$ 13,094,100	Levee	$ 4,376,296	Marsh	$ 3,068,950	Misc. Wave Break	$ 1,748,435	Clearing & Grubbing	$ 45,968
			CY Stiff Clay	$ 4,376,296	CY Marsh Fill	$ 2,904,000	SY Geotextile	$ 110,880	Mobilization & Demobilizatoin	$ 459,684
	21100 LF Levee		Null	$ -	CY Stiff Clay	$ 164,950	CY Sludge	$ 1,637,555	Estimated Constuction Cost	$ 9,699,334
	300 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 11,639,200
	9000 LF Misc. Wave Break								O&M	$ 484,967
									CM	$ 484,967
									E&D	$ 484,967
341	Marsh Restoration, Long Point Marsh, Galveston County	$ 39,124,700	Marsh	$ 17,620,847	Misc. Wave Break	$ 9,849,518	Null	$ -	Clearing & Grubbing	$ 137,352
			CY Marsh Fill	$ 16,068,800	SY Geotextile	$ 624,624	Null	$ -	Mobilization & Demobilizatoin	$ 1,373,518
	1660 ac Marsh		CY Stiff Clay	$ 1,552,047	CY Sludge	$ 9,224,894	Null	$ -	Estimated Constuction Cost	$ 28,981,235
	50700 LF Misc. Wave Break		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 34,777,482
	0 Null Null								O&M	$ 1,449,062
									CM	$ 1,449,062
									E&D	$ 1,449,062
342	Marsh Restoration South of Keith Lake	$ 67,702,600	Levee	$ 8,213,333	Marsh	$ 39,322,311	Null	$ -	Clearing & Grubbing	$ 237,678
			CY Stiff Clay	$ 8,213,333	CY Marsh Fill	$ 38,720,000	Null	$ -	Mobilization & Demobilizatoin	$ 2,376,782
	39600 LF Levee		Null	$ -	CY Stiff Clay	$ 602,311	Null	$ -	Estimated Constuction Cost	$ 50,150,105
	4000 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 60,180,126
	0 Null Null								O&M	$ 2,507,505
									CM	$ 2,507,505
									E&D	$ 2,507,505
343	Marsh Restoration, Texas Point National Wildlife Refuge	$ 72,770,100	Marsh	$ 51,093,617	Null	$ -	Null	$ -	Clearing & Grubbing	$ 255,468
			CY Marsh Fill	$ 48,400,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 2,554,681
	5000 ac Marsh		CY Stiff Clay	$ 2,693,617	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 53,903,766
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 64,684,519
	0 Null Null								O&M	$ 2,695,188
									CM	$ 2,695,188
									E&D	$ 2,695,188
344	Marsh Restoration, Pierce Marsh, Galveston County	$ 33,502,700	Marsh	$ 21,871,731	Misc. Wave Break	$ 1,651,300	Null	$ -	Clearing & Grubbing	$ 117,615
			CY Marsh Fill	$ 20,134,400	SY Geotextile	$ 104,720	Null	$ -	Mobilization & Demobilizatoin	$ 1,176,152
	2080 ac Marsh		CY Stiff Clay	$ 1,737,331	CY Sludge	$ 1,546,580	Null	$ -	Estimated Constuction Cost	$ 24,816,797
	8500 LF Misc. Wave Break		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 29,780,157
	0 Null Null								O&M	$ 1,240,840
									CM	$ 1,240,840
									E&D	$ 1,240,840
346	Marsh Restoration, IH-45 Causeway, Galveston County	$ 12,399,300	Marsh	$ 7,054,539	Misc. Wave Break	$ 1,651,300	Null	$ -	Clearing & Grubbing	$ 43,529
			CY Marsh Fill	$ 6,098,400	SY Geotextile	$ 104,720	Null	$ -	Mobilization & Demobilizatoin	$ 435,292
	630 ac Marsh		CY Stiff Clay	$ 956,139	CY Sludge	$ 1,546,580	Null	$ -	Estimated Constuction Cost	$ 9,184,660
	8500 LF Misc. Wave Break		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 11,021,592
	0 Null Null								O&M	$ 459,233
									CM	$ 459,233
									E&D	$ 459,233
351	Marsh Restoration, Jumbile Cove, Galveston County	$ 7,795,200	Breakwater	$ 2,255,000	Marsh	$ 3,218,223	Null	$ -	Clearing & Grubbing	$ 27,366
			tons of 250-lb class Stone	$ 2,200,000	CY Marsh Fill	$ 3,049,200	Null	$ -	Mobilization & Demobilizatoin	$ 273,661
	6600 LF Breakwater		SY Geotextile	$ 55,000	CY Stiff Clay	$ 169,023	Null	$ -	Estimated Constuction Cost	$ 5,774,250
	315 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,929,100
	0 Null Null								O&M	$ 288,713
									CM	$ 288,713
									E&D	$ 288,713

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
355	**Marsh and Bayou Restoration, Sweetwater Preserve, Galveston County**	$ 5,075,700	**Marsh**	$ 3,563,799	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 17,819
			CY Marsh Fill	$ 2,904,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 178,190
	300 ac Marsh		*CY Stiff Clay*	$ 659,799	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost*	$ 3,759,808
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 4,511,769
	0 Null Null								*O&M*	$ 187,990
									CM	$ 187,990
									E&D	$ 187,990
360	**West Bay Water Quality Protection Project**	$ 1,482,700	**Conservation Easement**	$ 210,000	**Acquisitions**	$ 525,000	**Fee Simple**	$ 525,000	*Clearing & Grubbing*	$ 2,625
			SY Conserved	$ 210,000	*SY Acquired*	$ 525,000	*Fee Simple*	$ 525,000	*Mobilization & Demobilizatoin*	$ 26,250
	70 ac Conservation Easement		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 553,875
	70 ac Acquisitions		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 664,650
	70 ac Fee Simple								*O&M*	$ 27,694
									CM	$ 27,694
									E&D	$ 27,694
380	**Gordy Marsh Restoration & Shoreline Protection - Phase 1**	$ 24,826,800	**Misc. Wave Break**	$ 582,812	**Marsh**	$ 16,848,659	**Null**	$ -	*Clearing & Grubbing*	$ 87,157
			SY Geotextile	$ 36,960	*CY Marsh Fill*	$ 16,456,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 871,574
	3000 LF Misc. Wave Break		*CY Sludge*	$ 545,852	*CY Stiff Clay*	$ 392,659	*Null*	$ -	*Estimated Constuction Cost*	$ 18,390,201
	1700 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 22,068,242
	0 Null Null								*O&M*	$ 919,510
									CM	$ 919,510
									E&D	$ 919,510
397	**GIWW Island Restoration, Brazoria County**	$ 1,424,300	**Wetlands/Forested Wetlands**	$ 1,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 5,000
			W/FW	$ 1,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 50,000
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,055,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,266,000
	0 Null Null								*O&M*	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
409	**Bolivar Marsh Restoration, Galveston County**	$ 29,999,800	**Marsh**	$ 21,063,593	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 105,318
			CY Marsh Fill	$ 19,360,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 1,053,180
	2000 ac Marsh		*CY Stiff Clay*	$ 1,703,593	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 22,222,091
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 26,666,509
	0 Null Null								*O&M*	$ 1,111,105
									CM	$ 1,111,105
									E&D	$ 1,111,105
413	**GIWW Island Restoration, Galveston County**	$ 47,452,800	**Barrier Islands**	$ 33,317,737	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 166,589
			CY Marsh Fill	$ 15,488,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 1,665,887
	400 ac Barrier Islands		*CY Stiff Clay*	$ 5,956,438	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 35,150,212
	0 Null Null		*tons of 250-lb Class Stone*	$ 11,873,298.52	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 42,180,255
	0 Null Null								*O&M*	$ 1,757,511
									CM	$ 1,757,511
									E&D	$ 1,757,511
414	**Galveston County Oyster Reef Creation**	$ 11,572,000	**Oyster Reef**	$ 8,125,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 40,625
			CY Recycled Concrete	$ 8,125,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 406,250
	100 ac Oyster Reef		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 8,571,875
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 10,286,250
	0 Null Null								*O&M*	$ 428,594
									CM	$ 428,594
									E&D	$ 428,594
417	**GIWW Island Restoration, Orange County**	$ 21,756,600	**Barrier Islands**	$ 15,275,853	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 76,379
			CY Marsh Fill	$ 5,072,320	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 763,793
	131 ac Barrier Islands		*CY Stiff Clay*	$ 3,408,728	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 16,116,025
	0 Null Null		*tons of 250-lb Class Stone*	$ 6,794,805.65	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 19,339,230
	0 Null Null								*O&M*	$ 805,801
									CM	$ 805,801
									E&D	$ 805,801
418	**Sargent Beach Dune/Beach Restoration**	$ 61,463,500	**Gulf**	$ 37,687,500	**Dune**	$ 5,467,500	**Null**	$ -	*Clearing & Grubbing*	$ 215,775
			CY Sand Fill	$ 37,687,500	*CY Sand Fill*	$ 5,437,500	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,157,750
	45000 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 30,000	*Null*	$ -	*Estimated Constuction Cost*	$ 45,528,525
	45000 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 54,634,230
	0 Null Null								*O&M*	$ 2,276,426
									CM	$ 2,276,426
									E&D	$ 2,276,426
423	**Matagorda Bay System Hydrologic Restoration**	$ 2,921,200	**Marsh**	$ 1,348,935	**Plans**	$ 1,000,000	**Null**	$ -	*Clearing & Grubbing*	$ 6,745
			CY Marsh Fill	$ 968,000	*EA Plan*	$ 1,000,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 67,447
	100 ac Marsh		*CY Stiff Clay*	$ 380,935	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,423,126
	1 EA Plans		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,707,752
	0 Null Null								*O&M*	$ 71,156
									CM	$ 71,156
									E&D	$ 71,156
430	**Redfish Lake on Carancahua Bay Shoreline Stabilization**	$ 9,251,500	**Breakwater**	$ 5,432,500	**Marsh**	$ 1,063,234	**Null**	$ -	*Clearing & Grubbing*	$ 32,479
			tons of 250-lb class Stone	$ 5,300,000	*CY Marsh Fill*	$ 968,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 324,787
	15900 LF Breakwater		*SY Geotextile*	$ 132,500	*CY Stiff Clay*	$ 95,234	*Null*	$ -	*Estimated Constuction Cost*	$ 6,852,999
	100 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 8,223,599
	0 Null Null								*O&M*	$ 342,650
									CM	$ 342,650
									E&D	$ 342,650
437	**Fulton Beach Road Protection**	$ 9,787,700	**Breakwater**	$ 6,320,833	**Marsh**	$ 551,340	**Null**	$ -	*Clearing & Grubbing*	$ 34,361
			tons of 250-lb class Stone	$ 6,166,667	*CY Marsh Fill*	$ 484,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 343,609
	18500 LF Breakwater		*SY Geotextile*	$ 154,167	*CY Stiff Clay*	$ 67,340	*Null*	$ -	*Estimated Constuction Cost*	$ 7,250,143
	50 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 8,700,172
	0 Null Null								*O&M*	$ 362,507
									CM	$ 362,507
									E&D	$ 362,507
439	**North Padre Island Dune and Beach Restoration**	$ 5,736,600	**Gulf**	$ 3,517,500	**Dune**	$ 510,300	**Null**	$ -	*Clearing & Grubbing*	$ 20,139
			CY Sand Fill	$ 3,517,500	*CY Sand Fill*	$ 507,500	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 201,390
	4200 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 2,800	*Null*	$ -	*Estimated Constuction Cost*	$ 4,249,329
	4200 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 5,099,195
	0 Null Null								*O&M*	$ 212,466
									CM	$ 212,466
									E&D	$ 212,466

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
443	**Nueces County Hydrologic Restoration Study**	$ 284,900	**Studies**	$ 200,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 1,000
			EA Study	$ 200,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 10,000
	1 EA Studies		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 211,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 253,200
	0 Null Null								*O&M*	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
448	**Copano Bay Shoreline Stabilization**	$ 4,667,200	**Breakwater**	$ 1,708,333	**Marsh**	$ 1,568,637	**Null**	$ -	*Clearing & Grubbing*	$ 16,385
			tons of 250-lb class Stone	$ 1,666,667	*CY Marsh Fill*	$ 1,452,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 163,849
	5000 LF Breakwater		*SY Geotextile*	$ 41,667	*CY Stiff Clay*	$ 116,637	*Null*	$ -	*Estimated Constuction Cost*	$ 3,457,204
	150 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 4,148,644
	0 Null Null								*O&M*	$ 172,860
									CM	$ 172,860
									E&D	$ 172,860
452	**Bird and Heron Islands Restoration, Cameron County**	$ 3,512,800	**Breakwater**	$ 1,452,083	**Rookery Islands**	$ 1,014,365	**Null**	$ -	*Clearing & Grubbing*	$ 12,332
			tons of 250-lb class Stone	$ 1,416,667	*CY Marsh Fill*	$ 726,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 123,322
	4250 LF Breakwater		*SY Geotextile*	$ 35,417	*CY Stiff Clay*	$ 288,365	*Null*	$ -	*Estimated Constuction Cost*	$ 2,602,103
	15 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,122,523
	0 Null Null								*O&M*	$ 130,105
									CM	$ 130,105
									E&D	$ 130,105
457	**GIWW Island Restoration, Jefferson County**	$ 894,600	**Marsh**	$ 628,124	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 3,141
			CY Marsh Fill	$ 387,200	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 31,406
	40 ac Marsh		*CY Stiff Clay*	$ 240,924	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 662,671
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 795,206
	0 Null Null								*O&M*	$ 33,134
									CM	$ 33,134
									E&D	$ 33,134
458	**Marsh Restoration, Jefferson County**	$ 133,448,800	**Marsh**	$ 93,697,604	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 468,488
			CY Marsh Fill	$ 90,024,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 4,684,880
	9300 ac Marsh		*CY Stiff Clay*	$ 3,673,604	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 98,850,972
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 118,621,167
	0 Null Null								*O&M*	$ 4,942,549
									CM	$ 4,942,549
									E&D	$ 4,942,549
600	**Half Moon Reef Restoration in Matagorda Bay - Phase III**	$ 3,471,600	**Oyster Reef**	$ 2,437,500	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 12,188
			CY Recycled Concrete	$ 2,437,500	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 121,875
	30 ac Oyster Reef		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 2,571,563
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,085,875
	0 Null Null								*O&M*	$ 128,578
									CM	$ 128,578
									E&D	$ 128,578
605	**Guadalupe Delta Estuary Restoration**	$ 4,282,200	**Breakwater**	$ 3,006,667	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 15,033
			tons of 250-lb class Stone	$ 2,933,333	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 150,333
	8800 LF Breakwater		*SY Geotextile*	$ 73,333	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 3,172,033
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 3,806,440
	0 Null Null								*O&M*	$ 158,602
									CM	$ 158,602
									E&D	$ 158,602
607	**Moses Lake Wetlands Restoration & Protection**	$ 2,434,400	**Breakwater**	$ 1,366,667	**Marsh**	$ 342,562	**Null**	$ -	*Clearing & Grubbing*	$ 8,546
			tons of 250-lb class Stone	$ 1,333,333	*CY Marsh Fill*	$ 290,400	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 85,461
	4000 LF Breakwater		*SY Geotextile*	$ 33,333	*CY Stiff Clay*	$ 52,162	*Null*	$ -	*Estimated Constuction Cost*	$ 1,803,236
	30 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,163,883
	0 Null Null								*O&M*	$ 90,162
									CM	$ 90,162
									E&D	$ 90,162
616	**Alligator Point Island Restoration**	$ 2,971,200	**Breakwater**	$ 1,366,667	**Rookery Islands**	$ 719,449	**Null**	$ -	*Clearing & Grubbing*	$ 10,431
			tons of 250-lb class Stone	$ 1,333,333	*CY Marsh Fill*	$ 484,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 104,306
	4000 LF Breakwater		*SY Geotextile*	$ 33,333	*CY Stiff Clay*	$ 235,449	*Null*	$ -	*Estimated Constuction Cost*	$ 2,200,852
	10 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,641,022
	0 Null Null								*O&M*	$ 110,043
									CM	$ 110,043
									E&D	$ 110,043
618	**Jig Saw Island Restoration**	$ 1,192,900	**Misc. Wave Break**	$ 563,385	**Rookery Islands**	$ 274,161	**Null**	$ -	*Clearing & Grubbing*	$ 4,188
			SY Geotextile	$ 35,728	*CY Marsh Fill*	$ 145,200	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 41,877
	2900 LF Misc. Wave Break		*CY Sludge*	$ 527,657	*CY Stiff Clay*	$ 128,961	*Null*	$ -	*Estimated Constuction Cost*	$ 883,610
	3 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,060,332
	0 Null Null								*O&M*	$ 44,181
									CM	$ 44,181
									E&D	$ 44,181
619	**Rollover Bay Island Restoration**	$ 2,456,900	**Breakwater**	$ 751,667	**Rookery Islands**	$ 973,359	**Null**	$ -	*Clearing & Grubbing*	$ 8,625
			tons of 250-lb class Stone	$ 733,333	*CY Marsh Fill*	$ 363,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 86,251
	2200 LF Breakwater		*SY Geotextile*	$ 18,333	*CY Stiff Clay*	$ 203,905	*Null*	$ -	*Estimated Constuction Cost*	$ 1,819,902
	7.5 ac Rookery Islands		*Null*	$ -	*tons of 250-lb Class Stone*	$ 406,455	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,183,883
	0 Null Null								*O&M*	$ 90,995
									CM	$ 90,995
									E&D	$ 90,995
622	**Seabrook Habitat Island Restoration**	$ 1,760,600	**Wetlands/Forested Wetlands**	$ 1,000,000	**Marsh**	$ 236,190	**Null**	$ -	*Clearing & Grubbing*	$ 6,181
			W/FW	$ 1,000,000	*CY Marsh Fill*	$ 193,600	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 61,809
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*CY Stiff Clay*	$ 42,590	*Null*	$ -	*Estimated Constuction Cost*	$ 1,304,180
	20 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,565,016
	0 Null Null								*O&M*	$ 65,209
									CM	$ 65,209
									E&D	$ 65,209
637	**Port Freeport Regional Sediment Management-Habitat Restoration Initiative**	$ 1,000,000	**Plans**	$ 1,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			EA Plan	$ 1,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	1 EA Plans		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
638	Magnolia Beach and Marshes Habitat Protection and Restoration - Phase I	$ 33,722,000	Misc. Wave Break	$ 3,691,141	Marsh	$ 19,785,898	Studies	$ 200,000	Clearing & Grubbing	$ 118,385
			SY Geotextile	$ 234,080	CY Marsh Fill	$ 19,360,000	EA Study	$ 200,000	Mobilization & Demobilizatoin	$ 1,183,852
	19000 LF Misc. Wave Break		CY Sludge	$ 3,457,061	CY Stiff Clay	$ 425,898	Null	$ -	Estimated Constuction Cost	$ 24,979,276
	2000 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 29,975,132
	1 EA Studies								O&M	$ 1,248,964
									CM	$ 1,248,964
									E&D	$ 1,248,964
641	Oyster Reef Restoration in Upper Galveston Bay	$ 17,358,000	Oyster Reef	$ 12,187,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ 60,938
			CY Recycled Concrete	$ 12,187,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 609,375
	150 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 12,857,813
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 15,429,375
	0 Null Null								O&M	$ 642,891
									CM	$ 642,891
									E&D	$ 642,891
645	Long-Term Recovery of Gulf Shorebirds and Waterbirds	$ 6,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Program	$ 5,000,000	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	EA Program	$ 5,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	1 EA Program		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
650	Bolivar Peninsula Habitat Acquisition, Restoration, and Enhancement	$ 2,250,000	Acquisitions	$ 2,250,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 2,250,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	300 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
652	Port Isabel Ecological Restoration Program	$ 520,500	Marsh	$ 363,959	Walkovers	$ 1,500	Null	$ -	Clearing & Grubbing	$ 1,827
			CY Marsh Fill	$ 193,600	YD Walkover	$ 1,500	Null	$ -	Mobilization & Demobilizatoin	$ 18,273
	20 ac Marsh		CY Stiff Clay	$ 170,359	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 385,560
	3 EA Walkovers		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 462,671
	0 Null Null								O&M	$ 19,278
									CM	$ 19,278
									E&D	$ 19,278
658	Bahia Grande Living Shoreline and Public Access Project	$ 544,000	Breakwater	$ 341,667	Marsh	$ 39,258	Walkovers	$ 1,000	Clearing & Grubbing	$ 1,910
			tons of 250-lb class Stone	$ 333,333	CY Marsh Fill	$ 24,200	YD Walkover	$ 1,000	Mobilization & Demobilizatoin	$ 19,096
	1000 LF Breakwater		SY Geotextile	$ 8,333	CY Stiff Clay	$ 15,058	Null	$ -	Estimated Constuction Cost	$ 402,930
	2.5 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 483,516
	2 EA Walkovers								O&M	$ 20,147
									CM	$ 20,147
									E&D	$ 20,147
678	Indian Point Shoreline Protection – Phase II	$ 1,291,300	Breakwater	$ 355,333	Marsh	$ 551,340	Null	$ -	Clearing & Grubbing	$ 4,533
			tons of 250-lb class Stone	$ 346,667	CY Marsh Fill	$ 484,000	Null	$ -	Mobilization & Demobilizatoin	$ 45,334
	1040 LF Breakwater		SY Geotextile	$ 8,667	CY Stiff Clay	$ 67,340	Null	$ -	Estimated Constuction Cost	$ 956,541
	50 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,147,849
	0 Null Null								O&M	$ 47,827
									CM	$ 47,827
									E&D	$ 47,827
680	Nueces Delta Marsh Plan and Restoration Project – Phase II	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
696	Shamrock Island Restoration – Phase II	$ 12,076,800	Breakwater	$ 307,500	Rookery Islands	$ 8,171,890	Null	$ -	Clearing & Grubbing	$ 42,397
			tons of 250-lb class Stone	$ 300,000	CY Marsh Fill	$ 7,260,000	Null	$ -	Mobilization & Demobilizatoin	$ 423,969
	900 LF Breakwater		SY Geotextile	$ 7,500	CY Stiff Clay	$ 911,890	Null	$ -	Estimated Constuction Cost	$ 8,945,756
	150 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 10,734,907
	0 Null Null								O&M	$ 447,288
									CM	$ 447,288
									E&D	$ 447,288
705	Packery Channel Nature Park Enhancement and Wildlife Rehabilitation Center	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
713	Middleton Wetlands Creation	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
716	Galveston Bay Bird Nesting Islands Restoration	$ 8,507,200	Misc. Wave Break	$ 388,541	Rookery Islands	$ 5,584,555	Null	$ -	Clearing & Grubbing	$ 29,865
			SY Geotextile	$ 24,640	CY Marsh Fill	$ 4,840,000	Null	$ -	Mobilization & Demobilizatoin	$ 298,655
	2000 LF Misc. Wave Break		CY Sludge	$ 363,901	CY Stiff Clay	$ 744,555	Null	$ -	Estimated Constuction Cost	$ 6,301,616
	100 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 7,561,939
	0 Null Null								O&M	$ 315,081
									CM	$ 315,081
									E&D	$ 315,081
717	South Deer Island Acquisition and Restoration	$ 10,817,600	Acquisitions	$ 750,000	Rookery Islands	$ 7,068,717	Null	$ -	Clearing & Grubbing	$ 35,344
			SY Acquired	$ 750,000	CY Marsh Fill	$ 4,840,000	Null	$ -	Mobilization & Demobilizatoin	$ 353,436
	100 ac Acquisitions		Null	$ -	CY Stiff Clay	$ 744,555	Null	$ -	Estimated Constuction Cost	$ 7,457,497
	100 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ 1,484,162.32	Null	$ -	Estimated Construction Cost + Contingecny	$ 8,948,996
	0 Null Null								O&M	$ 372,875
									CM	$ 372,875
									E&D	$ 372,875

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
718	East Copano Bay Shoreline Stabilization and Habitat Protection	$ 14,491,700	Breakwater	$ 2,050,000	Oyster Reef	$ 8,125,000	Null	$ -	Clearing & Grubbing	$ 50,875
			tons of 250-lb class Stone	$ 2,000,000	CY Recycled Concrete	$ 8,125,000	Null	$ -	Mobilization & Demobilizatoin	$ 508,750
	6000 LF Breakwater		SY Geotextile	$ 50,000	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 10,734,625
	100 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 12,881,550
	0 Null Null								O&M	$ 536,731
									CM	$ 536,731
									E&D	$ 536,731
731	Prescribed Burning in Texas Point National Wildlife Refuge	$ 115,146,600	Marsh	$ 80,847,186	Null	$ -	Null	$ -	Clearing & Grubbing	$ 404,236
			CY Marsh Fill	$ 77,440,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 4,042,359
	8000 ac Marsh		CY Stiff Clay	$ 3,407,186	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 85,293,781
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 102,352,538
	0 Null Null								O&M	$ 4,264,689
									CM	$ 4,264,689
									E&D	$ 4,264,689
732	Prescribed Burning in McFaddin National Wildlife Refuge	$ 840,494,000	Marsh	$ 590,130,964	Null	$ -	Null	$ -	Clearing & Grubbing	$ 2,950,655
			CY Marsh Fill	$ 580,800,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 29,506,548
	60000 ac Marsh		CY Stiff Clay	$ 9,330,964	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 622,588,167
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 747,105,800
	0 Null Null								O&M	$ 31,129,408
									CM	$ 31,129,408
									E&D	$ 31,129,408
733	Prescribed Burning in Anahuac National Wildlife Refuge	$ 499,651,600	Marsh	$ 350,817,365	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,754,087
			CY Marsh Fill	$ 343,640,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 17,540,868
	35500 ac Marsh		CY Stiff Clay	$ 7,177,365	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 370,112,320
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 444,134,784
	0 Null Null								O&M	$ 18,505,616
									CM	$ 18,505,616
									E&D	$ 18,505,616
734	Hydrological Restoration of Coastal Marsh (Robinson Bayou to Smith Point)	$ 14,527,400	Studies	$ 200,000	Hydrologic Restoration	$ 10,000,000	Null	$ -	Clearing & Grubbing	$ 51,000
			EA Study	$ 200,000	HR	$ 10,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 510,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 10,761,000
	1 EA Hydrologic Restoration		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 12,913,200
	0 Null Null								O&M	$ 538,050
									CM	$ 538,050
									E&D	$ 538,050
764	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	$ 12,750,000	Acquisitions	$ 12,750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 12,750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	1700 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
765	Acquisition of Intermediate Marsh Adjacent to the J.D. Murphree WMA	$ 2,437,500	Acquisitions	$ 2,437,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 2,437,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	325 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
769	San Jacinto North Shore Restoration	$ 823,000	Breakwater	$ 341,667	Marsh	$ 236,190	Null	$ -	Clearing & Grubbing	$ 2,889
			tons of 250-lb class Stone	$ 333,333	CY Marsh Fill	$ 193,600	Null	$ -	Mobilization & Demobilizatoin	$ 28,893
	1000 LF Breakwater		SY Geotextile	$ 8,333	CY Stiff Clay	$ 42,590	Null	$ -	Estimated Constuction Cost	$ 609,639
	20 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 731,566
	0 Null Null								O&M	$ 30,482
									CM	$ 30,482
									E&D	$ 30,482
777	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	$ 214,223,800	Acquisitions	$ 75,000,000	Marsh	$ 97,752,337	Null	$ -	Clearing & Grubbing	$ 488,762
			SY Acquired	$ 75,000,000	CY Marsh Fill	$ 96,800,000	Null	$ -	Mobilization & Demobilizatoin	$ 4,887,617
	10000 ac Acquisitions		Null	$ -	CY Stiff Clay	$ 952,337	Null	$ -	Estimated Constuction Cost	$ 103,128,716
	10000 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 123,754,459
	0 Null Null								O&M	$ 5,156,436
									CM	$ 5,156,436
									E&D	$ 5,156,436
779	Copano Bay Oyster Reef Restoration	$ 5,786,000	Oyster Reef	$ 4,062,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ 20,313
			CY Recycled Concrete	$ 4,062,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 203,125
	50 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 4,285,938
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 5,143,125
	0 Null Null								O&M	$ 214,297
									CM	$ 214,297
									E&D	$ 214,297
793	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	$ 2,397,500	Breakwater	$ 683,333	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Clearing & Grubbing	$ 8,417
			tons of 250-lb class Stone	$ 666,667	W/FW	$ 1,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 84,167
	2000 LF Breakwater		SY Geotextile	$ 16,667	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,775,917
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 2,131,100
	0 Null Null								O&M	$ 88,796
									CM	$ 88,796
									E&D	$ 88,796
794	Galveston Bay Oyster Reef Restoration and Enhancement	$ 46,288,100	Oyster Reef	$ 32,500,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 162,500
			CY Recycled Concrete	$ 32,500,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 1,625,000
	400 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 34,287,500
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 41,145,000
	0 Null Null								O&M	$ 1,714,375
									CM	$ 1,714,375
									E&D	$ 1,714,375
797	Restore Colonial Water Bird Rookery Habitat in Dickinson Bay	$ 1,285,900	Oyster Reef	$ 162,500	Rookery Islands	$ 740,356	Null	$ -	Clearing & Grubbing	$ 4,514
			CY Recycled Concrete	$ 162,500	CY Marsh Fill	$ 242,000	Null	$ -	Mobilization & Demobilizatoin	$ 45,143
	2 ac Oyster Reef		Null	$ -	CY Stiff Clay	$ 166,488	Null	$ -	Estimated Constuction Cost	$ 952,513
	5 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ 331,869	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,143,016
	0 Null Null								O&M	$ 47,626
									CM	$ 47,626
									E&D	$ 47,626

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
801	West Galveston Bay Marsh Restoration – Chocolate Bay	$ 24,229,000	Marsh	$ 17,011,740	Null	$ -	Null	$ -	Clearing & Grubbing	$ 85,059
			CY Marsh Fill	$ 15,488,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 850,587
	1600 ac Marsh		CY Stiff Clay	$ 1,523,740	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 17,947,386
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 21,536,863
	0 Null Null								O&M	$ 897,369
									CM	$ 897,369
									E&D	$ 897,369
801	West Galveston Bay Marsh Restoration – Chocolate Bay	$ 24,229,000	Marsh	$ 17,011,740	Null	$ -	Null	$ -	Clearing & Grubbing	$ 85,059
			CY Marsh Fill	$ 15,488,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 850,587
	1600 ac Marsh		CY Stiff Clay	$ 1,523,740	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 17,947,386
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 21,536,863
	0 Null Null								O&M	$ 897,369
									CM	$ 897,369
									E&D	$ 897,369
806	Restoration of Rookery Islands in Upper Laguna Madre	$ 3,183,800	Rookery Islands	$ 2,235,425	Null	$ -	Null	$ -	Clearing & Grubbing	$ 11,177
			CY Marsh Fill	$ 242,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 111,771
	5 ac Rookery Islands		CY Stiff Clay	$ 665,950	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 2,358,374
	0 Null Null		tons of 250-lb Class Stone	$ 1,327,475.13	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 2,830,048
	0 Null Null								O&M	$ 117,919
									CM	$ 117,919
									E&D	$ 117,919
809	Barrier Island Habitat Conservation - Coastal Bend	$ 750,000	Acquisitions	$ 750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	100 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
811	Zarate Tract - Laguna Atascosa National Wildlife Refuge	$ 6,862,500	Acquisitions	$ 6,862,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 6,862,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	915 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
822	Wetlands of Paso Corvinas at the Bahia Grande Unit of Laguna Atascosa - Phase II	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
827	South Padre Island American Land Conservancy Tract	$ 1,387,500	Acquisitions	$ 1,387,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 1,387,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	185 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
829	Oyster Reef Restoration in Nueces and Corpus Christi Bays	$ 5,578,600	Oyster Reef	$ 406,250	Program	$ 5,000,000	Null	$ -	Clearing & Grubbing	$ 2,031
			CY Recycled Concrete	$ 406,250	EA Program	$ 5,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 20,313
	5 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 428,594
	1 EA Program		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 514,313
	0 Null Null								O&M	$ 21,430
									CM	$ 21,430
									E&D	$ 21,430
834	Salt Bayou Siphons	$ 14,242,500	Hydrologic Restoration	$ 10,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 50,000
			HR	$ 10,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 500,000
	1 EA Hydrologic Restoration		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 10,550,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 12,660,000
	0 Null Null								O&M	$ 527,500
									CM	$ 527,500
									E&D	$ 527,500
837	Creation of Los Fresnos Nature Park	$ 615,900	Marsh	$ 432,467	Null	$ -	Null	$ -	Clearing & Grubbing	$ 2,162
			CY Marsh Fill	$ 242,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 21,623
	25 ac Marsh		CY Stiff Clay	$ 190,467	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 456,253
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 547,504
	0 Null Null								O&M	$ 22,813
									CM	$ 22,813
									E&D	$ 22,813
841	Nueces Bay Living Shoreline	$ 4,191,600	Breakwater	$ 2,391,667	Marsh	$ 551,340	Null	$ -	Clearing & Grubbing	$ 14,715
			tons of 250-lb class Stone	$ 2,333,333	CY Marsh Fill	$ 484,000	Null	$ -	Mobilization & Demobilizatoin	$ 147,150
	7000 LF Breakwater		SY Geotextile	$ 58,333	CY Stiff Clay	$ 67,340	Null	$ -	Estimated Constuction Cost	$ 3,104,872
	50 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 3,725,847
	0 Null Null								O&M	$ 155,244
									CM	$ 155,244
									E&D	$ 155,244
842	West Bay Estuarine Habitat Restoration and Protection Project	$ 30,342,500	Breakwater	$ 13,290,833	Marsh	$ 8,013,362	Null	$ -	Clearing & Grubbing	$ 106,521
			tons of 250-lb class Stone	$ 12,966,667	CY Marsh Fill	$ 7,744,000	Null	$ -	Mobilization & Demobilizatoin	$ 1,065,210
	38900 LF Breakwater		SY Geotextile	$ 324,167	CY Stiff Clay	$ 269,362	Null	$ -	Estimated Constuction Cost	$ 22,475,926
	800 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 26,971,111
	0 Null Null								O&M	$ 1,123,796
									CM	$ 1,123,796
									E&D	$ 1,123,796
844	Rookery Island Creation in Coastal Bend	$ 5,051,800	Revetment	$ 2,708,244	Rookery Islands	$ 838,721	Null	$ -	Clearing & Grubbing	$ 17,735
			SY Geotextile	$ 52,705	CY Marsh Fill	$ 580,800	Null	$ -	Mobilization & Demobilizatoin	$ 177,348
	10000 LF Revetment		tons of 250-lb Class Stone	$ 2,626,646	CY Stiff Clay	$ 257,921	Null	$ -	Estimated Constuction Cost	$ 3,742,048
	12 ac Rookery Islands		CY Excavation	$ 28,893.11	tons of 250-lb Class Stone	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 4,490,458
	0 Null Null								O&M	$ 187,102
									CM	$ 187,102
									E&D	$ 187,102

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
849	Myrtle Foester Whitmire Unit Wetland Enhancement Project	$ 4,378,300	Levee	$ 2,074,074	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Clearing & Grubbing	$ 15,370
			CY Stiff Clay	$ 2,074,074	W/FW	$ 1,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 153,704
	10000 LF Levee		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 3,243,148
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 3,891,778
	0 Null Null								O&M	$ 162,157
									CM	$ 162,157
									E&D	$ 162,157
853	Texas Mid-Coast Oyster Restoration and Enhancement	$ 52,074,100	Oyster Reef	$ 36,562,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ 182,813
			CY Recycled Concrete	$ 36,562,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 1,828,125
	450 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 38,573,438
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 46,288,125
	0 Null Null								O&M	$ 1,928,672
									CM	$ 1,928,672
									E&D	$ 1,928,672
855	Sabine Lake Oyster Reef Restoration and Enhancement	$ 4,628,800	Oyster Reef	$ 3,250,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 16,250
			CY Recycled Concrete	$ 3,250,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 162,500
	40 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 3,428,750
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 4,114,500
	0 Null Null								O&M	$ 171,438
									CM	$ 171,438
									E&D	$ 171,438
862	Habitat Enhancement for Mottled Ducks at Mad Island WMA	$ 3,524,600	Marsh	$ 2,474,723	Null	$ -	Null	$ -	Clearing & Grubbing	$ 12,374
			CY Marsh Fill	$ 1,936,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 123,736
	200 ac Marsh		CY Stiff Clay	$ 538,723	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 2,610,833
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 3,133,000
	0 Null Null								O&M	$ 130,542
									CM	$ 130,542
									E&D	$ 130,542
865	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	$ 22,781,400	Marsh	$ 15,995,355	Null	$ -	Null	$ -	Clearing & Grubbing	$ 79,977
			CY Marsh Fill	$ 14,520,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 799,768
	1500 ac Marsh		CY Stiff Clay	$ 1,475,355	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 16,875,099
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 20,250,119
	0 Null Null								O&M	$ 843,755
									CM	$ 843,755
									E&D	$ 843,755
869	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
870	Brazoria National Wildlife Refuge Habitat Improvement	$ 45,824,300	Conservation Easement	$ 44,400,000	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Clearing & Grubbing	$ 5,000
			SY Conserved	$ 44,400,000	W/FW	$ 1,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	14800 ac Conservation Easement		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
871	Texas Mid-Coast Wetland Initiative	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
873	Anahuac National Wildlife Refuge Wetlands Creation	$ 1,799,300	Wetlands/Forested Wetlands	$ 1,000,000	Conservation Easement	$ 375,000	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	SY Conserved	$ 375,000	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	125 ac Conservation Easement		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
896	San Antonio Bay Oyster Reef Restoration and Enhancement	$ 173,580,500	Oyster Reef	$ 121,875,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 609,375
			CY Recycled Concrete	$ 121,875,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 6,093,750
	1500 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 128,578,125
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 154,293,750
	0 Null Null								O&M	$ 6,428,906
									CM	$ 6,428,906
									E&D	$ 6,428,906
914	Palacios Marsh Restoration	$ 6,599,800	Marsh	$ 4,633,870	Null	$ -	Null	$ -	Clearing & Grubbing	$ 23,169
			CY Marsh Fill	$ 3,872,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 231,693
	400 ac Marsh		CY Stiff Clay	$ 761,870	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 4,888,733
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 5,866,479
	0 Null Null								O&M	$ 244,437
									CM	$ 244,437
									E&D	$ 244,437
917	Matagorda Beach/Dune Restoration	$ 21,717,100	Gulf	$ 13,316,250	Dune	$ 1,931,850	Null	$ -	Clearing & Grubbing	$ 76,241
			CY Sand Fill	$ 13,316,250	CY Sand Fill	$ 1,921,250	Null	$ -	Mobilization & Demobilizatoin	$ 762,405
	15900 LF Gulf		Null	$ -	YD Sand Fence	$ 10,600	Null	$ -	Estimated Constuction Cost	$ 16,086,746
	15900 LF Dune		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 19,304,095
	0 Null Null								O&M	$ 804,337
									CM	$ 804,337
									E&D	$ 804,337
922	Oliver Point and Chinquapin Oyster Reef Restoration	$ 4,893,000	Oyster Reef	$ 2,031,250	Plans	$ 2,000,000	Null	$ -	Clearing & Grubbing	$ 10,156
			CY Recycled Concrete	$ 2,031,250	EA Plan	$ 2,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 101,563
	25 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 2,142,969
	2 EA Plans		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 2,571,563
	0 Null Null								O&M	$ 107,148
									CM	$ 107,148
									E&D	$ 107,148

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
936	Mustang Island State Park Freshwater Wetland Habitat Enhancement - Phase II	$ 1,426,400	Wetlands/Forested Wetlands	$ 1,000,000	Abandoned Structures/Obstacles	$ 1,500	Null	$ -	*Clearing & Grubbing*	$ 5,008
			W/FW	$ 1,000,000	*EA Removal*	$ 1,500	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 50,075
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,056,583
	1 EA Abandoned Structures/Obstacles		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,267,899
	0 Null Null								*O&M*	$ 52,829
									CM	$ 52,829
									E&D	$ 52,829
1052	West Galveston Island Repair and Beach Nourishment	$ 65,127,400	Gulf	$ 45,727,500	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ 228,638
			CY Sand Fill	$ 45,727,500	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 2,286,375
	54600 LF Gulf		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 48,242,513
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 57,891,015
	0 Null Null								*O&M*	$ 2,412,126
									CM	$ 2,412,126
									E&D	$ 2,412,126
1094	Boca Chica Beach Coastal Conservation & Enhancement Project	$ 28,409,800	Gulf	$ 17,420,000	Dune	$ 2,527,200	Null	$ -	*Clearing & Grubbing*	$ 99,736
			CY Sand Fill	$ 17,420,000	*CY Sand Fill*	$ 2,513,333	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 997,360
	20800 LF Gulf		*Null*	$ -	*YD Sand Fence*	$ 13,867	*Null*	$ -	*Estimated Constuction Cost*	$ 21,044,296
	20800 LF Dune		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 25,253,155
	0 Null Null								*O&M*	$ 1,052,215
									CM	$ 1,052,215
									E&D	$ 1,052,215
1106	Cameron County Living Coastline	$ 1,104,200	Misc. Wave Break	$ 485,676	Marsh	$ 289,617	Null	$ -	*Clearing & Grubbing*	$ 3,876
			SY Geotextile	$ 30,800	*CY Marsh Fill*	$ 242,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 38,765
	2500 LF Misc. Wave Break		*CY Sludge*	$ 454,876	*CY Stiff Clay*	$ 47,617	*Null*	$ -	*Estimated Constuction Cost*	$ 817,934
	25 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 981,521
	0 Null Null								*O&M*	$ 40,897
									CM	$ 40,897
									E&D	$ 40,897
1179	Texas Point National Wildlife Refuge Marsh Restoration	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ 5,000
			W/FW	$ 1,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 50,000
	1 EA Wetlands/Forested Wetlands		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,055,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 1,266,000
	0 Null Null								*O&M*	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
1187	Regional Sediment Management Plan	$ 1,000,000	Plans	$ 1,000,000	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ -
			EA Plan	$ 1,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	1 EA Plans		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
1188	Port Alto Living Shoreline	$ 1,104,200	Misc. Wave Break	$ 485,676	Marsh	$ 289,617	Null	$ -	*Clearing & Grubbing*	$ 3,876
			SY Geotextile	$ 30,800	*CY Marsh Fill*	$ 242,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 38,765
	2500 LF Misc. Wave Break		*CY Sludge*	$ 454,876	*CY Stiff Clay*	$ 47,617	*Null*	$ -	*Estimated Constuction Cost*	$ 817,934
	25 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 981,521
	0 Null Null								*O&M*	$ 40,897
									CM	$ 40,897
									E&D	$ 40,897
2311	Statewide Beach Monitoring and Maintenance Program	$ 5,000,000	Program	$ 5,000,000	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ -
			EA Program	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	1 EA Program		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
9000	Managing Freshwater Inflows from Hill Country to Coast	$ 7,121,300	Fresh Water Inflow	$ 5,000,000	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ 25,000
			FWI	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 250,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,275,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,330,000
	0 Null Null								*O&M*	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9001	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	$ 2,445,400	Misc. Wave Break	$ 1,165,623	Marsh	$ 551,340	Null	$ -	*Clearing & Grubbing*	$ 8,585
			SY Geotextile	$ 73,920	*CY Marsh Fill*	$ 484,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 85,848
	6000 LF Misc. Wave Break		*CY Sludge*	$ 1,091,703	*CY Stiff Clay*	$ 67,340	*Null*	$ -	*Estimated Constuction Cost*	$ 1,811,397
	50 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,173,676
	0 Null Null								*O&M*	$ 90,570
									CM	$ 90,570
									E&D	$ 90,570
9002	Lower Nueces River Freshwater Inflows	$ 7,406,100	Studies	$ 200,000	Fresh Water Inflow	$ 5,000,000	Null	$ -	*Clearing & Grubbing*	$ 26,000
			EA Study	$ 200,000	*FWI*	$ 5,000,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 260,000
	1 EA Studies		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,486,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,583,200
	0 Null Null								*O&M*	$ 274,300
									CM	$ 274,300
									E&D	$ 274,300
9003	Coastal Prairie Estuarine Wetland and Mima Mound Complex Habitat Protection at Shell Point Ranch	$ 3,000,000	Acquisitions	$ 3,000,000	Null	$ -	Null	$ -	*Clearing & Grubbing*	$ -
			SY Acquired	$ 3,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	400 ac Acquisitions		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
9004	Lamar Beach Road Protection	$ 2,569,300	Breakwater	$ 1,804,000	Marsh	$ -	Null	$ -	*Clearing & Grubbing*	$ 9,020
			tons of 250-lb class Stone	$ 1,760,000	*CY Marsh Fill*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 90,200
	5280 LF Breakwater		*SY Geotextile*	$ 44,000	*CY Stiff Clay*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 1,903,220
	0 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,283,864
	0 Null Null								*O&M*	$ 95,161
									CM	$ 95,161
									E&D	$ 95,161

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
9005	Bayshore Pocket Beach Stabilization	$ 553,400	Misc. Wave Break	$ 388,541	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,943
			SY Geotextile	$ 24,640	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 19,427
	2000 LF Misc. Wave Break		CY Sludge	$ 363,901	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 409,911
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 491,893
	0 Null Null								O&M	$ 20,496
									CM	$ 20,496
									E&D	$ 20,496
9006	Dagger Island Shoreline Protection	$ 1,809,000	Misc. Wave Break	$ 718,801	Marsh	$ 551,340	Null	$ -	Clearing & Grubbing	$ 6,351
			SY Geotextile	$ 45,584	CY Marsh Fill	$ 484,000	Null	$ -	Mobilization & Demobilizatoin	$ 63,507
	3700 LF Misc. Wave Break		CY Sludge	$ 673,217	CY Stiff Clay	$ 67,340	Null	$ -	Estimated Constuction Cost	$ 1,339,999
	50 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,607,999
	0 Null Null								O&M	$ 67,000
									CM	$ 67,000
									E&D	$ 67,000
9007	Live Oak Woodland Pothole Wetland Habitat Protection, Live Oak Peninsula	$ 3,750,000	Acquisitions	$ 3,750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 3,750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	500 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9008	Flour Bluff / Laguna Shores Road Living Shoreline	$ 2,976,600	Misc. Wave Break	$ 1,538,623	Marsh	$ 551,340	Null	$ -	Clearing & Grubbing	$ 10,450
			SY Geotextile	$ 97,574	CY Marsh Fill	$ 484,000	Null	$ -	Mobilization & Demobilizatoin	$ 104,498
	7920 LF Misc. Wave Break		CY Sludge	$ 1,441,049	CY Stiff Clay	$ 67,340	Null	$ -	Estimated Constuction Cost	$ 2,204,911
	50 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 2,645,894
	0 Null Null								O&M	$ 110,246
									CM	$ 110,246
									E&D	$ 110,246
9009	Flour Bluff / Laguna Shores Road Abandoned Structures Removal	$ 10,700	Abandoned Structures/Obstacles	$ 7,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ 38
			EA Removal	$ 7,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 375
	5 EA Abandoned Structures/Obstacles		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 7,913
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 9,495
	0 Null Null								O&M	$ 396
									CM	$ 396
									E&D	$ 396
9010	Tidal Datums and Inundation Frequency Markers	$ 284,900	Studies	$ 200,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,000
			EA Study	$ 200,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 10,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 211,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 253,200
	0 Null Null								O&M	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
9011	Hydrologic Study of the Freshwater Inflows to the Upper Laguna Madre	$ 7,406,100	Studies	$ 200,000	Fresh Water Inflow	$ 5,000,000	Null	$ -	Clearing & Grubbing	$ 26,000
			EA Study	$ 200,000	FWI	$ 5,000,000	Null	$ -	Mobilization & Demobilizatoin	$ 260,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 5,486,000
	1 EA Fresh Water Inflow		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,583,200
	0 Null Null								O&M	$ 274,300
									CM	$ 274,300
									E&D	$ 274,300
9012	Monitoring Water Quality on North Padre Island	$ 284,900	Studies	$ 200,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,000
			EA Study	$ 200,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 10,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 211,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 253,200
	0 Null Null								O&M	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
9013	Nueces Bay Productivity Enhancement through Wastewater Delivery	$ 7,121,300	Fresh Water Inflow	$ 5,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 25,000
			FWI	$ 5,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 250,000
	1 EA Fresh Water Inflow		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 5,275,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,330,000
	0 Null Null								O&M	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9014	Causeway Island Rookery Habitat Protection	$ 1,190,700	Misc. Wave Break	$ 116,562	Rookery Islands	$ 719,449	Null	$ -	Clearing & Grubbing	$ 4,180
			SY Geotextile	$ 7,392	CY Marsh Fill	$ 484,000	Null	$ -	Mobilization & Demobilizatoin	$ 41,801
	600 LF Misc. Wave Break		CY Sludge	$ 109,170	CY Stiff Clay	$ 235,449	Null	$ -	Estimated Constuction Cost	$ 881,992
	10 ac Rookery Islands		Null	$ -	tons of 250-lb Class Stone	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,058,390
	0 Null Null								O&M	$ 44,100
									CM	$ 44,100
									E&D	$ 44,100
9015	Coastal Zoning and Flood Study	$ 284,900	Studies	$ 200,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,000
			EA Study	$ 200,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 10,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 211,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 253,200
	0 Null Null								O&M	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
9016	Swan Lake Marsh Restoration	$ 190,300	Marsh	$ 133,580	Null	$ -	Null	$ -	Clearing & Grubbing	$ 668
			CY Marsh Fill	$ 48,400	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 6,679
	5 ac Marsh		CY Stiff Clay	$ 85,180	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 140,927
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 169,112
	0 Null Null								O&M	$ 7,046
									CM	$ 7,046
									E&D	$ 7,046
9018	Hydrologic Restoration of Upper Cow Bayou	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
9019	Rose City Marsh Restoration	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
9020	Alternative Solutions for Beach Erosion	$ 284,900	Studies	$ 200,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,000
			EA Study	$ 200,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 10,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 211,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 253,200
	0 Null Null								O&M	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
9021	Create & Restore Habitat for Neotropical Migrant Songbirds	$ 1,424,300	Wetlands/Forested Wetlands	$ 1,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 5,000
			W/FW	$ 1,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 50,000
	1 EA Wetlands/Forested Wetlands		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 1,055,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 1,266,000
	0 Null Null								O&M	$ 52,750
									CM	$ 52,750
									E&D	$ 52,750
9022	Jones Bay Oyster Restoration	$ 23,144,100	Oyster Reef	$ 16,250,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 81,250
			CY Recycled Concrete	$ 16,250,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 812,500
	200 ac Oyster Reef		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 17,143,750
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 20,572,500
	0 Null Null								O&M	$ 857,188
									CM	$ 857,188
									E&D	$ 857,188
9024	Maintain Freshwater Inflows to Trinity River Delta	$ 7,121,300	Fresh Water Inflow	$ 5,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 25,000
			FWI	$ 5,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 250,000
	1 EA Fresh Water Inflow		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 5,275,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,330,000
	0 Null Null								O&M	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9025	Bessie Heights Marsh Restoration	$ 15,502,400	Marsh	$ 10,884,622	Null	$ -	Null	$ -	Clearing & Grubbing	$ 54,423
			CY Marsh Fill	$ 9,680,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 544,231
	1000 ac Marsh		CY Stiff Clay	$ 1,204,622	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 11,483,276
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 13,779,932
	0 Null Null								O&M	$ 574,164
									CM	$ 574,164
									E&D	$ 574,164
9026	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	$ 7,347,500	Misc. Wave Break	$ 971,353	Gulf	$ 4,187,500	Null	$ -	Clearing & Grubbing	$ 25,794
			SY Geotextile	$ 61,600	CY Sand Fill	$ 4,187,500	Null	$ -	Mobilization & Demobilizatoin	$ 257,943
	5000 LF Misc. Wave Break		CY Sludge	$ 909,753	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 5,442,590
	5000 LF Gulf		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 6,531,108
	0 Null Null								O&M	$ 272,129
									CM	$ 272,129
									E&D	$ 272,129
9027	San Antonio Bay Rookery Island Restoration	$ 12,424,800	Rookery Islands	$ 8,723,764	Null	$ -	Null	$ -	Clearing & Grubbing	$ 43,619
			CY Marsh Fill	$ 2,420,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 436,188
	50 ac Rookery Islands		CY Stiff Clay	$ 2,105,919	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 9,203,571
	0 Null Null		tons of 250-lb Class Stone	$ 4,197,844.95	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 11,044,285
	0 Null Null								O&M	$ 460,179
									CM	$ 460,179
									E&D	$ 460,179
9028	Schicke Point Living Shoreline and Marsh Protection	$ 4,834,600	Misc. Wave Break	$ 2,331,247	Marsh	$ 1,063,234	Null	$ -	Clearing & Grubbing	$ 16,972
			SY Geotextile	$ 147,840	CY Marsh Fill	$ 968,000	Null	$ -	Mobilization & Demobilizatoin	$ 169,724
	12000 LF Misc. Wave Break		CY Sludge	$ 2,183,407	CY Stiff Clay	$ 95,234	Null	$ -	Estimated Constuction Cost	$ 3,581,177
	100 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 4,297,412
	0 Null Null								O&M	$ 179,059
									CM	$ 179,059
									E&D	$ 179,059
9029	Guadalupe Bay - Victoria Barge Canal Cuts	$ 830,100	Misc. Wave Break	$ 582,812	Null	$ -	Null	$ -	Clearing & Grubbing	$ 2,914
			SY Geotextile	$ 36,960	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 29,141
	3000 LF Misc. Wave Break		CY Sludge	$ 545,852	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 614,866
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 737,840
	0 Null Null								O&M	$ 30,743
									CM	$ 30,743
									E&D	$ 30,743
9030	Matagorda Peninsula and East Matagorda Bay State Scientific Area	$ 30,000,000	Acquisitions	$ 30,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 30,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	4000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9031	Traylor Cut (Mission Lake - Guadalupe River)	$ 284,900	Studies	$ 200,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ 1,000
			EA Study	$ 200,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 10,000
	1 EA Studies		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 211,000
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 253,200
	0 Null Null								O&M	$ 10,550
									CM	$ 10,550
									E&D	$ 10,550
9032	Aransas NWR San Antonio Bay Shoreline Protection	$ 276,700	Misc. Wave Break	$ 194,271	Null	$ -	Null	$ -	Clearing & Grubbing	$ 971
			SY Geotextile	$ 12,320	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ 9,714
	1000 LF Misc. Wave Break		CY Sludge	$ 181,951	Null	$ -	Null	$ -	Estimated Constuction Cost	$ 204,955
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 245,947
	0 Null Null								O&M	$ 10,248
									CM	$ 10,248
									E&D	$ 10,248

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
9033	**San Antonio Bay Freshwater Inflows**	$ 7,121,300	**Fresh Water Inflow**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 25,000
			FWI	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 250,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,275,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,330,000
	0 Null Null								*O&M*	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9034	**Matagorda Bay Freshwater Inflows from the Colorado River**	$ 7,121,300	**Fresh Water Inflow**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 25,000
			FWI	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 250,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,275,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,330,000
	0 Null Null								*O&M*	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9035	**Matagorda Bay Estuary System Freshwater Inflows from Tributary Streams**	$ 7,121,300	**Fresh Water Inflow**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 25,000
			FWI	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 250,000
	1 EA Fresh Water Inflow		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 5,275,000
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 6,330,000
	0 Null Null								*O&M*	$ 263,750
									CM	$ 263,750
									E&D	$ 263,750
9036										
	Laguna Madre Land Acquisition Endowment Initiative	$ 300,000,000	**Conservation Easement**	$ 300,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			SY Conserved	$ 300,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	100000 ac Conservation Easement		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
9037	**Boca Chica Dune and Tidal-Flat Cable Fence Protection**	$ 900	**Cable Fence**	$ 667	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 3
			YD Cable Fence	$ 667	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 33
	1000 LF Cable Fence		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 703
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 844
	0 Null Null								*O&M*	$ 35
									CM	$ 35
									E&D	$ 35
9038	**Cameron County Land Acquistion Program**	$ 5,000,000	**Program**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			EA Program	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	1 EA Program		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -
9039	**Native Plant Propagation for Restoration & Resiliency**	$ 712,100	**Small Plan**	$ 500,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 2,500
			EA Small Plan	$ 500,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 25,000
	1 EA Small Plan		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 527,500
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 633,000
	0 Null Null								*O&M*	$ 26,375
									CM	$ 26,375
									E&D	$ 26,375
9040	**South Padre Island Tidal Flats Protection**	$ 712,100	**Small Plan**	$ 500,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 2,500
			EA Small Plan	$ 500,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 25,000
	1 EA Small Plan		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 527,500
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 633,000
	0 Null Null								*O&M*	$ 26,375
									CM	$ 26,375
									E&D	$ 26,375
9041	**Harlingen Ship Channel Living Shoreline**	$ 5,504,600	**Breakwater**	$ 2,801,667	**Marsh**	$ 1,063,234	**Null**	$ -	*Clearing & Grubbing*	$ 19,325
			tons of 250-lb class Stone	$ 2,733,333	*CY Marsh Fill*	$ 968,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 193,245
	8200 LF Breakwater		*SY Geotextile*	$ 68,333	*CY Stiff Clay*	$ 95,234	*Null*	$ -	*Estimated Constuction Cost*	$ 4,077,470
	100 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 4,892,964
	0 Null Null								*O&M*	$ 203,873
									CM	$ 203,873
									E&D	$ 203,873
9042	**Bahia Grande Living Shoreline**	$ 2,897,800	**Misc. Wave Break**	$ 971,353	**Marsh**	$ 1,063,234	**Null**	$ -	*Clearing & Grubbing*	$ 10,173
			SY Geotextile	$ 61,600	*CY Marsh Fill*	$ 968,000	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 101,729
	5000 LF Misc. Wave Break		*CY Sludge*	$ 909,753	*CY Stiff Clay*	$ 95,234	*Null*	$ -	*Estimated Constuction Cost*	$ 2,146,489
	100 ac Marsh		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 2,575,787
	0 Null Null								*O&M*	$ 107,324
									CM	$ 107,324
									E&D	$ 107,324
9043	**Lower Laguna Madre Pole and Troll Area**	$ 712,100	**Small Plan**	$ 500,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ 2,500
			EA Small Plan	$ 500,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ 25,000
	1 EA Small Plan		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ 527,500
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ 633,000
	0 Null Null								*O&M*	$ 26,375
									CM	$ 26,375
									E&D	$ 26,375
9044										
	Public Transportation Enhancement Program	$ 5,000,000	**Program**	$ 5,000,000	**Null**	$ -	**Null**	$ -	*Clearing & Grubbing*	$ -
			EA Program	$ 5,000,000	*Null*	$ -	*Null*	$ -	*Mobilization & Demobilizatoin*	$ -
	1 EA Program		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Constuction Cost*	$ -
	0 Null Null		*Null*	$ -	*Null*	$ -	*Null*	$ -	*Estimated Construction Cost + Contingecny*	$ -
	0 Null Null								*O&M*	$ -
									CM	$ -
									E&D	$ -

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
9045	Packery Channel Nature Park Habitat Restoration - Phase II	$ 158,100	Misc. Wave Break	$ 77,708	Marsh	$ 32,828	Walkovers	$ 500	Clearing & Grubbing	$ 555
			SY Geotextile	$ 4,928	CY Marsh Fill	$ 19,360	YD Walkover	$ 500	Mobilization & Demobilizatoin	$ 5,552
	400 LF Misc. Wave Break		CY Sludge	$ 72,780	CY Stiff Clay	$ 13,468	Null	$ -	Estimated Constuction Cost	$ 117,143
	2 ac Marsh		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ 140,572
	1 EA Walkovers								O&M	$ 5,857
									CM	$ 5,857
									E&D	$ 5,857
9046	Follets Island Conservation Initiative	$ 9,750,000	Acquisitions	$ 9,750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 9,750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	1300 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9047	Sabine Ranch Habitat Protection	$ 90,750,000	Acquisitions	$ 90,750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 90,750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	12100 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9048										
	Baer Ranch Addition to San Bernard NWR	$ 75,000,000	Acquisitions	$ 75,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 75,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	10000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9049	Lake Austin Shoreline Addition to Big Boggy NWR	$ 5,677,500	Acquisitions	$ 5,677,500	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 5,677,500	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	757 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9050										
	Sargent Ranch Addition to San Bernard NWR	$ 60,000,000	Acquisitions	$ 60,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 60,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	8000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9051	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	$ 75,000,000	Acquisitions	$ 75,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 75,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	10000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9051										
	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	$ 75,000,000	Acquisitions	$ 75,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 75,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	10000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9051	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	$ 75,000,000	Acquisitions	$ 75,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 75,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	10000 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9052										
	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	$ 30,750,000	Acquisitions	$ 30,750,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 30,750,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	4100 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9053	Protect Bahia Grande and Vadia Ancha Shorelines (Laguna Heights Acquisition)	$ 10,500,000	Acquisitions	$ 10,500,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Acquired	$ 10,500,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	1400 ac Acquisitions		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9054	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	$ 6,000,000	Conservation Easement	$ 6,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Conserved	$ 6,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	2000 ac Conservation Easement		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -
9055	Bahia Grande Watershed Corridor Protection	$ 6,000,000	Conservation Easement	$ 6,000,000	Null	$ -	Null	$ -	Clearing & Grubbing	$ -
			SY Conserved	$ 6,000,000	Null	$ -	Null	$ -	Mobilization & Demobilizatoin	$ -
	2000 ac Conservation Easement		Null	$ -	Null	$ -	Null	$ -	Estimated Constuction Cost	$ -
	0 Null Null		Null	$ -	Null	$ -	Null	$ -	Estimated Construction Cost + Contingecny	$ -
	0 Null Null								O&M	$ -
									CM	$ -
									E&D	$ -

Project Cost Summary Tables

PROJ ID	PROJ NAME	TOTAL COST	SUBTYPE 1	SUBTYPE 1 COST	SUBTYPE 2	SUBTYPE 2 COST	SUBTYPE 3	SUBTYPE 3 COST	MISCELLANEOUS	MISC COST
9056										
	Restoration of the San Bernard River Deltaic Process	**$ 14,527,400**	**Studies**	**$ 200,000**	**Hydrologic Restoration**	**$ 10,000,000**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 51,000*
			EA Study	*$ 200,000*	*HR*	*$ 10,000,000*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 510,000*
	1 EA Studies		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 10,761,000*
	1 EA Hydrologic Restoration		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 12,913,200*
	0 Null Null								*O&M*	*$ 538,050*
									CM	*$ 538,050*
									E&D	*$ 538,050*
9057	**Wetland Restoration, Water Quality Improvement, and Flood Risk Reduction**	**$ 1,424,300**	**Wetlands/Forested Wetlands**	**$ 1,000,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 5,000*
			W/FW	*$ 1,000,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 50,000*
	1 EA Wetlands/Forested Wetlands		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 1,055,000*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 1,266,000*
	0 Null Null								*O&M*	*$ 52,750*
									CM	*$ 52,750*
									E&D	*$ 52,750*
9058										
	Dune and Wetland Protection and Public Access	**$ 284,900**	**Studies**	**$ 200,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 1,000*
			EA Study	*$ 200,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 10,000*
	1 EA Studies		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 211,000*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 253,200*
	0 Null Null								*O&M*	*$ 10,550*
									CM	*$ 10,550*
									E&D	*$ 10,550*
9059	**Little Bay Restoration Initiative**	**$ 52,967,500**	**Rookery Islands**	**$ 37,189,737**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 185,949*
			CY Marsh Fill	*$ 19,360,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 1,859,487*
	400 ac Rookery Islands		*CY Stiff Clay*	*$ 5,956,438*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 39,235,172*
	0 Null Null		*tons of 250-lb Class Stone*	*$ 11,873,298.52*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 47,082,207*
	0 Null Null								*O&M*	*$ 1,961,759*
									CM	*$ 1,961,759*
									E&D	*$ 1,961,759*
9060										
	Beach Re-Nourishment at Padre Island National Seashore	**$ 44,133,900**	**Gulf**	**$ 30,987,500**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 154,938*
			CY Sand Fill	*$ 30,987,500*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 1,549,375*
	37000 LF Gulf		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 32,691,813*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 39,230,175*
	0 Null Null								*O&M*	*$ 1,634,591*
									CM	*$ 1,634,591*
									E&D	*$ 1,634,591*
9061	**Galveston Island Bayside Flood Protection Feasibility Study**	**$ 284,900**	**Studies**	**$ 200,000**	**Null**	**$ -**	**Null**	**$ -**	*Clearing & Grubbing*	*$ 1,000*
			EA Study	*$ 200,000*	*Null*	*$ -*	*Null*	*$ -*	*Mobilization & Demobilizatoin*	*$ 10,000*
	1 EA Studies		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Constuction Cost*	*$ 211,000*
	0 Null Null		*Null*	*$ -*	*Null*	*$ -*	*Null*	*$ -*	*Estimated Construction Cost + Contingecny*	*$ 253,200*
	0 Null Null								*O&M*	*$ 10,550*
									CM	*$ 10,550*
									E&D	*$ 10,550*

Appendix D. Economics Analysis

Economics Analysis

As discussed in the report, an economic and benefits assessment was used to characterize the economic backdrop of Texas's coastal counties and facilitate an evaluation of candidate projects and project types. The Plan does not define projects with sufficient specificity (i.e., detailed project design) to quantify each project's individual economic performance. Rather, a high-level economic approach was used to determine local and regional economic vulnerabilities, and the extent to which they would be positively impacted by proposed projects.

Provided in this appendix are the following economics assessment results:

1. Characterization of Coastal Economies;
2. Coastal Erosion Rates and Market Analysis;
3. Coastal Ecosystem Services Analysis; and
4. Project Alternatives Economic Impact Analysis.

The information and data informing the economics analysis of the Texas coast were collected prior to the final production of the Plan. As a result, some of the terminology used (e.g., vulnerabilities, habitat types) may or may not correspond directly with the definitions provided in the Plan.

Characterization of Coastal Economies

Contents

Economic Characterization of the Texas Coast

Introduction

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 GLO's Master Plan for Coastal Resiliency.

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 Master 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 1.

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.

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 1, 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 9 million by 2050. (Texas Comptroller of Public Accounts, 2014). Ten of the 18 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 2, following county aggregations into regions as developed by the GLO in previous work, shown in Table 1.

Table 1: 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 2: Texas Coastal Population Growth, 2010-2014

Region	County	Population		Percent Change	Population Change	Percent of State Increase
		2014	2010	2010-2014	2010-2014	2010-2014
1a	Orange*	83,433	81,993	1.8%	1,440	0.1%
1a	Jefferson *	252,235	252,495	-0.1%	-260	0.0%
All 1a		335,668	334,488	0.4%	1,180	0.1%
1b	Chambers*	38,145	35,406	7.7%	2,739	0.2%
1b	Harris*	4,441,370	4,108,909	8.1%	332,461	19.4%
1b	Galveston *	314,198	292,574	7.4%	21,624	1.3%
1b	Brazoria*	338,124	314,452	7.5%	23,672	1.4%
All 1b		5,131,837	4,751,341	8.0%	380,496	22.2%
2	Matagorda	36,519	36,721	-0.6%	-202	0.0%
2	Jackson	14,739	14,070	4.8%	669	0.0%
2	Victoria	91,081	86,849	4.9%	4,232	0.2%
2	Calhoun	21,797	21,336	2.2%	461	0.0%

All 2		164,136	158,976	3.2%	5,160	0.3%
3	Refugio	7,302	7,357	-0.7%	-55	0.0%
3	Aransas*	24,972	23,204	7.6%	1,768	0.1%
3	San Patricio*	66,915	64,502	3.7%	2,413	0.1%
3	Nueces*	356,221	340,320	4.7%	15,901	0.9%
3	Kleberg	32,190	32,095	0.3%	95	0.0%
All 3		487,600	467,478	4.3%	20,122	1.2%
4	Kenedy	400	418	-4.3%	-18	0.0%
4	Willacy	21,903	22,202	-1.3%	-299	0.0%
4	Cameron *	420,392	407,672	3.1%	12,720	0.7%
All 4		442,695	430,292	2.9%	12,403	0.7%
All Coastal Counties		6,561,936	6,142,575	6.8%	419,361	24.5%
Texas		26,956,958	25,245,717	6.8%	1,711,241	

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

Source: U.S. Bureau of the Census

Texas' coastal counties added nearly 420,000 persons over the four year period 2010-2014 for an overall increase of nearly 7 percent. Region 1b, which is comprised of four of the counties that make up the Houston-Sugar Land-Baytown Metropolitan Area, dominated growth within the coastal counties overall, capturing over 90 percent of coastal county growth between 2010-2014. Region 1a showed the least growth among coastal regions. One quarter of Texas' population growth between 2010 and 2014 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 3 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 15 million persons by 2050. Of that number, over 3 million will live in Texas' coastal counties. Region 1b is expected to capture 17 percent of State's population growth between 2010-2040 and over 80 percent of that growth along the Texas coast with an additional 2.6 million people (Texas Comptroller of Public Accounts, 2014).

The forecast for future growth in coastal regions is shown in Figure 1 which summarizes expectations for growth in Region 4 to be faster than other coastal regions and the State overall. By 2050 Region 4 is projected to grow its population by almost 80 percent over its 2010 count. Texas overall is expected to increase its total population by over 60 percent over the same period. Region 1a is expected to have the slowest growth with a 25 percent increase in population from 2010-2050.

Table 3: 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	86,614	90,934	94,059	96,458	0.4%	14,621	0.1%
1a	Jefferson	252,273	267,188	283,813	300,728	319,868	0.6%	67,595	0.4%
All 1a		334,110	353,802	374,747	394,787	416,326	0.6%	82,216	0.5%
1b	Chambers	35,096	41,934	49,836	58,010	66,757	1.6%	31,661	0.2%
1b	Harris	4,092,459	4,683,874	5,262,009	5,799,833	6,304,828	1.1%	2,212,369	14.4%
1b	Galveston	291,309	321,519	350,673	374,837	396,723	0.8%	105,414	0.7%
1b	Brazoria	313,166	372,259	438,727	512,195	588,988	1.6%	275,822	1.8%
All 1b		4,732,030	5,419,586	6,101,245	6,744,875	7,357,296	1.1%	2,625,266	17.1%
2	Matagorda	36,702	39,448	41,823	43,482	44,774	0.5%	8,072	0.1%
2	Jackson	14,075	14,663	15,200	15,441	15,649	0.3%	1,574	0.0%
2	Victoria	86,793	93,902	100,465	105,735	110,868	0.6%	24,075	0.2%

2	Calhoun	21,381	23,935	26,659	29,203	31,666	1.0%	10,285	0.1%
All 2		158,951	171,948	184,147	193,861	202,957	0.6%	44,006	0.3%
3	Refugio	7,383	7,659	7,906	7,937	8,050	0.2%	667	0.0%
3	Aransas	23,158	24,550	25,123	25,096	25,204	0.2%	2,046	0.0%
3	San Patricio	64,804	70,122	75,073	78,669	81,990	0.6%	17,186	0.1%
3	Nueces	340,223	370,473	399,947	421,032	438,408	0.6%	98,185	0.6%
3	Kleberg	32,061	35,597	39,018	42,231	45,268	0.9%	13,207	0.1%
All 3		467,629	508,401	547,067	574,965	598,920	0.6%	131,291	0.9%
4	Kenedy	416	452	477	474	458	0.2%	42	0.0%
4	Willacy	22,134	25,763	29,591	33,459	37,733	1.3%	15,599	0.1%
4	Cameron	406,220	479,754	560,637	641,946	728,518	1.5%	322,298	2.1%
All 4		428,770	505,969	590,705	675,879	766,709	1.5%	337,939	2.2%
All Coastal Counties		6,121,490	6,959,706	7,797,911	8,584,367	9,342,208	1.1%	3,220,718	21.0%
Texas		25,145,561	28,813,282	32,680,217	36,550,595	40,502,749	1.2%	15,357,188	

Source: Texas Comptroller of Public Accounts, 2014

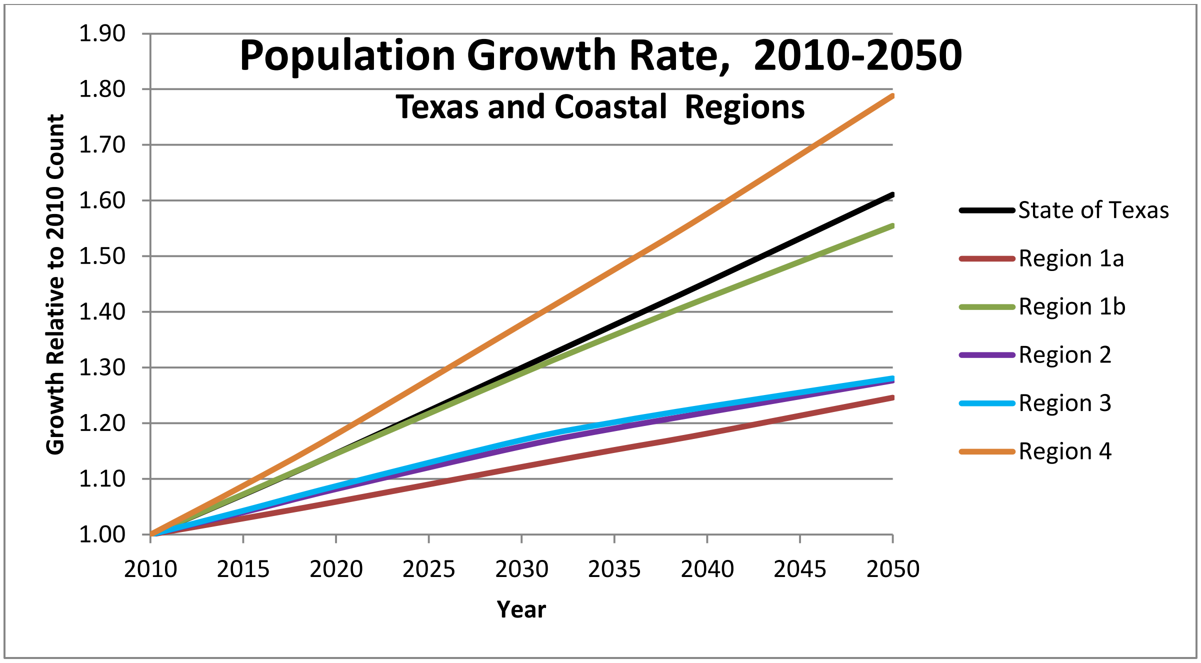


Figure 1. Population Growth Rate, 2010-2050

Source: Texas Comptroller of Public Accounts, 2014

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 4 displays the market value of real property for 2014 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, 2014).

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 2014, over $600 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 $880 billion. Currently, coastal region 1b dominates the coastal regions with 80 percent of the market value of built assets along the Texas coast.

Table 4: Estimate of the Value of the Built Environment, Texas Coastal Counties, 2014

Region	County	Total Market Value 2014	Percent of State Total 2014	Average Annual Pop Growth Rate, 2010-2050	Projected Market Value, 2050	Land Area Sq. Mi.	Value per Sq. Mi. 2014
1a	Orange	$6,406,376,607	0.3%	0.4%	$7,427,833,544	334	$19,198,012
1a	Jefferson	$30,478,006,835	1.2%	0.6%	$37,737,800,380	876	$34,780,334
All 1a		$36,884,383,442	1.5%	0.6%	$45,165,633,924	1,210	$30,482,962
1b	Chambers	$10,656,492,126	0.4%	1.6%	$19,007,698,720	597	$17,847,081
1b	Harris	$416,170,000,000	16.5%	1.1%	$614,031,690,576	1,704	$244,302,906
1b	Galveston	$27,467,730,693	1.1%	0.8%	$36,269,612,031	378	$72,589,140
1b	Brazoria	$28,698,892,803	1.1%	1.6%	$50,671,504,512	1,358	$21,137,875
All 1b		$482,993,115,622	19.1%	1.1%	$719,980,505,838	4,037	$119,650,486
2	Matagorda	$5,569,953,838	0.2%	0.5%	$6,661,225,617	1,100	$5,062,214
2	Jackson	$2,784,169,167	0.1%	0.3%	$3,062,880,042	829	$3,356,847
2	Victoria	$8,577,813,279	0.3%	0.6%	$10,692,172,338	882	$9,724,309
2	Calhoun	$4,374,185,459	0.2%	1.0%	$6,228,821,237	507	$8,630,989
All 2		$21,306,121,743	0.8%	0.6%	$26,645,099,233	3,319	$6,420,214
3	Refugio	$2,088,521,280	0.1%	0.2%	$2,257,592,821	770	$2,710,957

3	Aransas	$3,153,120,922	0.1%	0.2%	$3,402,766,946	252	$12,507,421
3	San Patricio	$6,380,992,444	0.3%	0.6%	$7,885,539,220	694	$9,201,143
3	Nueces	$28,846,097,389	1.1%	0.6%	$36,240,183,337	839	$34,402,024
3	Kleberg	$1,932,293,716	0.1%	0.9%	$2,635,760,591	881	$2,192,549
All 3		$42,401,025,751	1.7%	0.6%	$52,421,842,915	3,436	$12,340,947
4	Kenedy	$1,797,642,467	0.1%	0.2%	$1,960,190,373	1,458	$1,232,697
4	Willacy	$1,733,887,520	0.1%	1.3%	$2,802,310,201	591	$2,935,807
4	Cameron	$18,089,734,557	0.7%	1.5%	$30,601,539,857	891	$20,305,011
All 4		$21,621,264,544	0.9%	1.5%	$35,364,040,430	2,940	$7,354,672
All Coastal Counties		$605,205,911,102	24.0%	1.1%	$879,577,122,341	14,941	$40,506,657
Texas		$2,523,975,193,961		1.2%	$3,876,197,851,891	261,233	$9,661,774

Source: Texas Comptroller of Public Accounts, 2014

COASTAL ECONOMY

GROSS DOMESTIC PRODUCT

A measure 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 $1.3 trillion (chained 2009 dollars) in 2014, 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 5 presents the number of businesses, employment, wages, and GDP by industrial sector. In 2014, the largest contributor to Texas' financial wealth was manufacturing. This industry accounted for almost 15 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 5: Establishments, Employment, Wages, and GDP by Industry in Texas, 2014

NAICS** Sector	Annual Establishments	Annual Average Employment	Total Annual Wages	Annual Wages per Employee	Real GDP in millions, chained 2009 $	Percent of Total Real GDP	Rank by Real GDP
NAICS 11 Agriculture, forestry, fishing and hunting	9,850	58,964	$1,916,119,822	$32,497	$8,230	0.6%	18
NAICS 21 Mining, quarrying, and oil and gas extraction	10,384	306,069	$38,057,082,094	$124,341	$161,915	12.7%	2
NAICS 22 Utilities	1,898	49,015	$4,920,359,249	$100,385	$28,121	2.2%	15
NAICS 23 Construction	44,477	651,290	$38,171,757,541	$58,609	$70,027	5.5%	8
NAICS 31-33 Manufacturing	23,040	886,779	$63,129,004,598	$71,189	$188,134	14.7%	1
NAICS 42 Wholesale trade	45,151	577,539	$44,613,766,034	$77,248	$113,793	8.9%	4
NAICS 44-45 Retail trade	75,260	1,256,770	$37,718,875,636	$30,013	$81,486	6.4%	6
NAICS 48-49 Transportation and warehousing	18,071	410,219	$23,888,384,711	$58,233	$48,175	3.8%	12
NAICS 51 Information	9,150	202,899	$15,570,674,427	$76,741	$54,305	4.3%	10

NAICS 52 Finance and insurance	37,234	489,820	$39,116,278,196	$79,858	$63,136	4.9%	9
NAICS 53 Real estate and rental and leasing	26,938	196,778	$11,280,275,535	$57,325	$134,252	10.5%	3
NAICS 54 Professional and technical services	80,545	678,734	$58,785,658,996	$86,611	$90,223	7.1%	5
NAICS 55 Management of companies and enterprises	2,616	110,214	$13,737,027,554	$124,640	$18,512	1.4%	16
NAICS 56 Administrative and waste services	32,633	757,490	$30,755,766,444	$40,602	$48,904	3.8%	11
NAICS 61 Educational services	6,630	145,785	$6,390,808,264	$43,837	$7,987	0.6%	19
NAICS 62 Health care and social assistance	70,707	1,312,335	$57,819,293,260	$44,058	$78,661	6.2%	7
NAICS 71 Arts, entertainment, and recreation	6,632	123,867	$3,841,973,521	$31,017	$8,980	0.7%	17
NAICS 72 Accommodation and food services	48,175	1,064,216	$19,354,644,327	$18,187	$38,345	3.0%	13
NAICS 81 Other services, except public administration	54,805	314,880	$11,095,546,874	$35,237	$28,511	2.2%	14
NAICS 99 Unclassified	2,295	3,627	$169,883,666	$46,845	$5,160	0.4%	20
Total	606,491	9,597,290	$520,333,180,749		$1,276,857	100.0%	

*The public government sector is not included.

**NAICS: North American Industrial Classification System

Sources: Bureau of Economic Analysis, 2014b & Bureau of Labor Statistics, 2014.

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 6 presents 2014 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 27 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, coastal regions fare below par with the State overall 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 6: Personal Income and Per Capita Income, Coastal Counties, 2014

Region	County	Population 2014	Personal Income 2014, in thousands	Per Capita Income 2014	Percent of State Total	
					Populatio n	Personal Income
1a	Orange	83,433	$3,331,718	$39,933	0.3%	0.3%
1a	Jefferson	252,235	$9,971,437	$39,532	0.9%	0.8%
All 1a		335,668	$13,303,155	$39,632	1.2%	1.1%
1b	Chambers	38,145	$1,792,274	$46,986	0.1%	0.1%
1b	Harris	4,441,370	$252,694,912	$56,896	16.5%	20.5%
1b	Galveston	314,198	$14,741,197	$46,917	1.2%	1.2%
1b	Brazoria	338,124	$14,376,571	$42,519	1.3%	1.2%
All 1b		5,131,837	$283,604,954	$55,264	19.0%	23.0%

2	Matagorda	36,519	$1,363,043	$37,324	0.1%	0.1%
2	Jackson	14,739	$596,450	$40,467	0.1%	0.0%
2	Victoria	91,081	$4,318,998	$47,419	0.3%	0.4%
2	Calhoun	21,797	$850,375	$39,013	0.1%	0.1%
All 2		164,136	$7,128,866	$43,433	0.6%	0.6%
3	Refugio	7,302	$330,824	$45,306	0.0%	0.0%
3	Aransas	24,972	$1,081,091	$43,292	0.1%	0.1%
3	San Patricio	66,915	$2,604,348	$38,920	0.2%	0.2%
3	Nueces	356,221	$15,117,598	$42,439	1.3%	1.2%
3	Kleberg	32,190	$1,099,216	$34,148	0.1%	0.1%
All 3		487,600	$20,233,077	$41,495	1.8%	1.6%
4	Kenedy	400	$22,520	$56,300	0.0%	0.0%
4	Willacy	21,903	$558,081	$25,480	0.1%	0.0%
4	Cameron	420,392	$10,598,668	$25,211	1.6%	0.9%
All 4		442,695	11,179,269	$25,253	1.6%	0.9%
All Coastal Counties		6,561,936	$335,449,321	$51,120	24.3%	27.2%
Texas		26,956,958	$1,231,084,591	$45,669	100.0%	100.0%

Source: Bureau of Economic Analysis, 2014a

Employment, Businesses and Wages

As of 2014, Texas possessed 8 percent of the total U.S. employment with 9.5 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 with higher employment percentages than the U.S. does overall in construction, wholesale trade, transportation and warehousing, and real estate. (Bureau of Labor Statistics, 2014)

Table 7 displays the total employment, establishment count, and total wages for the coastal counties for 2014. 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. Total wages along the Texas coast are higher as a whole over that of the State capturing over 30 percent of all wages in the State. Consequently annual average wages per employee are 17 percent higher along the coast with Harris, Kenedy, Calhoun, and Chambers Counties having higher wages per employee than does the State overall on average.

Table 7: Annual Average Employment, Business Establishments, and Wages Coastal Counties, 2014

Region	Coastal County	Annual Average Total Employment	Percent of Total State Employment	Percent of Coastal County Employment	Annual Average Establishment Count	Percent of State Establishment Count	Percent of Coastal County Establishment Count	Annual Average Total Wages	Percent of State Total Wages	Percent of Coastal County Total Wages	Annual Average Pay^1	Percent of State Annual Average Pay	Percent of Coastal County Average Annual Pay
1a	Jefferson County, Texas	123,412	1.1%	4.1%	5,831	0.9%	3.9%	$6,460,582,373	1.1%	3.4%	$52,350	98.4%	84.1%
1a	Orange County, Texas	22,351	0.2%	0.7%	1,406	0.2%	0.9%	$1,066,487,361	0.2%	0.6%	$47,715	89.7%	76.7%
All 1a		145,763			7,237			$7,527,069,734					
1b	Harris County, Texas	2,257,442	19.8%	74.5%	108,692	17.4%	72.8%	$153,737,410,396	25.4%	81.6%	$68,102	128.0%	109.5%
1b	Galveston County, Texas	101,503	0.9%	3.4%	5,688	0.9%	3.8%	$4,585,363,877	0.8%	2.4%	$45,175	84.9%	72.6%
1b	Chambers County, Texas	11,906	0.1%	0.4%	625	0.1%	0.4%	$650,572,325	0.1%	0.3%	$54,642	102.7%	87.8%
1b	Brazoria County, Texas	98,971	0.9%	3.3%	5,235	0.8%	3.5%	$5,140,740,652	0.8%	2.7%	$51,942	97.6%	83.5%
All 1b		2,469,822			120,240			$164,114,087,250					
2	Matagorda County, Texas	10,342	0.1%	0.3%	833	0.1%	0.6%	$500,422,032	0.1%	0.3%	$48,387	90.9%	77.8%

2	Jackson County, Texas	5,791	0.1%	0.2%	416	0.1%	0.3%	$235,812,199	0.0%	0.1%	$40,720	76.5%	65.5%
2	Victoria County, Texas	41,420	0.4%	1.4%	2,484	0.4%	1.7%	$1,892,381,203	0.3%	1.0%	$45,688	85.9%	73.4%
2	Calhoun County, Texas	11,458	0.1%	0.4%	559	0.1%	0.4%	$689,071,744	0.1%	0.4%	$60,139	113.0%	96.7%
All 2		69,011			4,292			$3,317,687,178					
3	Refugio County, Texas	2,705	0.0%	0.1%	227	0.0%	0.2%	$113,796,080	0.0%	0.1%	$42,069	79.1%	67.6%
3	Aransas County, Texas	6,434	0.1%	0.2%	621	0.1%	0.4%	$228,979,640	0.0%	0.1%	$35,589	66.9%	57.2%
3	San Patricio County, Texas	19,213	0.2%	0.6%	1,125	0.2%	0.8%	$842,796,140	0.1%	0.4%	$43,866	82.4%	70.5%
3	Nueces County, Texas	163,150	1.4%	5.4%	8,147	1.3%	5.5%	$7,429,190,405	1.2%	3.9%	$45,536	85.6%	73.2%
3	Kleberg County, Texas	13,306	0.1%	0.4%	651	0.1%	0.4%	$485,220,541	0.1%	0.3%	$36,466	68.5%	58.6%
All 3		204,808			10,771			$9,099,982,806					
4	Kenedy County, Texas	790	0.0%	0.0%	40	0.0%	0.0%	$47,608,190	0.0%	0.0%	$60,264	113.2%	96.9%
4	Willacy County, Texas	3,997	0.0%	0.1%	316	0.1%	0.2%	$134,441,682	0.0%	0.1%	$33,636	63.2%	54.1%
4	Cameron County, Texas	134,059	1.2%	4.4%	6,377	1.0%	4.3%	$4,163,915,448	0.7%	2.2%	$31,060	58.4%	49.9%

All 4		138,846			6,733			$4,345,965,320			$31,301		
Coastal Counties		3,028,250	26.6%	100.0%	149,273	23.9%	100.0%	$188,404,792,288	31.1%	100.0%	$62,216	116.9%	100.0%
Texas Statewide		11,379,184			623,544			$605,573,335,013			$53,218		

^[1]: Total Wages divided by Total Employment

Source: Bureau of Labor Statistics, 2014

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 that 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.

Region 1a. Table 8 displays the location quotients for each county by coastal region and industrial subsector. As shown in Table 8, Region 1a has an economy dominated by petroleum refining and 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 heavy machinery rental and leasing and commercial machinery repair and maintenance.

Region 4. 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 8: 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	0.21	ND	0.11	0.15	0.65	1.44	15.41	5.75	ND	1.24	5.61	NC	4.99	0.74	0.25	NC	29.27	1.23
NAICS 112 Animal production and aquaculture	0.14	0.32	0.08	0.1	1.15	ND	5.92	3.13	1.36	1.5	8.01	ND	ND	0.27	ND	31.5	4.64	0.25
NAICS 113 Forestry and logging	ND	NC	0.01	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NAICS 114 Fishing, hunting and trapping	ND	NC	0.12	ND	17.78	ND	18.15	ND	NC	ND	NC	ND	ND	ND	ND	NC	ND	7.9
NAICS 115 Agriculture and forestry support activities	0.3	ND	0.18	ND	1.85	0.67	9.22	6.67	ND	ND	8.33	NC	6.7	ND	0.61	NC	38.99	1.64
NAICS 211 Oil and gas extraction	ND	0.14	2.36	ND	2.54	ND	0.64	1.18	ND	ND	2.98	ND	0.75	0.54	ND	NC	ND	ND
NAICS 212 Mining, except oil and gas	ND	ND	0.34	ND	ND	ND	NC	NC	ND	NC	NC	NC	1.24	3.79	ND	NC	NC	ND
NAICS 213 Support activities for mining	0.24	ND	1.04	0.28	ND	0.37	2.34	4.39	4.72	ND	11.84	3.12	2.76	1.81	1.39	ND	ND	0.02
NAICS 221 Utilities	1.51	1.21	1.3	0.62	ND	0.39	ND	ND	2.19	ND	ND	ND	1.56	1.11	0.72	ND	ND	0.59
NAICS 236 Construction of buildings	2.28	1.04	1.4	1.34	1.08	4.51	0.61	2.09	1.2	ND	ND	1.23	3.17	2.88	0.52	NC	ND	0.3
NAICS 237 Heavy and civil engineering construction	2.64	2.93	1.14	0.44	2.44	3.45	0.24	4.1	0.54	ND	ND	0.8	10.82	1.38	2.02	NC	ND	0.41
NAICS 312 Beverage and tobacco product manufacturing	ND	ND	0.89	ND	ND	ND	NC	ND	ND	ND	NC	ND	NC	1.03	NC	NC	NC	0.46
NAICS 313 Textile mills	NC	NC	0.32	ND	NC	ND	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0.77
NAICS 314 Textile product mills	1.27	ND	0.89	0.51	ND	ND	ND	NC	1.03	NC	NC	ND	NC	0.79	ND	NC	NC	1.03

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
NAICS 315 Apparel manufacturing	ND	ND	0.49	NC	NC	NC	NC	NC	NC	NC	NC	NC	ND	0.17	NC	NC	NC	ND
NAICS 316 Leather and allied product manufacturing	NC	ND	0.13	NC	ND	NC	NC	NC	NC	NC	NC	NC	NC	ND	ND	NC	ND	NC
NAICS 321 Wood product manufacturing	0.67	ND	0.49	0.41	NC	0.18	ND	NC	NC	NC	NC	ND	NC	0.23	NC	NC	NC	0.2
NAICS 322 Paper manufacturing	NC	ND	0.36	NC	NC	ND	NC	NC	NC	NC	NC	NC	NC	ND	NC	NC	NC	1.17
NAICS 238 Specialty trade contractors	1.49	1.47	1.04	1.33	0.68	1.45	0.5	2.19	1	4.56	2.62	1.37	0.73	1	0.64	NC	0.45	0.47
NAICS 311 Food manufacturing	0.45	0.11	0.45	0.68	1.9	0.42	1.26	NC	0.35	1.58	ND	ND	ND	1.1	0.35	NC	ND	1.25
NAICS 337 Furniture and related product manufacturing	0.25	0.89	0.36	0.21	NC	ND	NC	NC	0.29	NC	NC	NC	NC	0.16	ND	NC	NC	0.19
NAICS 339 Miscellaneous manufacturing	0.35	ND	0.85	0.21	NC	1.08	ND	NC	0.45	NC	NC	ND	NC	0.76	ND	NC	NC	0.23
NAICS 423 Merchant wholesalers, durable goods	0.72	0.91	1.2	0.39	1.33	0.74	0.21	0.83	0.96	0.17	ND	0.26	0.2	0.75	0.47	NC	0.31	0.66
NAICS 424 Merchant wholesalers, nondurable goods	0.64	0.25	1.04	0.6	0.36	0.39	0.49	ND	1.24	0.05	0.97	0.07	0.39	0.9	ND	NC	ND	0.51
NAICS 425 Electronic markets and agents and brokers	0.18	0.16	1.19	0.24	ND	0.24	ND	ND	0.22	ND	NC	0.53	NC	0.28	ND	NC	NC	0.29
NAICS 441 Motor vehicle and parts dealers	1	1.03	0.84		0.47	1.03	0.78	0.87	1.54	1.26	1.24	1.73	1.37	1.07	1.72	NC	0.78	1.29
NAICS 442 Furniture and home furnishings stores	0.79	0.39	1	0.76	NC	0.66	0.65	NC	0.98	ND	NC	1.46	0.05	0.97	ND	NC	ND	1.47
NAICS 443 Electronics	2.77	0.67	1.02	0.55	ND	0.82	ND	ND	1.36	ND	NC	ND	ND	0.89	0.57	NC	ND	1.1

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
and appliance stores																		
NAICS 444 Building material and garden supply stores	1.16	1.62	0.71	1.37	1.64	1.5	0.99	ND	1.73	1.02	ND	4.66	0.84	1.09	2.28	NC	ND	1.16
NAICS 445 Food and beverage stores	0.94	1.66	0.99	1.51	0.81	1.2	1.98	1.06	0.93	0.81	ND	1.84	1.56	0.96	1.38	ND	1.55	1.12
NAICS 446 Health and personal care stores	1.08	1.56	0.83	1.46	0.4	1.16	1.54	NC	1.16	0.44	ND	1.05	0.79	1.22	1.35	NC	ND	1.16
NAICS 323 Printing and related support activities	0.5	0.16	0.81	0.42	NC	0.51	ND	ND	0.56	ND	NC	0.56	0.17	0.31	ND	NC	NC	0.25
NAICS 324 Petroleum and coal products manufacturing	18.94	NC	1.32	16.75	NC	ND	NC	NC	NC	ND	NC	NC	ND	8.37	NC	NC	NC	ND
NAICS 325 Chemical manufacturing	5.19	14.57	1.42	1.85	17.24	11.67	ND	NC	3.12	28.95	NC	NC	2.79	0.56	ND	NC	ND	0.13
NAICS 326 Plastics and rubber products manufacturing	0.37	ND	1	0.05	ND	0.59	NC	ND	ND	NC	NC	ND	NC	ND	NC	NC	NC	0.4
NAICS 327 Nonmetallic mineral product manufacturing	0.43	ND	0.53	0.29	ND	0.84	ND	NC	1.37	NC	NC	NC	1.19	0.42	ND	NC	NC	0.71
NAICS 331 Primary metal manufacturing	0.86	ND	0.79	ND	ND	0.36	NC	NC	ND	ND	NC	NC	ND	ND	NC	NC	NC	ND
NAICS 332 Fabricated metal product manufacturing	1.54	2.85	1.72	0.67	4.09	1.6	0.38	0.06	0.51	ND	ND	0.34	0.19	0.59	ND	NC	NC	0.43
NAICS 333 Machinery manufacturing	1.59	ND	2.12	0.15	0.19	0.92	NC	ND	1.52	ND	ND	NC	0.13	0.25	ND	NC	NC	0.35
NAICS 334 Computer and electronic product manufacturing	0.64	ND	0.72	0.19	NC	0.59	NC	ND	ND	NC	NC	NC	ND	0.37	NC	NC	ND	0.17
NAICS 335 Electrical equipment and appliance mfg.	0.69	NC	1.52	ND	NC	2.68	NC	ND	NC	NC	NC	NC	NC	0.25	NC	NC	NC	ND

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
NAICS 336 Transportation equipment manufacturing	0.8	2.37	0.27	0.32	ND	0.21	1.39	NC	0.14	0.8	NC	ND	ND	0.13	NC	NC	NC	1.68
NAICS 533 Lessors of nonfinancial intangible assets	0.38	ND	0.6	NC	NC	ND	NC	NC	NC	NC	NC	NC	NC	ND	NC	NC	NC	ND
NAICS 541 Professional and technical services	0.72	0.43	1.3	0.68	0.49	0.65	0.7	0.34	0.42	ND	0.29	0.65	0.58	0.59	ND	ND	ND	0.33
NAICS 551 Management of companies and enterprises	1.14	0.4	1.38	0.18	ND	0.12	NC	ND	0.22	ND	NC	NC	0.17	0.36	ND	NC	NC	0.28
NAICS 561 Administrative and support services	0.62	ND	1.12	0.59	0.27	0.62	0.25	ND	0.43	0.55	ND	0.4	0.43	0.67	0.5	ND	ND	1.04
NAICS 562 Waste management and remediation services	1.84	ND	1.15	3.2	ND	1.21	1.33	NC	0.81	NC	NC	1.27	0.57	1.83	NC	NC	NC	1.04
NAICS 611 Educational services	0.45	0.19	1.22	0.66	ND	0.43	ND	NC	0.38	0.2	ND	ND	0.17	0.37	ND	NC	NC	0.72
NAICS 621 Ambulatory health care services	1.14	0.45	0.83	0.72	0.21	0.65	0.96	0.16	1.12	0.34	ND	0.62	0.44	1.44	1.94	ND	1.19	2.77
NAICS 622 Hospitals	1.38	ND	1.08	0.57	ND	ND	ND	ND	1.21	ND	NC	NC	ND	1.6	ND	NC	NC	1.24
NAICS 623 Nursing and residential care facilities	1.29	1.41	0.54	1.57	ND	ND	2.14	ND	2.24	ND	3.57	2.58	1.46	1.14	1.66	NC	ND	1.57
NAICS 624 Social assistance	0.6	ND	0.82	1.2	0.67		1.13	0.28	1.13	0.39	ND	ND	ND	1.12	1.01	NC	ND	3.51
NAICS 447 Gasoline stations	0.84	2.08	0.55	1.07	3.06	1.4	1.7	3.74	1.94	1.15	5.84	3.1	2.15	1.38	2.25	NC	3.16	2.31
NAICS 448 Clothing and clothing accessories stores	0.91	0.64	0.92	1.16	ND	0.81	0.49	ND	0.81	ND	ND	0.45	0.05	0.86	0.32	NC	NC	0.96
NAICS 451 Sports, hobby, music	0.89	0.68	0.81	1.04	ND	0.61	0.44	NC	1.59	ND	NC	1.26	0.38	1.31	0.78	NC	NC	1.35

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
instrument, book stores																		
NAICS 452 General merchandise stores	1.26	1.51	0.76	1.78	0.15	1.48	1.54	ND	1.24	ND	ND	1.75	1.48	0.96	1.42	NC	ND	1.54
NAICS 453 Miscellaneous store retailers	1.18	0.55	0.73	1.02	0.68	0.96	0.4	ND	1.21	ND	NC	0.86	0.65	0.79	0.52	NC	NC	0.89
NAICS 454 Nonstore retailers	0.61	0.54	0.6	0.63	0.9	0.41	ND	ND	0.87	ND	ND	ND	ND	0.32	ND	NC	ND	1.13
NAICS 481 Air transportation	ND	NC	1.85	0.34	NC	ND	NC	NC	ND	ND	NC	ND	NC	0.1	NC	NC	NC	0.2
NAICS 482 Rail transportation	NC	NC	ND	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NAICS 483 Water transportation	1.55	ND	3.76	5.55	NC	0.36	ND	NC	NC	ND	NC	ND	11.96	1.76	NC	NC	NC	NC
NAICS 484 Truck transportation	0.43	0.52	0.74	0.16	1.17	0.85	0.5	0.28	1.19	0.33	1.31	ND	0.68	0.95	1.04	ND	0.68	1.19
NAICS 485 Transit and ground passenger transportation	2.89	ND	0.79	0.68	NC	0.27	NC	NC	ND	ND	ND	NC	ND	ND	ND	NC	NC	0.46
NAICS 486 Pipeline transportation	2.53	ND	2.67	ND	20.66	0.87	10.06	3.71	1.43	NC	3.11	NC	1.4	1.41	NC	NC	NC	NC
NAICS 487 Scenic and sightseeing transportation	NC	ND	ND	22.17	NC	ND	NC	NC	NC	NC	NC	ND	ND	12.1	NC	NC	NC	ND
NAICS 488 Support activities for transportation	2.01	1.19	1.57	2.83	0.97	0.93	0.18	ND	0.4	0.39	ND	ND	0.75	1.48	0.24	ND	ND	1.3
NAICS 491 Postal service	ND	NC	1.38	NC	NC	ND	ND	NC	NC	NC	NC	NC	NC	ND	NC	NC	NC	ND
NAICS 492 Couriers and messengers	0.78	NC	0.8	ND	ND	0.45	NC	NC	0.92	NC	NC	NC	ND	0.7	NC	NC	NC	0.78
NAICS 493 Warehousing and storage	0.66	1.14	0.85	0.33	ND	1	ND	ND	0.77	NC	NC	NC	ND	0.41	ND	NC	ND	0.93

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
NAICS 511 Publishing industries, except Internet	0.56	0.28	0.66	0.53	ND	0.38	ND	ND	ND	0.15	NC	1.82	ND	0.49	ND	NC	ND	0.51
NAICS 512 Motion picture and sound recording industries	0.59	ND	0.56	0.57	NC	0.32	NC	ND	ND	ND	NC	ND	ND	0.96	ND	NC	NC	ND
NAICS 515 Broadcasting, except Internet	1.36	0.49	0.64	ND	NC	ND	ND	NC	1.33	ND	NC	NC	ND	1.45	NC	NC	NC	0.64
NAICS02 516 Internet publishing and broadcasting	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NAICS 517 Telecommunications	0.53	0.22	0.73	0.45	ND	0.35	0.42	1.57	0.47	0.1	ND	0.18	0.85	0.63	0.75	NC	ND	0.74
NAICS 518 Data processing, hosting and related services	ND	ND	0.56	ND	NC	0.04	ND	NC	ND	NC	NC	ND	NC	0.1	NC	NC	NC	ND
NAICS 519 Other information services	ND	NC	0.78	0.88	NC	ND	ND	NC	ND	NC	NC	ND	NC	0.74	NC	NC	NC	NC
NAICS 521 Monetary authorities - central bank	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NAICS 522 Credit intermediation and related activities	0.58	0.92	0.65	0.93	0.41	0.64	0.78	0.59	0.86	1.48	0.45	0.52	0.57	0.68	1.1	NC	0.65	0.71
NAICS 523 Securities, commodity contracts, investments	ND	0.22	1.24	ND	0.24	ND	ND	0.73	0.44	0.12	ND	0.55	0.23	ND	0.15	NC	ND	0.22
NAICS 524 Insurance carriers and related activities	0.38	0.45	0.64	1.64	0.13	0.33	ND	0.25	0.31	0.08	ND	0.72	0.33	0.59	0.2	NC	ND	0.7
NAICS 525 Funds, trusts, and other financial vehicles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NAICS 531 Real estate	0.73	0.48	1.11	1.11	ND	0.81	0.36	ND	0.62	0.17	ND	1.68	0.4	ND	0.52	ND	ND	1.04

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
NAICS 532 Rental and leasing services	1.02	ND	1.11	0.75	ND	ND	1.86	ND	3.28	1.05	ND	0.34	0.59	2	1.71	NC	ND	ND
NAICS 711 Performing arts and spectator sports	0.2	ND	1	1.24	ND	ND	NC	NC	ND	0.35	NC	ND	NC	0.89	ND	NC	ND	0.27
NAICS 712 Museums, historical sites, zoos, and parks	0.53	ND	1.1	11.77	NC	ND	ND	NC	ND	NC	NC	ND	NC	1.99	NC	NC	NC	1.47
NAICS 713 Amusements, gambling, and recreation	0.65	0.38	0.72	1.63	ND	1.11	ND	ND	0.9	0.23	ND	2.61	0.69	0.88	ND	ND	ND	0.87
NAICS 721 Accommodation	0.66	0.71	0.77	2.19	ND	0.53	1.27	ND	0.76	1.04	ND	3.72	1.53	1.64	1.32	ND	ND	1.24
NAICS 722 Food services and drinking places	0.92	1.12	0.86	1.71	0.73	1.09	1.15	0.65	1.02	0.6	1.62	1.74	1.16	1.28	1.55	ND	1.13	1.1
NAICS 811 Repair and maintenance	1.5	1.22	0.97	1.23	2.98	1.14	2.57	0.83	0.86	0.45	ND	1.68	1.19	1.27	1.79	ND	ND	0.69
NAICS 812 Personal and laundry services	0.82	0.97	1.01	1.15	0.47	1.08	0.77	0.79	1.01	0.37	ND	0.69	0.45	1.14	1.1	NC	0.72	0.6
NAICS 813 Membership associations and organizations	0.83	0.38	0.79	1.1	0.15	1.11	0.91	0.39	1.02	0.54	0.68	1.86	0.56	1.15	0.59	NC	1.88	1.15
NAICS 814 Private households	0.61	0.22	1.31	0.79	0.37	0.7	1.39	2.19	1.72	0.7	12.23	1.1	0.53	0.82	0.68	ND	1.76	0.66
NAICS 999 Unclassified	0.15	0.58	0.9	1.17	ND	0.33	NC	NC	0.15	0.52	NC	0.49	0.17	0.33	0.61	3.76	NC	0.69

Footnotes:

-Highlighted cells indicate export economies; bold-faced cells indicate very high concentrations of employment

-(ND) Not Disclosable

-(NC) Not Calculable, the data does not exist or it is zero

-Texas employment is basis for comparison.

Source: Bureau of Labor Statistics, 2014

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 2, 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)

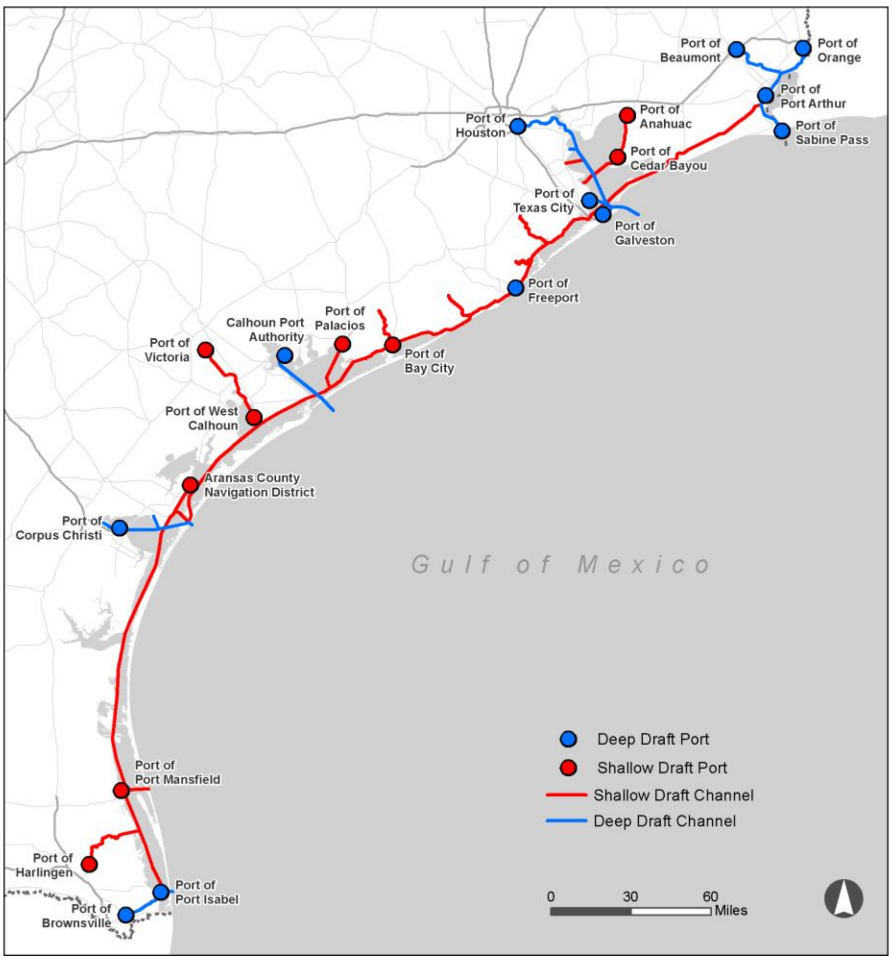


Figure 2 Texas Maritime Transportation System
Source: Texas Department of Transportation, 2016

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 552 million tons of foreign and domestic cargo each year — 22 percent of all U.S. port tonnage (USACE, 2016).
- Seven Texas ports rank in the top 50 of all U.S. ports in terms of annual 2015 tonnage: Houston (2nd), Beaumont (5th), Corpus Christi (6th) and Texas City (15th), Port Arthur (19th), Freeport (32nd), and Matagorda/Port Lavaca (46th); (USACE, 2016).
- The tons of cargo moving via Texas ports generate 112,100 jobs directly related to marine cargo activities (Texas Ports Association, 2016).
- Texas ports generate $270 billion in economic activity and $6 billion in state and local taxes per year (Texas Ports Association, 2016).
- Texas port activities represent approximately 25% of the total State Gross Domestic Product (Texas Ports Association, 2016).
- 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 displays the principal 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 including Baton Rouge and New Orleans). Over one-quarter by tonnage of all the United States’ foreign trade moves through Texas ports.

Table 10 presents commodity movements along the State's waterways. Crude petroleum and petroleum products make up 70 percent of all commodity movements on Texas waterways as of 2014. Crude petroleum and petroleum products comprise 70 percent of commodities destined for Texas ports. Petroleum products and chemicals comprise two-thirds 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 11 presents the value of commodities moved through Texas ports. Texas ports moved $145 billion of imports and $146 billion in exports in 2015. This volume makes up nearly 10 percent of the value of our nation's imports and 24 percent of our nation's exports. The Port of Houston ranks first in the nation in value of exports and third in the nation in value of imports.

Table 9: 2015 Commodity Tonnage Moved at Principal Ports in Texas

PORT_NAME	TOTAL	DOMESTIC	FOREIGN	IMPORTS	EXPORTS
	Tonnage in Short Tons				
Houston, TX	240,933,410	77,522,394	163,411,016	71,387,511	92,023,505
Beaumont, TX	87,169,875	35,337,070	51,832,805	32,351,597	19,481,208
Corpus Christi, TX	85,674,966	40,403,957	45,271,009	25,454,599	19,816,410
Texas City, TX	42,923,997	15,327,257	27,596,740	12,352,521	15,244,219
Port Arthur, TX	35,787,331	9,691,127	26,096,204	8,597,232	17,498,972
Freeport, TX	21,132,931	5,404,002	15,728,929	12,049,111	3,679,818
Matagorda Port Lv Pt Com, TX	11,821,386	3,578,900	8,242,486	5,751,355	2,491,131
Galveston, TX	10,380,588	4,311,499	6,069,089	1,910,468	4,158,621
Brownsville, TX	7,779,109	2,756,992	5,022,117	4,009,427	1,012,690
Victoria, TX	6,733,044	6,733,044	-	-	-
Aransas Pass, TX	916,985	916,985	-	-	-
Orange, TX	837,869	837,709	160	160	-
Total Tonnage, Texas Ports	552,091,491	202,820,936	349,270,555	173,863,981	175,406,574
All Tonnage, All U.S. Ports	2,529,992,031	1,234,038,045	1,295,953,986	683,453,829	612,500,157
Texas Tonnage as Percent of U.S.	21.8%	16.4%	27.0%	25.4%	28.6%

Source: USACE, 2016

Table 10: Commodity Movements to and from Texas on Texas Waterways, 2014

COMMODITY	ORIGIN Shipping		DESTINATION Receiving		INTRASTATE		TOTAL	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Coal, Lignite, and Coal Coke	2,124,020	1.0%	1,041	0.0%	62,616	0.1%	2,187,677	0.4%
Crude Petroleum	33,554,723	15.8%	118,889,639	54.6%	18,435,041	24.3%	170,879,403	33.7%
Petroleum Products	111,102,093	52.2%	35,100,825	16.1%	40,151,214	53.0%	186,354,132	36.8%
Chemical Fertilizers	638,457	0.3%	1,776,282	0.8%	122,976	0.2%	2,537,715	0.5%
Chemicals excluding Fertilizers	34,244,003	16.1%	13,086,336	6.0%	15,817,988	20.9%	63,148,327	12.5%
Lumber, Logs, Wood Chips, and Pulp	756,877	0.4%	918,051	0.4%	0	0.0%	1,674,928	0.3%
Sand, Gravel, Shells, Clay, Salt, and Slag	1,331,321	0.6%	8,899,243	4.1%	557,809	0.7%	10,788,373	2.1%
Iron Ore, Iron, and Steel Waste and Scrap	1,803,589	0.8%	133,654	0.1%	0	0.0%	1,937,243	0.4%
Non-Ferrous Ores and Scrap	2,129,701	1.0%	9,476,499	4.3%	0	0.0%	11,606,200	2.3%
Primary Non-Metal Products	317,964	0.1%	3,560,309	1.6%	0	0.0%	3,878,273	0.8%
Primary Metal Products	1,195,952	0.6%	12,948,461	5.9%	286,726	0.4%	14,431,139	2.8%
Food and Food Products	15,519,035	7.3%	3,075,717	1.4%	34,925	0.0%	18,629,677	3.7%
Manufactured Goods	3,377,823	1.6%	3,835,693	1.8%	195,841	0.3%	7,409,357	1.5%
Unknown and NEC Products	4,900,547	2.3%	6,190,705	2.8%	47,885	0.1%	11,139,137	2.2%

Total	212,996,105	100.0%	217,892,455	100.0%	75,713,021	100.0%	506,601,581	100.0%
Foreign in 1,000s	157,349	73.9%	189,022	86.8%				
Domestic in 1,000s	55,647	26.1%	28,870	13.2%				

Source: USACE, 2014

Table 11: Value of Commodity Imports and Exports, Port Rank, Trade Countries, and Top Trade Commodities, 2014

2014 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	$75.1	$92.0	3	1	Mexico	Brazil	Crude Oil From Petroleum And Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Beaumont, TX	$6.0	$6.5	38	22	Venezuela	Mexico	Crude Oil From Petroleum And Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Corpus Christi, TX	$12.9	$12.1	19	13	Russia	Mexico	Crude Oil From Petroleum And Bituminous Minerals	Lt Oils, Preps Gt=70% Petroleum/bitum Nt Biodiesel
Texas City, TX	$8.3	$8.8	27	19	Kuwait	Mexico	Crude Oil From Petroleum And Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Port Arthur, TX	$23.7	$9.4	12	18	Saudi Arabia	Mexico	Crude Oil From Petroleum And Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Freeport, TX	$6.5	$2.7	34	38	Venezuela	Canada	Crude Oil From Petroleum And Bituminous Minerals	Crude Oil From Petroleum And Bituminous Minerals
Port Lavaca, TX	$0.5	$0.8	71	59	Trinidad and Tobago	South Korea	Anhydrous Ammonia	Acrylonitrile
Galveston, TX	$4.1	$4.0	44	29	Germany	Canada	Crude Oil From Petroleum And Bituminous Minerals	Petrol Oil Bitum Mineral (nt Crud) Etc Nt Biodiesl
Brownsville, TX	$8.1	$10.0	73	63	Netherlan	Switzerla	Unwrought Aluminum,	Crude Oil From Petroleum

					ds	nd	Not Alloyed	And Bituminous Minerals
Victoria, TX	-	-	-	-	-	-	-	-
Aransas Pass, TX	-	-	-	-	-	-	-	-
Orange, TX	$0.0	$0.0	386	182	n.d.	Nicarag ua	n.d.	Tubes & Pipes, Of Copper Alloys Nesoi
Total Value, Texas Ports	$145.2	$146.3						
All Value, All U.S. Ports	$1,515.5	$600.7			China	China	Crude Oil From Petroleum And Bituminous Minerals	Crude Oil From Petroleum And Bituminous Minerals
Texas Tonnage Value as Percent of U.S.	9.6%	24.4%						

^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 12 and Figure 3Figure 4 display the efficiencies of GIWW transportation in Texas as determined by this Master Plan (Kruse et al., 2014).

Figure 3: Ton-Miles Traveled per Gallon of Fuel

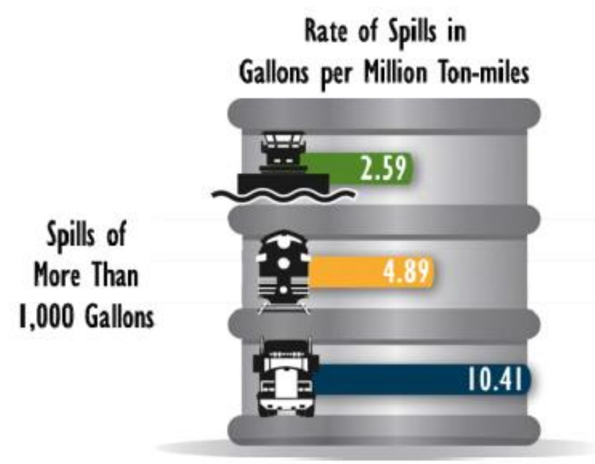


Figure 4: Rate of Spills in Gallons per Million Ton-Miles

Table 12: Summary of Emissions (Grams per Ton-Mile), 2009

Mode	Emissions (grams/ton-mile) 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 13 presents tonnage movements on the GIWW in Texas in 2014. Over 100 million tons of cargo moves along the shallow-draft waterway with 65 percent of all tonnage moving along the Sabine River to Galveston segment of the waterway. The majority of this cargo is classified as 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. (REMI) 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 14 presents businesses, employment and income from the marine transportation industry within the 18-coastal counties. Within the State, over $1 billion in wages is earned by 17,500 workers in the industry per year. Region 1b dominates the industry with 83 percent of the employment and 85 percent of the wages earned from marine transportation.

Table 13: Tonnage Moved on the Gulf Intercoastal Waterway, Texas Segments, 2014

	Inbound Receiving		Outbound Shipping		Local		Through		Grand Total
TX GIWW SEGMENT	Upbound	Downbound	Upbound	Downbound	Upbound	Downbound	Upbound	Downbound	
Sabine River to Galveston	953	2,180	1,918	1,989	1	114	31,585	28,823	67,563
Galveston to Corpus Christi	23	351	3,007	148	12		19,674	10,574	33,789
Corpus Christi to Mexican border		19					797	992	1,808
Total	976	2,550	4,925	2,137	13	114	52,056	40,389	103,160

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

Source: USACE, 2014b

Table 14: Marine Transportation Industries, Annual Average Employment, Business Establishments, and Wages in Coastal Counties, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	26	699	$26,645,530	$38,119
1a	Orange County	--	--	--	--
All 1a		26	699	$26,645,530	$38,119
1b	Harris County	207	12,648	$848,256,428	$67,066
1b	Galveston County	47	1,770	$79,369,092	$44,841
1b	Chambers County	--	--	--	--
1b	Brazoria County	8	182	$12,086,882	$66,503
All 1b		262	14,600	$939,712,402	$178,411
2	Matagorda County	--	--	--	--
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	--	--	--	--
All 2		0	0	$0	$0
3	Refugio County	--	--	--	--
3	Aransas County	--	--	--	--
3	San Patricio County	--	--	--	--

3	Nueces County	19	250	$13,911,836	$55,684
3	Kleberg County	--	--	--	--
All 3		19	250	$13,911,836	$55,684
4	Kenedy County	--	--	--	--
4	Willacy County	--	--	--	--
4	Cameron County	19	521	$16,032,011	$30,752
All 4		19	521	$16,032,011	$30,752
Coastal Counties		326	16,070	$996,301,779	$61,998
Coastal Counties % of State		71.6%	91.5%	90.6%	99.0%
Texas Statewide		455	17,562	$1,099,249,909	$62,593

*NAICS codes: 4831, 4832, 4883.

Source: Bureau of Labor Statistics, 2014

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 numbers of active duty and reserve members of the military with 173,118 personnel as of May, 2016. 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 15 ("Military Active-Duty Personnel," 2017).

Table 15: Active Military Personnel in Texas, May 2016

Branch of Service	Active Duty	Reserves	Government Civilians	Total
Army	74,306	18,132	25,649	118,087
Navy	5,659	5,015	1,340	12,014
Marine Corps	1,955	3,271	Included in Navy	5,226

Air Force	35,344	5,507	15,271	56,122
Coast Guard	1,688	355	143	2,186
Air National Guard	--	3,286	--	3,286
Army Guard	--	18,600	--	18,600
Defense Dept.	--	--	4,577	4,577
Total	118,952	54,166	46,980	220,098

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

In 2015, the Texas Comptroller of Public Accounts estimated the contribution of U.S. Department of Defense installations to the Texas' economy as shown in Table 16. In total over 800,000 persons are employed in military installation earning nearly $48 billion in personal income. The U.S. military presence in Texas generates $137 billion in economic output to the State and contributes $81 billion to the State's GDP.

Table 16: Economic Impact of Military Installations in Texas and in Texas' Coastal Regions, 2015

	Statewide Total	Coastal Region 1	Coastal Region 3
Total Employment	804,268	4,155	35,577
Output to the Texas Economy (in Billions)	$136.69	$0.78	$5.31
GDP (in Billions)	$81.22	$0.45	$3.31
Disposal Personal Income (in Billions)	$47.88	$0.26	$2.09

Source: Texas Comptroller of Public Accounts, 2015; Office of the Governor Greg Abbot, 2017

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

1. Ellington Field Joint Reserve Base 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). Ellington Field 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 (147th RW) 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: 924

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: 448 active-duty; 205 reserve; 221 civilians

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

Naval Air Station Corpus Christi (NASCC) 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 (CNATRA) is headquartered at NASCC and oversees all aviation training for the U.S. Navy.

Personnel: 1,270 active-duty; 439 reserve; 713 civilians

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

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

Personnel: 8 active-duty; 3,262 civilians; 827 contractors

The economic contribution of these installations is displayed by region and is included in the statewide total in Table 16. Within Texas' coastal counties, the U.S. military presence employs nearly 40,000 persons generating $2.3 billion in personal income. The economic contribution of these facilities to the state is $6 billion and the contribution to the state's GDP is estimated at $3.8 billion (Office of the Governor Greg Abbot, 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 (Colgan, 2007) 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. 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 17 with their associated industries.

Table 17: 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 GIWWW. Also because the energy industry is so active in Texas and especially along the coast, these industrial sectors were included as Ocean sectors. Table 18 displays the sector, industry, and associated North American Industry Classification System (NAICS) codes of Texas' ocean economy; Table 19 presents their contribution to the coastal economy. Coastal counties capture one-third of the employment and almost half of the wages paid in Ocean economy industrial sectors within the Texas.

Table 18: 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 19: Ocean Economy - Annual Average Employment, Business Establishments, and Wages in Texas Coastal Counties, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	657	26,231	$1,764,648,387	$67,273
1a	Orange County	160	4,539	$279,720,798	$61,626
All 1a		817	30,770	$2,044,369,185	$66,440
1b	Harris County	12,051	383,857	$30,037,073,329	$78,251
1b	Galveston County	842	23,973	$978,847,818	$40,831
1b	Chambers County	117	2510	216358762	$86,199
1b	Brazoria County	648	21,504	$1,445,543,411	$67,222
All 1b		13658	431,844	$32,677,823,320	$75,670
2	Matagorda County	118	1,495	$34,195,803	$22,873
2	Jackson County	42	90	$6,628,807	$73,653
2	Victoria County	252	5,268	$176,046,236	$33,418
2	Calhoun County	88	3681	$289,214,318	$78,569
All 2		500	10,534	$506,085,164	$48,043
3	Refugio County	54	550	$39,831,952	$72,422
3	Aransas County	123	1,682	$46,948,652	$27,912
3	San Patricio County	184	3,785	$157,720,275	$41,670

3	Nueces County	1225	32,205	$1,439,596,955	$44,701
3	Kleberg County	80	1,497	$21,793,759	$14,558
All 3		1,666	38,842	$1,642,692,003	$42,292
4	Kenedy County	7			
4	Willacy County	33			
4	Cameron County	753	15,799	$286,619,064	$18,142
All 4		793	15,799	$286,619,064	$18,142
Coastal Counties		17,434	527,789	37,157,588,736	$70,402
Coastal Counties % of State		24.8%	32.8%	47.0%	143.3%
Texas Statewide		70,298	1,609,726	$79,109,672,145	$49,145

*NAICS codes in Table 10

Source: Bureau of Labor Statistics, 2014

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 18 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 20 presents these industries as they are represented on the Texas Gulf coast. Texas' coastal counties account for 20 percent of the businesses, one-third of the employment, and half of the wages for the mineral extraction industries in Texas as a whole.

Table 20: Mineral Resource Extraction - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	--	--	--	
1a	Orange County	4	27	$2,638,989	$97,740
All 1a		4	27	2,638,989	$97,740
1b	Harris County	1,705	96,653	$17,245,694,285	$178,429
1b	Galveston County	--	--	--	
1b	Chambers County	10	205	$12,333,491	$60,163
1b	Brazoria County	4	87	$3,608,754	$41,480
All 1b		1,719	96,945	$17,261,636,530	$178,056
2	Matagorda County	--	--	--	
2	Jackson County	10	59	$2,932,818	$49,709
2	Victoria County	--	--	--	
2	Calhoun County	--	--	--	
All 2		10	59	$2,932,818	$49,709
3	Refugio County	30	539	$38,926,509	
3	Aransas County	11	338	$24,273,081	
3	San Patricio County	45	970	$69,456,462	$71,605

3	Nueces County	199	4,989	$502,385,075	$100,699
3	Kleberg County	--	--	--	
All 3		285	5,959	$571,841,537	$95,963
4	Kenedy County	--	--	--	
4	Willacy County	--	--	--	
4	Cameron County	--	--	--	
All 4		0	0	$0	
Coastal Counties		2,018	102,990	$17,839,049,874	$173,211
Coastal Counties % of State		19.1%	33.5%	46.5%	138.7%
Texas Statewide		10,554	307,349	$38,371,386,597	$124,846

*NAICS codes: 212321, 212322, 211111, 211112, 213111,213112, and 541360.

Source: Bureau of Labor Statistics, 2014

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 21 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 one-third of the businesses and one-half of the employment in these high-paying industrial sectors in Texas.

Table 21: Petroleum Product, Chemical, and Plastics Manufacturing - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	59	9,386	$1,175,949,302	$125,288
1a	Orange County	9	2,141	$242,908,582	$113,456
All 1a		68	11,527	$1,418,857,884	$123,090
1b	Harris County	621	37,231	$4,028,332,816	$108,198
1b	Galveston County	32	4,220	$564,252,394	$133,709
1b	Chambers County	10	1,386	$147,876,564	$106,693
1b	Brazoria County	57	7,828	$1,034,065,774	$132,098
All 1b		720	50,665	$5,774,527,548	$113,975
2	Matagorda County	--	--	--	
2	Jackson County	--	--	--	
2	Victoria County	11	883	$94,781,873	$107,341
2	Calhoun County	7	2,364	$244,129,375	$103,270
All 2		18	3,247	$338,911,248	$104,377
3	Refugio County	--	--	--	
3	Aransas County	--	--	--	

3	San Patricio County	9	345	$40,706,865	$117,991
3	Nueces County	22	3,317	$382,498,802	$115,315
3	Kleberg County	--	--	--	
All 3		31	3,662	$423,205,667	$115,567
4	Kenedy County	--	--	--	
4	Willacy County	--	--	--	
4	Cameron County	13	279	$11,556,528	$41,421
All 4		13	279	$11,556,528	$41,421
Coastal Counties		850	69,380	$7,967,058,875	$114,832
Coastal Counties % of State		34.2%	49.9%	61.6%	123.6%
Texas Statewide		2,485	139,156	$12,924,689,106	$92,879

*NAICS codes: 3241, 325, and 326

Source: Bureau of Labor Statistics, 2014

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 22 shows, over half of the State's employment in this sector is located in coastal counties.

Table 22: Oil and Gas Pipeline Construction - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	17	3,498	$270,346,618	$77,281

1a	Orange County	--	--	--	--
All 1a		17	3,498	270,346,618	$77,281
1b	Harris County	130	13,579	$1,335,199,136	$98,325
1b	Galveston County	8	247	$16,979,899	$68,675
1b	Chambers County	6	318	$14,628,423	$46,074
1b	Brazoria County	22	2,960	$208,656,675	$70,494
All 1b		166	17,104	$1,575,464,133	$92,111
2	Matagorda County	--	--	--	--
2	Jackson County	--	--	--	--
2	Victoria County	5	80	$3,394,593	$42,477
2	Calhoun County	--	--	--	--
All 2		5	80	$3,394,593	$42,477
3	Refugio County	--	--	--	--
3	Aransas County	--	--	--	--
3	San Patricio County	7	304	$11,528,763	$37,872
3	Nueces County	11	1,595	$132,216,946	$82,873
3	Kleberg County	--	--	--	
All 3		18	1,899	$143,745,709	$75,695
4	Kenedy	--	--	--	--

	County				
4	Willacy County	--	--	--	--
4	Cameron County	--	--	--	--
All 4		0	0	$0	--
Coastal Counties		206	22,581	$1,992,951,053	$88,258
Coastal Counties % of State		38.4%	54.8%	61.4%	111.9%
Texas Statewide		536	41,184	$3,246,945,024	$78,840

*NAICS code 237120

Source: Bureau of Labor Statistics, 2014

Pipeline Transportation

Transportation of petroleum, natural gas, and products by pipeline supports the energy and manufacturing industries and contributes to the coastal economy. Table 23 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 23: Pipeline Transportation Industry - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	15	476	$44,524,831	$93,622
1a	Orange County	--	--	--	--
All 1a		15	476	$44,524,831	$93,622
1b	Harris County	141	9,446	$1,575,331,012	$166,777
1b	Galveston County	--	--	--	--
1b	Chambers County	9	364	$29,478,539	$81,059
1b	Brazoria	11	125	$12,154,393	$97,495

	County				
All 1b		161	9,935	$1,616,963,944	$162,754
2	Matagorda County	10	142	$10,791,089	$76,217
2	Jackson County	4	31	$3,695,989	$119,225
2	Victoria County	8	89	$9,026,476	$101,516
2	Calhoun County	--	--	--	--
All 2		22	262	$23,513,554	$296,958
3	Refugio County	4	11	$905,443	$84,227
3	Aransas County	--	--	--	--
3	San Patricio County	4	38	$3,545,397	$94,334
3	Nueces County	18	339	$34,424,332	$101,572
3	Kleberg County	--	--	--	
All 3		26	388	$38,875,172	$280,133
4	Kenedy County	--	--	--	--
4	Willacy County	--	--	--	--
4	Cameron County	--	--	--	--
All 4		0	0	$0	--
Coastal Counties		224	11,061	$1,723,877,501	$155,852
Coastal Counties % of State		36.4%	65.1%	71.2%	109.4%

Texas Statewide		616	17,001	$2,422,540,268	$142,495

*NAICS code 486

Source: Bureau of Labor Statistics, 2014

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 24 shows the contribution of ship building and repairs to the economy of the Texas coast. Two-thirds of the employment in these industrial sectors is located within the 18-counties adjacent to the Gulf coast.

Table 24: Ship and Boat Building Industry - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	7	780	$48,970,939	$62,763
1a	Orange County	--	--	--	--
All 1a		7	780	$48,970,939	$62,763
1b	Harris County	22	1,039	$90,026,525	$86,619
1b	Galveston County				
1b	Chambers County	8	226	$11,596,313	$51,254
1b	Brazoria County	3	83	$7,149,558	$86,313
All 1b		33	1,348	$108,772,396	$224,186
2	Matagorda County	6	105	$3,946,863	$37,530
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	--	--	--	--
All 2		6	105	$3,946,863	$37,530

3	Refugio County	--	--	--	--
3	Aransas County	--	--	--	--
3	San Patricio County	--	--	--	--
3	Nueces County	3	122	$6,168,578	$50,459
3	Kleberg County	--	--	--	--
All 3		3	122	$6,168,578	$50,459
4	Kenedy County	--	--	--	--
4	Willacy County	--	--	--	--
4	Cameron County	10	1,030	$47,521,014	$46,129
All 4		10	1,030	$47,521,014	$46,129
Coastal Counties		59	3,385	$215,379,790	$63,628
Coastal Counties % of State		59.6%	66.4%	71.0%	107.0%
Texas Statewide		99	5,097	$303,245,907	$59,490

*NAICS code: 336611 and 336612

Source: Bureau of Labor Statistics, 2014

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. One quarter of the State's employment in heavy construction is found in the 18-coastal county area, as shown in Table 25.

Table 25: Marine Construction Industry - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee

1a	Jefferson County	13	186	13,517,971	72,873
1a	Orange County	--	--	--	--
All 1a		13	186	$13,517,971	$72,873
1b	Harris County	86	3,293	264,718,982	80,380
1b	Galveston County	10	161	7,869,212	49,004
1b	Chambers County	--	--	--	--
1b	Brazoria County	--	--	--	--
All 1b		96	3,454	$272,588,194	$129,384
2	Matagorda County	--	--	--	--
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	5	544	32,724,463	60,128
All 2		5	544	$32,724,463	$60,128
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		114	4,184	$318,830,628	$76,202
Coastal Counties % of State		22.9%	26.7%	24.5%	91.7%
Texas Statewide		497	15,683	$1,303,119,862	$83,089

*NAICS code: 237990

Source: Bureau of Labor Statistics, 2014

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 2014 Texas commercial fishermen landed 74.7 million pounds of seafood valued at $262.6 million. The leading 20 species landed by weight and value are shown in Table 26 (NMFS 2015). Shrimp and oyster harvests ranked highest in both weight and value, comprising 89 percent of the total landed weight and 92 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 26: 2014 Top Commercial Fish Species Landed by Weight and Value, Texas

	Ranked by Volume			Ranked by Value	
Rank	Species	Pounds Caught	Rank	Species	Ex-vessel Value

1	SHRIMP, BROWN	43,815,522	1	SHRIMP, BROWN	$149,892,082
2	SHRIMP, WHITE	18,138,963	2	SHRIMP, WHITE	$71,536,772
3	OYSTER, EASTERN	4,128,910	3	OYSTER, EASTERN	$19,221,247
4	CRAB, BLUE	2,234,470	4	SNAPPER, RED	$7,617,401
5	SNAPPER, RED	1,796,837	5	SHRIMP, MARINE, OTHER	$3,722,431
6	DRUM, BLACK	1,747,264	6	CRAB, BLUE	$3,050,132
7	SHRIMP, MARINE, OTHER	931,745	7	DRUM, BLACK	$1,980,566
8	SHRIMP, ROCK	357,038	8	GROUPER, YELLOWEDGE	$938,947
9	GROUPER, YELLOWEDGE	220,446	9	SHRIMP, ROCK	$873,636
10	SNAPPER, VERMILION	202,623	10	CROAKER, ATLANTIC	$681,403
11	TILEFISH, GOLDEN	186,227	11	SNAPPER, VERMILION	$603,801
12	SHRIMP, PINK	120,883	12	TILEFISH, GOLDEN	$515,417
13	CATFISH, BLUE	105,157	13	SHRIMP, PINK	$359,010
14	SHRIMP, SEABOB	94,972	14	MULLETS	$193,260
15	CROAKER, ATLANTIC	77,724	15	FINFISHES, UNC GENERAL	$178,396
16	MULLETS	72,116	16	SHRIMP, SEABOB	$160,541
17	AMBERJACK, GREATER	55,752	17	GROUPER, WARSAW	$158,189
18	FINFISHES, UNC GENERAL	52,082	18	MACKEREL, KING	$106,243
19	MACKEREL, KING	50,262	19	CATFISH, BLUE	$101,788
20	GROUPER, WARSAW	44,232	20	FLATFISH	$97,052
	ALL LANDED SPECIES	74,687,129		TOTAL VALUE	$262,605,432

Source: National Marine Fisheries Service, 2015.

The leading Texas ports in 2014 for commercial fisheries landings are presented in Table 27. The ports of Galveston and Brownsville-Port Isabel ranked highest in weight and value of commercial fishery harvests.

Table 27: Top Texas Ports for Commercial Fishery Landings, 2014

Rank	Port	Weight in pounds	Rank	Port	Landed Value
1	Galveston, TX	14,000,000	1	Brownsville-Port Isabel, TX	$76,300,000
2	Brownsville-Port Isabel, TX	12,100,000	2	Galveston, TX	$69,000,000
3	Port Arthur, TX	9,400,000	3	Port Arthur, TX	$40,600,000
4	Palacios, TX	7,000,000	4	Palacios, TX	$38,300,000
5	Aransas Pass-Rockport, TX	1,500,000	5	Freeport, TX	$7,200,000
6	Freeport, TX	1,300,000	6	Aransas Pass-Rockport, TX	$5,700,000

Source: National Ocean Economics Program, 2014

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 fishery are shown in Table 28 and are confined to the domestic harvest in 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 harvesters 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 28. The most current estimates of the commercial fisheries contribution to the Texas' economy are for the year 2012 when a total of 91.4 million pounds of fish were landed in Texas valued at $215 million. The economic contribution of the commercial fishery industry to the Texas coastal counties is shown in Table 29.

Table 28: Economic Impacts to Texas from Domestic Commercial Fishery Landings, 2012

Employment, jobs	17,899
Income	$392,497,000
Sales	$1,078,674,000
Value Added (GDP contribution)	$550,187,000
Landed Fisheries Volume, 2012	91,437,754
Landed Fisheries Value, 2012	$215,082,979

Includes direct, indirect, and induced effects.

Sources: National Marine Fisheries Service, 2012a.

Table 29: Commercial Fishing Industry - Annual Average Employment, Business Establishments, and Wages, 2014

Region	Coastal County	Establishments	Employment	Annual Wages	Average Wage per Employee
1a	Jefferson County	--	--	--	--
1a	Orange County	--	--	--	--
All 1a		0	0	$0	--
1b	Harris County	20	99	2,943,196	29,855
1b	Galveston County	12	288	$6,238,259	$21,661
1b	Chambers County	3	11	$445,432	$39,303
1b	Brazoria County	--	--	--	--
All 1b		35	398	$9,626,887	$90,819
2	Matagorda County	9	152	$3,144,755	$20,689
2	Jackson County	--	--	--	--
2	Victoria County	--	--	--	--
2	Calhoun County	3	17	587,542	33,897
All 2		12	169	$3,732,297	$54,586
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	6	41	$1,033,055	$25,455
All 4		6	41	$1,033,055	$25,455
Coastal Counties		53	608	$14,392,239	$23,671
Coastal Counties % of State		21.3%	24.5%	17.2%	70.0%
Texas Statewide		249	2,478	$83,851,145	$33,838

*NAICS code: 31170, 1125, 1141, 445220

Source: Bureau of Labor Statistics, 2014

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 300,000 coastal residents across a variety of enterprises, from hotel and restaurant services to boat dealers and offshore fishing guides. Table 30 displays the contribution of leisure and hospitality industrial sectors to the local and regional economies in 2014. Region 3 has 13 percent of its workforce in the leisure and hospitality industries. One-in-five employed persons in Aransas County work in leisure and hospitality services. Galveston County in Region 1b has 17 percent employment in leisure and hospitality, whereas Texas overall has 9 percent employment in those services.

Table 30: Leisure and Hospitality Services Representation in Coastal Counties, 2014

Region	Coastal County	Leisure and Hospitality Establishments	Percent of Coastal Counties' Establishments in Sector	Leisure and Hospitality Sector Employment	Percent of Total County/Regional Employment	Percent of Coastal Counties' Employment in Sector	Leisure and Hospitality Sector Wages	Percent of All Coastal Counties' Wage

								s in Sector
1a	Jefferson County, Texas	520	3.8%	11,206	9.1%	3.8%	$184,693,196	3.0%
1a	Orange County, Texas	147	1.1%	2,371	10.6%	0.8%	$34,173,227	0.6%
All 1a		667	4.9%	13,577	9.3%	4.6%	$218,866,423	3.6%
1b	Harris County, Texas	9,119	67.1%	209,869	9.3%	70.5%	$4,646,570,949	76.3%
1b	Galveston County, Texas	733	5.4%	17,287	17.0%	5.8%	$304,138,962	5.0%
1b	Chambers County, Texas	71	0.5%	nd			nd	
1b	Brazoria County, Texas	543	4.0%	10,239	10.3%	3.4%	$167,821,375	2.8%
All 1b		10466	77.0%	237,395	9.6%	79.8%	$5,118,531,286	84.1%
2	Matagorda Count	93	0.7%	1,096	10.6%	0.4%	$16,313,096	0.3%

	y, Texas							
2	Jackson County, Texas	28	0.2%	nd			nd	
2	Victoria County, Texas	228	1.7%	4,216	10.2%	1.4%	$68,843,294	1.1%
2	Calhoun County, Texas	73	0.5%	756	6.6%	0.3%	$11,772,938	0.2%
All 2		422	3.1%	6,068	8.8%	2.0%	$96,929,328	1.6%
3	Refugio County, Texas	20	0.1%	nd			nd	
3	Aransas County, Texas	112	0.8%	1,344	20.9%	0.5%	$22,675,571	0.4%
3	San Patricio County, Texas	119	0.9%	2,128	11.1%	0.7%	$32,482,788	0.5%
3	Nueces County, Texas	953	7.0%	21,593	13.2%	7.3%	$367,991,386	6.0%

3	Kleberg County, Texas	80	0.6%	1,497	11.3%	0.5%	$21,793,759	0.4%
All 3		1,284	9.5%	26,562	13.0%	8.9%	$444,943,504	7.3%
4	Kenedy County, Texas	7	0.1%	nd			nd	
4	Willacy County, Texas	33	0.2%	nd			nd	
4	Cameron County, Texas	705	5.2%	13,928	10.4%	4.7%	$210,476,456	3.5%
All 4		745	5.5%	13,928	10.0%	4.7%	$210,476,456	3.5%
Coastal Counties		13,584	100.0%	297,530	9.8%	100.0%	$6,089,746,997	
Texas State wide		54,807	24.8%	1,064,216		28.0%	$19,354,644,327	31.5%

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

Source: Bureau of Labor Statistics, 2014

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 31 presents marine recreational fishing expenditures and saltwater fishing pressure for Texas for 2011. In 2011, 750,000 fishermen fished Texas' marine waters, making 5.2 million fishing trips. Recreational expenditures for marine fishing averaged $77 per trip in 2011. The most popular types of saltwater fish caught in Texas waters are redfish, flounder, and seatrout.

Table 31: Annual Marine Recreational Angler Trip & Durable Equipment Expenditures, Texas

2011	Texas Resident	Non-resident	Total
Durable Equipment			$1,001,002,000
For-Hire Boat	$57,001,000	$4,616,000	$61,617,000
Private Boat	$153,062,000	$8,983,000	$162,045,000
Shore Fishing	$162,772,000	$15,081,000	$177,853,000
Total Expenditures	$372,835,000	$28,680,000	$401,515,000
Anglers	685,000	66,000	751,000
Trips	4,882,000	321,000	5,203,000
Days of Fishing	7,562,000	595,000	8,157,000
Average Days of Fishing	11	9	11
Average Expenditure per Trip			$77.17

Source: National Marine Fisheries Service, 2014 and U.S. Department of the Interior, 2011.

Marine recreational fishing impacts to the Texas economy are presented in Table 32. Marine recreational fishing supported nearly 14,000 jobs in 2012 and provided $616 million in income to full and part-time workers. Over $1 billion in value added was contributed to the GDP of the state.

Table 32: Economic Impacts to Texas from Marine Recreational Fishing, 2012

2012	Employment	Income	Sales	Value Added (GDP Contribution)
Durable Equipment	8,199	$384,922,000	$1,017,950,000	$613,629,000
For-Hire Boats	1,199	$62,896,000	$148,950,000	$97,195,000
Private Boat	1,996	$76,341,000	$253,670,000	$134,277,000
Shore Fishing	2,550	$91,554,000	$299,139,000	$159,939,000

Total	13,944	$615,713,000	$1,719,709,000	$1,005,040,000

Includes direct, indirect, and induced effects.

Sources: National Marine Fisheries Service, 2012b.

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 impact of wildlife watching within the state employed over 146,000 people in 2011 and contributed $13.8 billion to the Texas economy (as shown in

Table 33) including direct, indirect, and induced effects. This impact accounted for 1 percent of the State's GDP for 2011 (Texas GDP, 2015).

Texas' ten ecological regions, shown in Figure 5, 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).

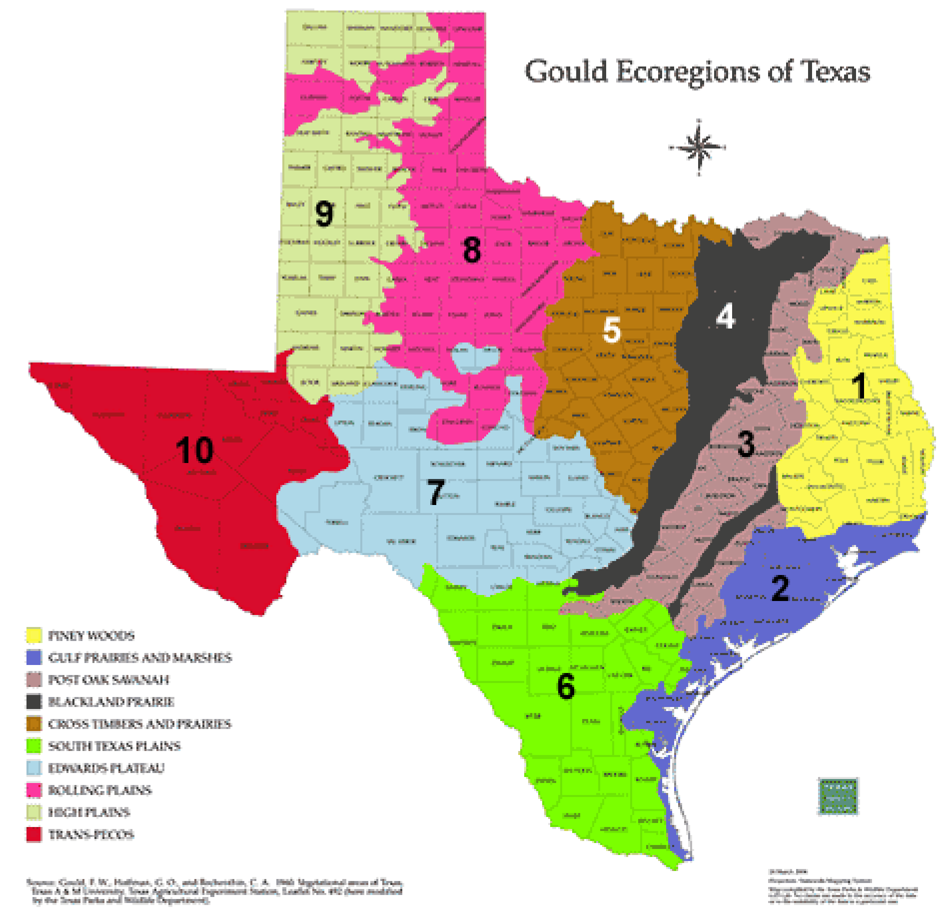


Figure 5: Ecological Regions of Texas

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 34 presents expenditures by Texans and non-residents in this recreational activity. Table 35 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. Each trip lasted one day and on each trip, the participant spent an average of $247.

Table 33: 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 34: 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	--
Total	$219,485	204	$1,076	$1,613

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

Table 35: Participation, Trips, and Days of Participation in Away-From-Home Wildlife Watching, 2011

	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 30, 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 more than 901,000 passengers and crew in 2013. With over $1.2 billion in direct spending and 20,271 jobs paying $1.16 billion in total income, Texas accounted for 6.3 percent of the cruise industry's direct expenditures, 5.6 percent of the industry's total employment impact and 6.3 percent of the income impact. The state's ranking for cruise ship activity is third behind Florida and California (The Port of Galveston, 2014). Other ports in Texas are also working to become ports for the cruise industry.

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Coastal Erosion Analysis

Legend

- Potential Breaching Location
- Estimated Area of Land Loss Due to Erosion Over 50-Years

N

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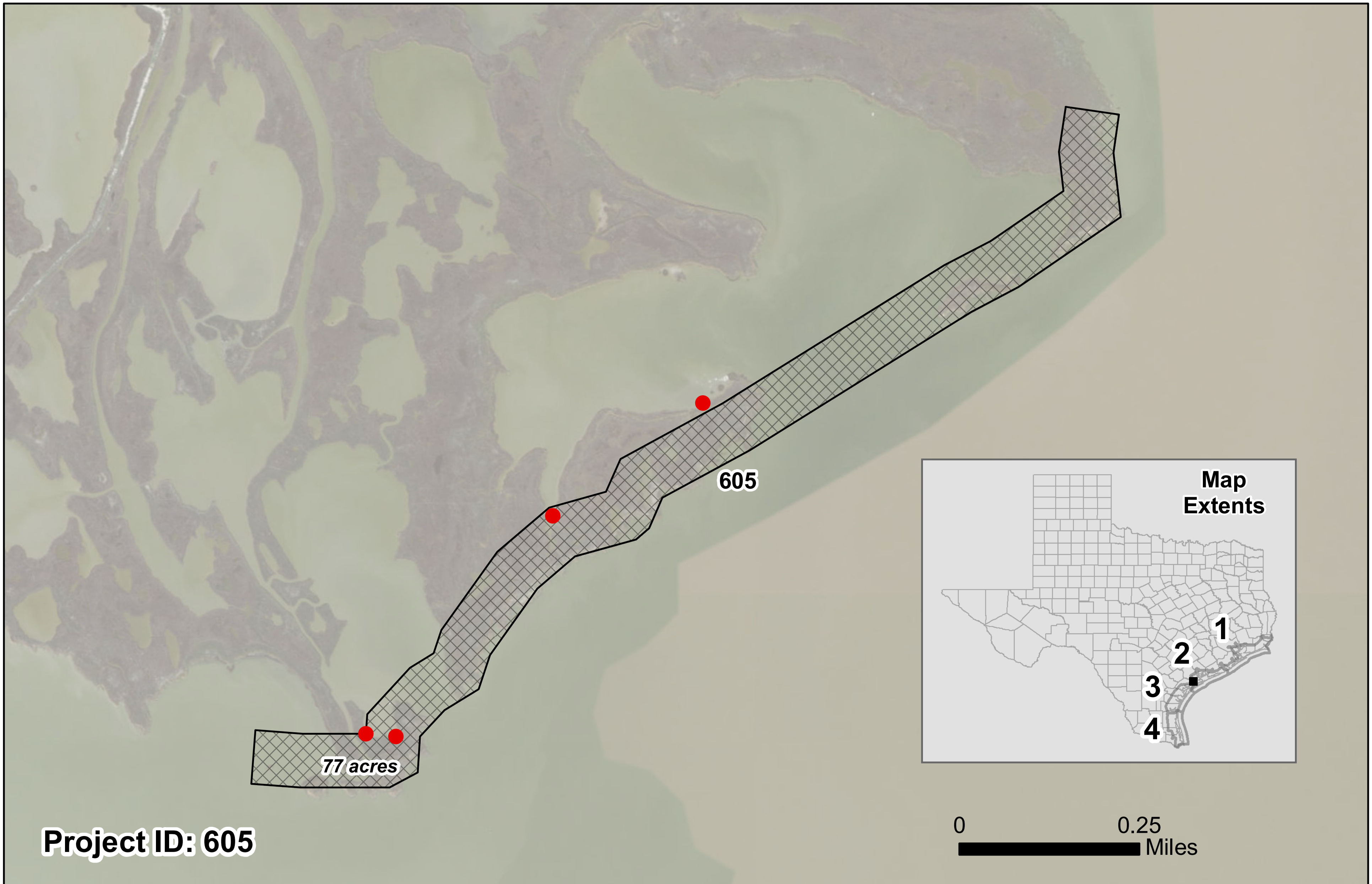
TXGLO

Texas Coastal Resiliency Master Plan

Estimated Erosion Over 50-Year Time Period

October 2016



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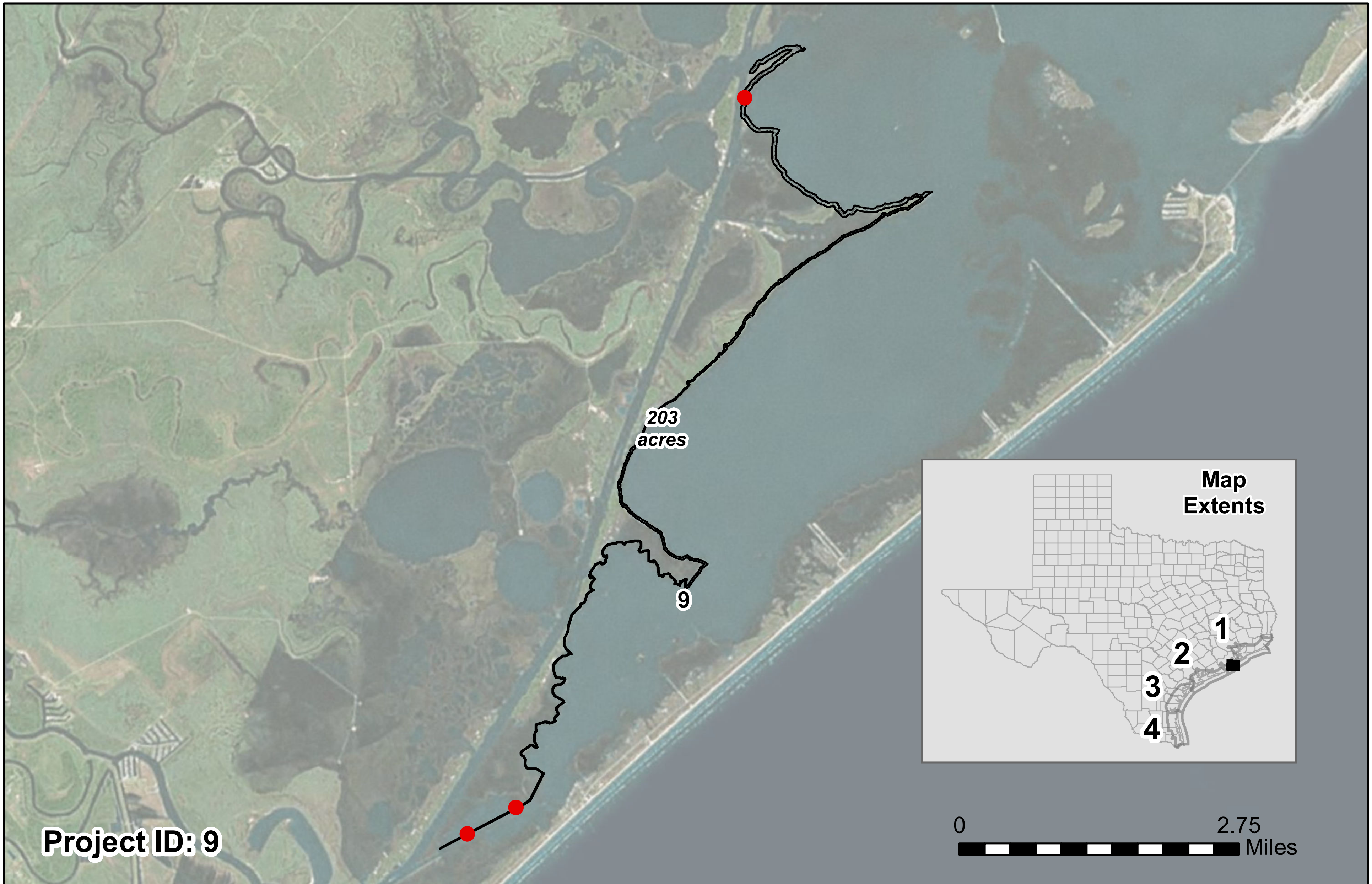

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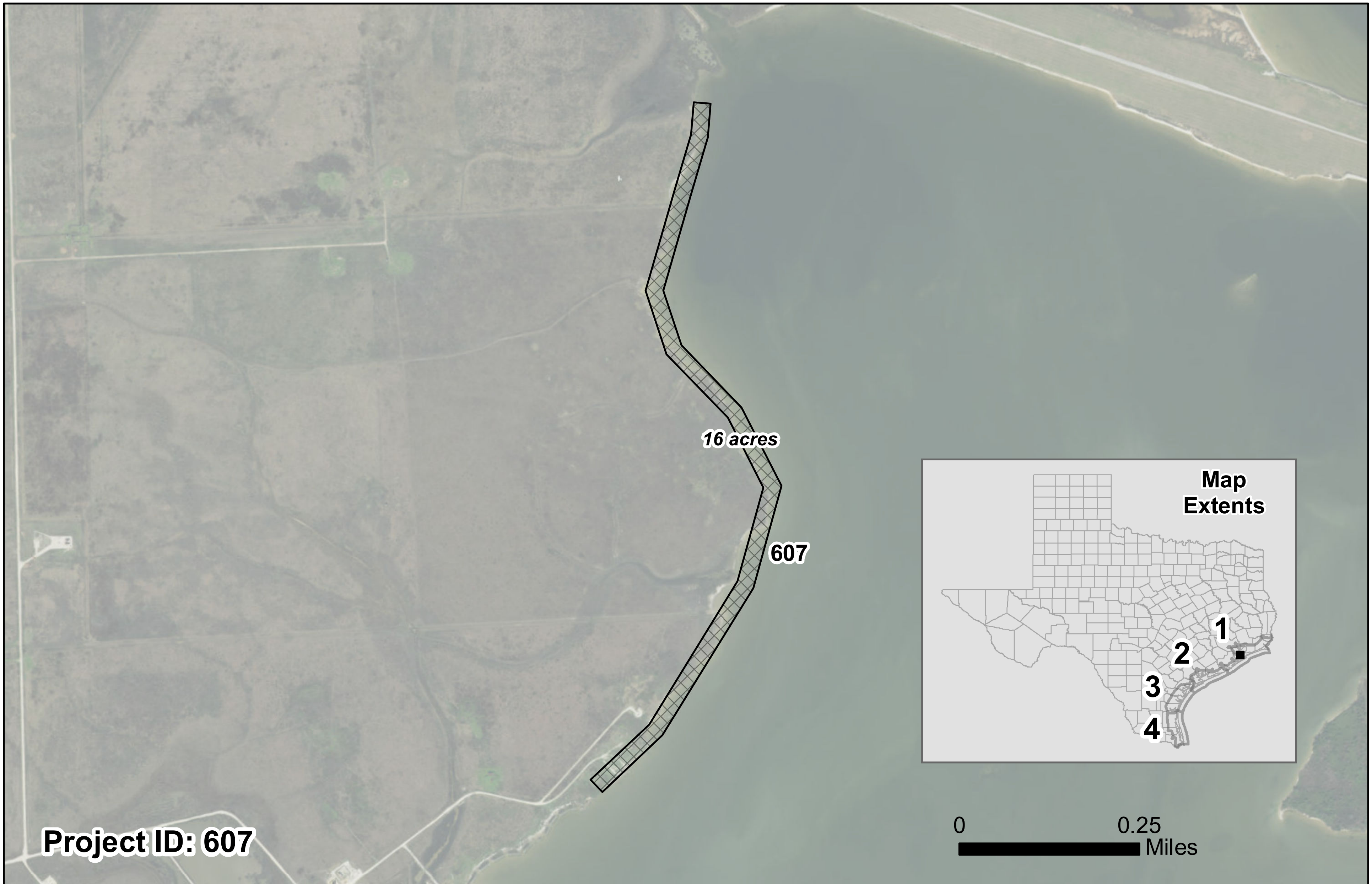

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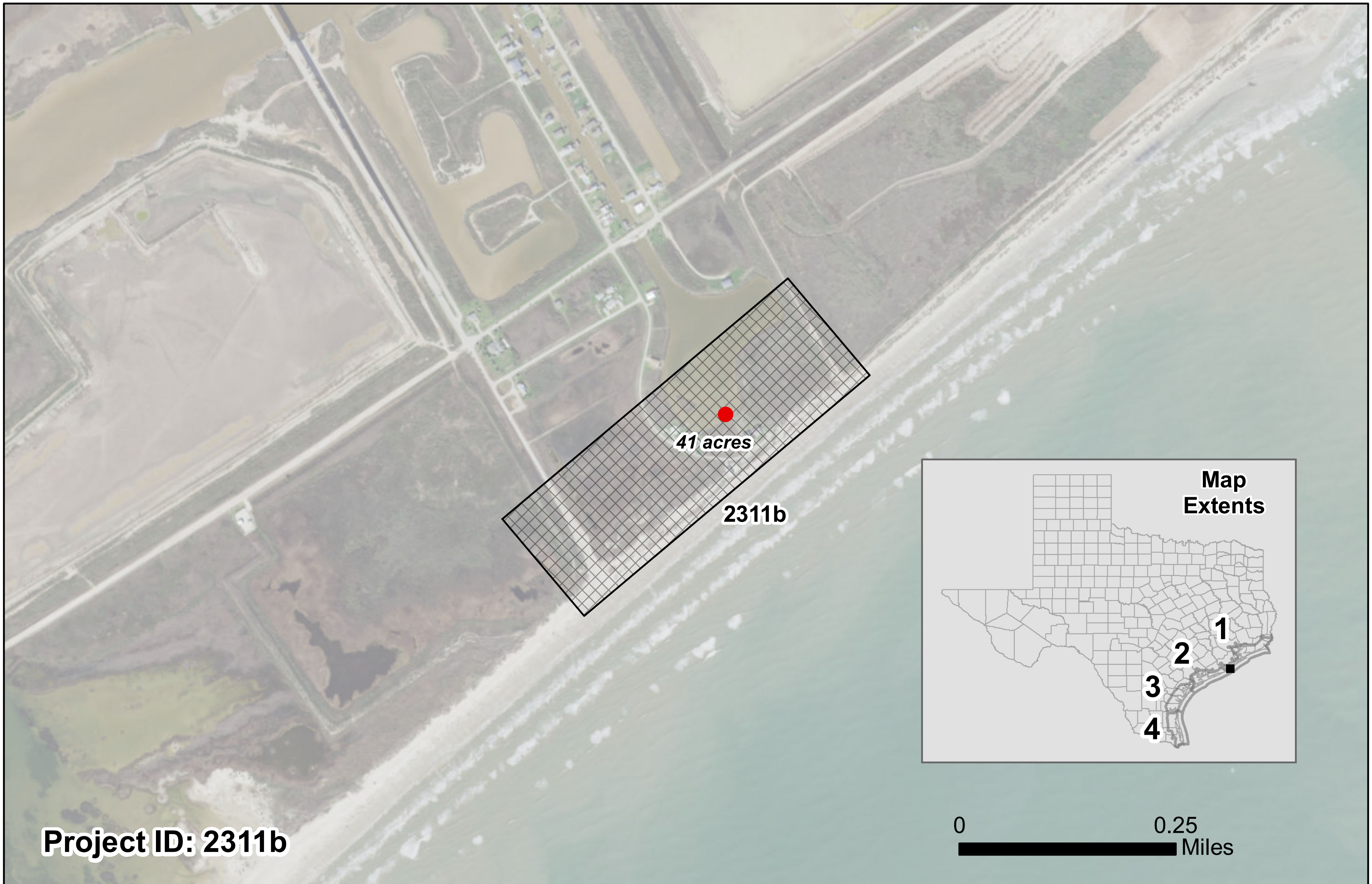

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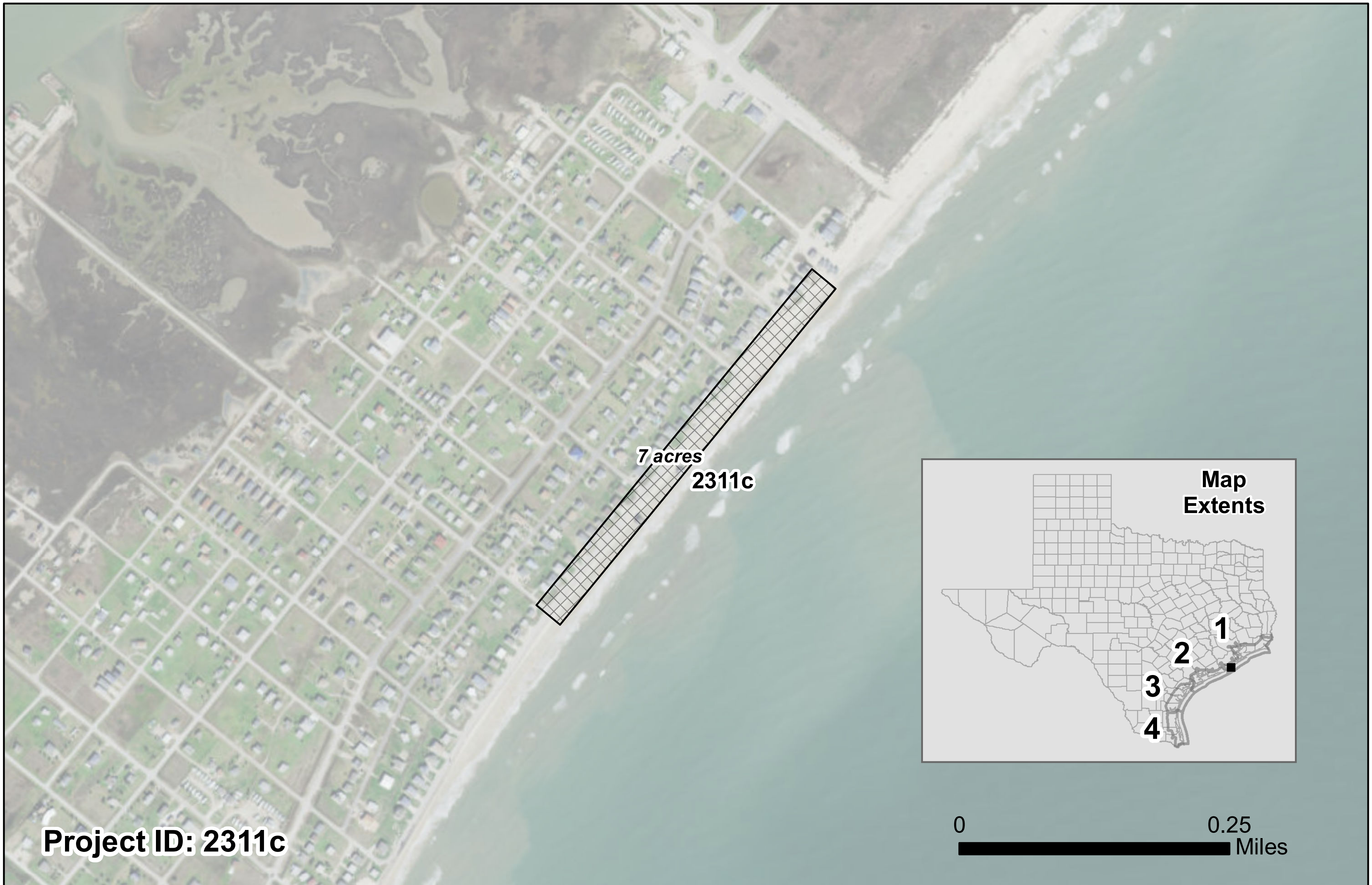

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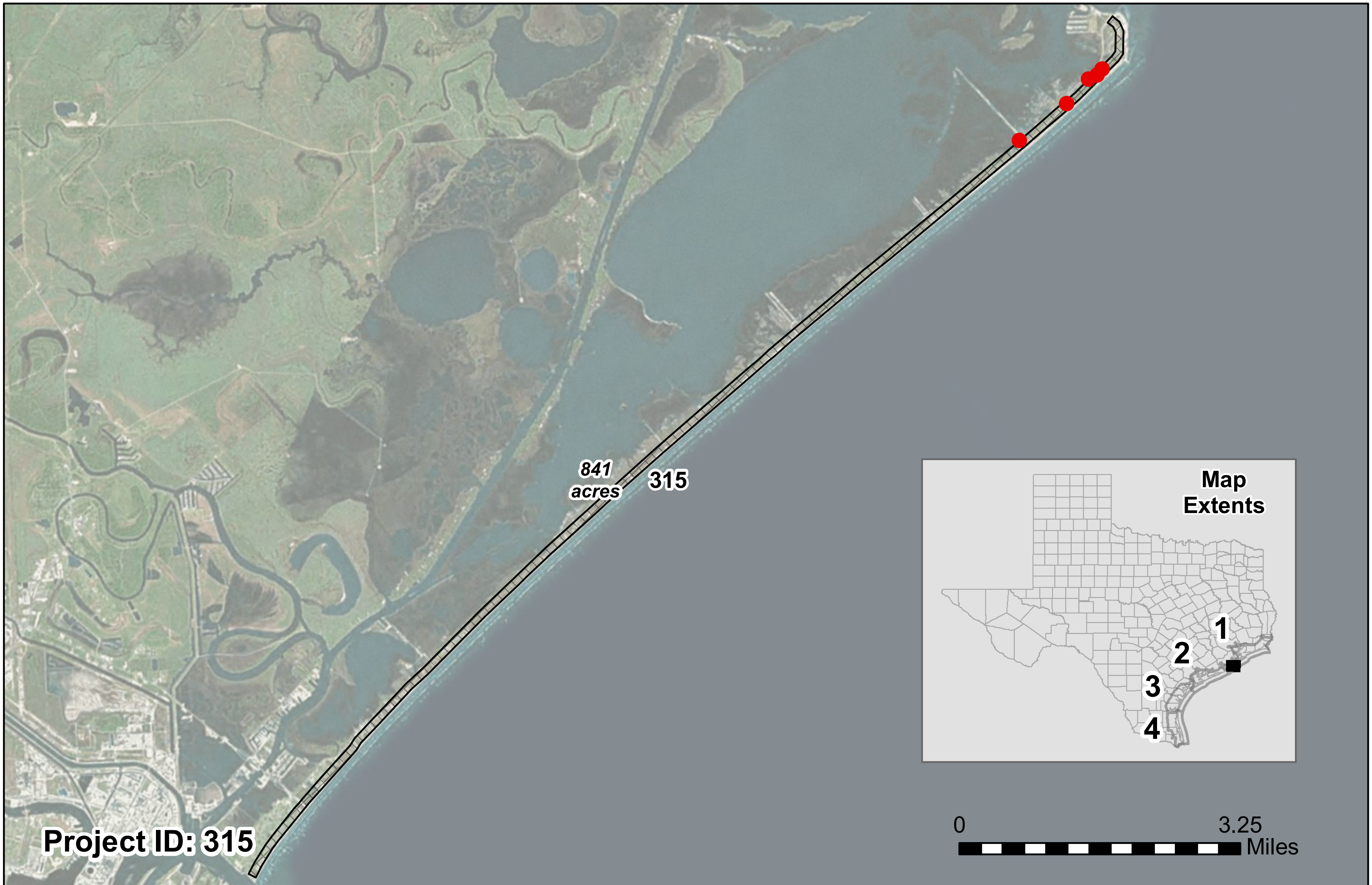

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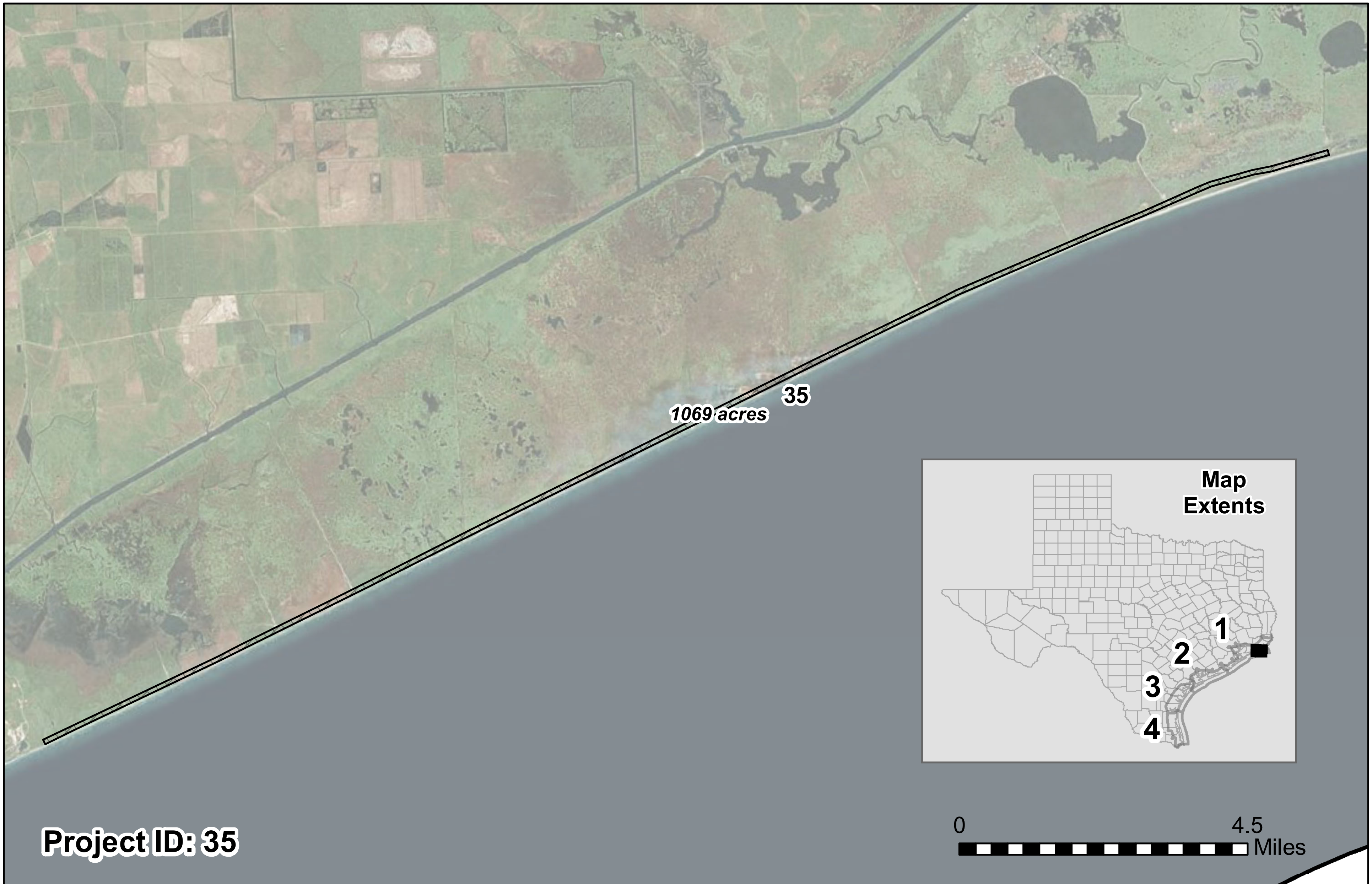

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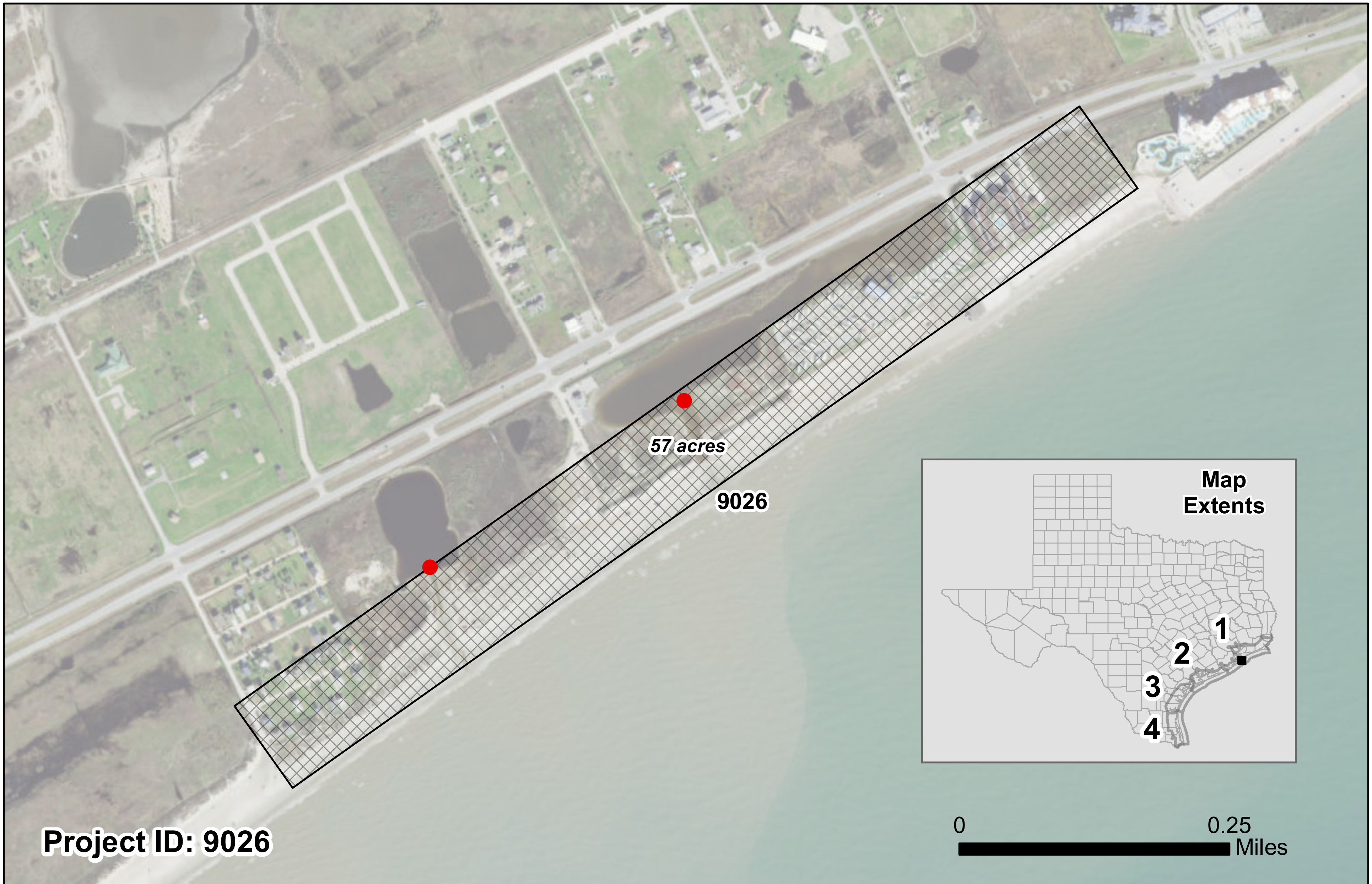

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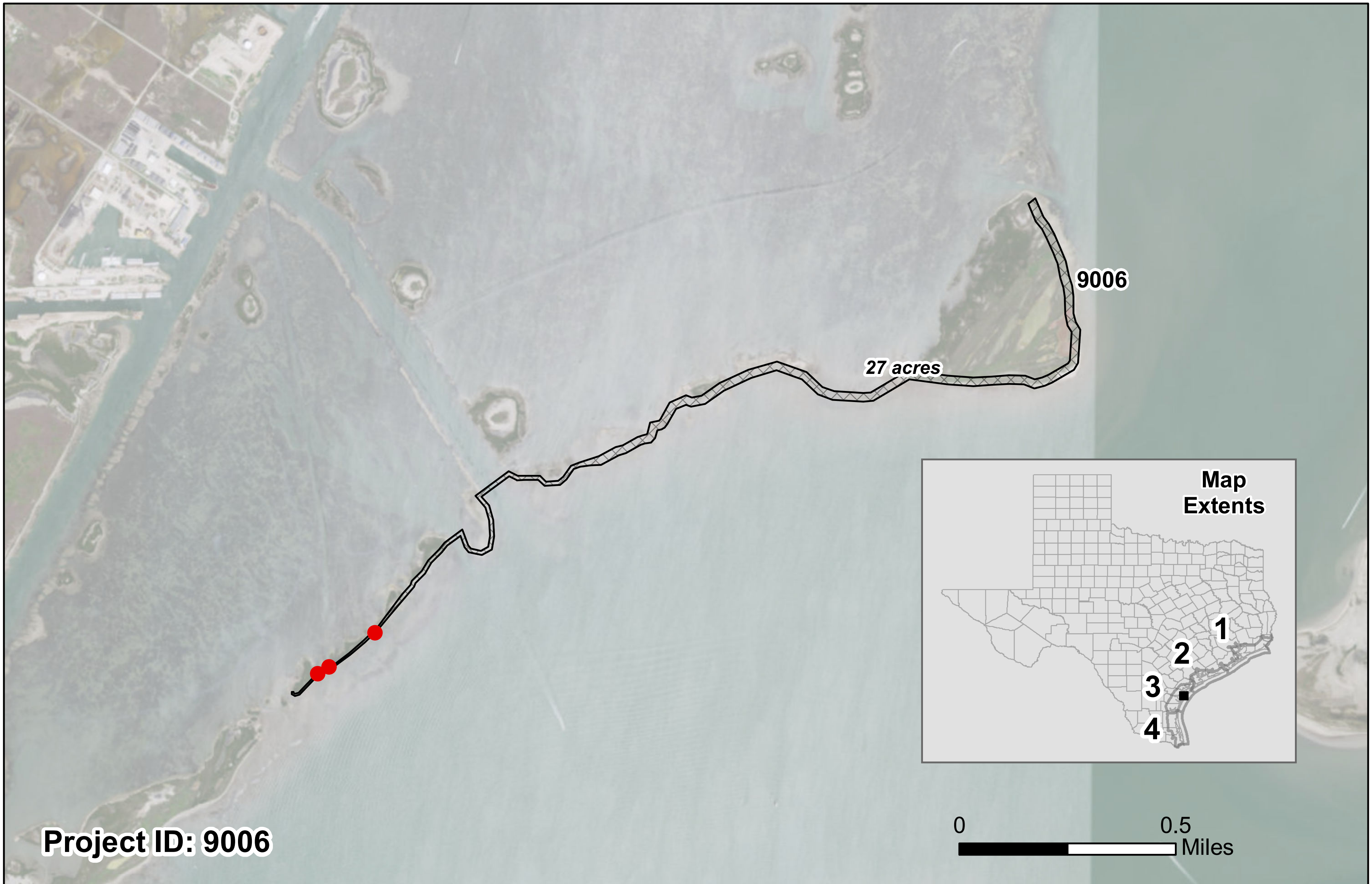

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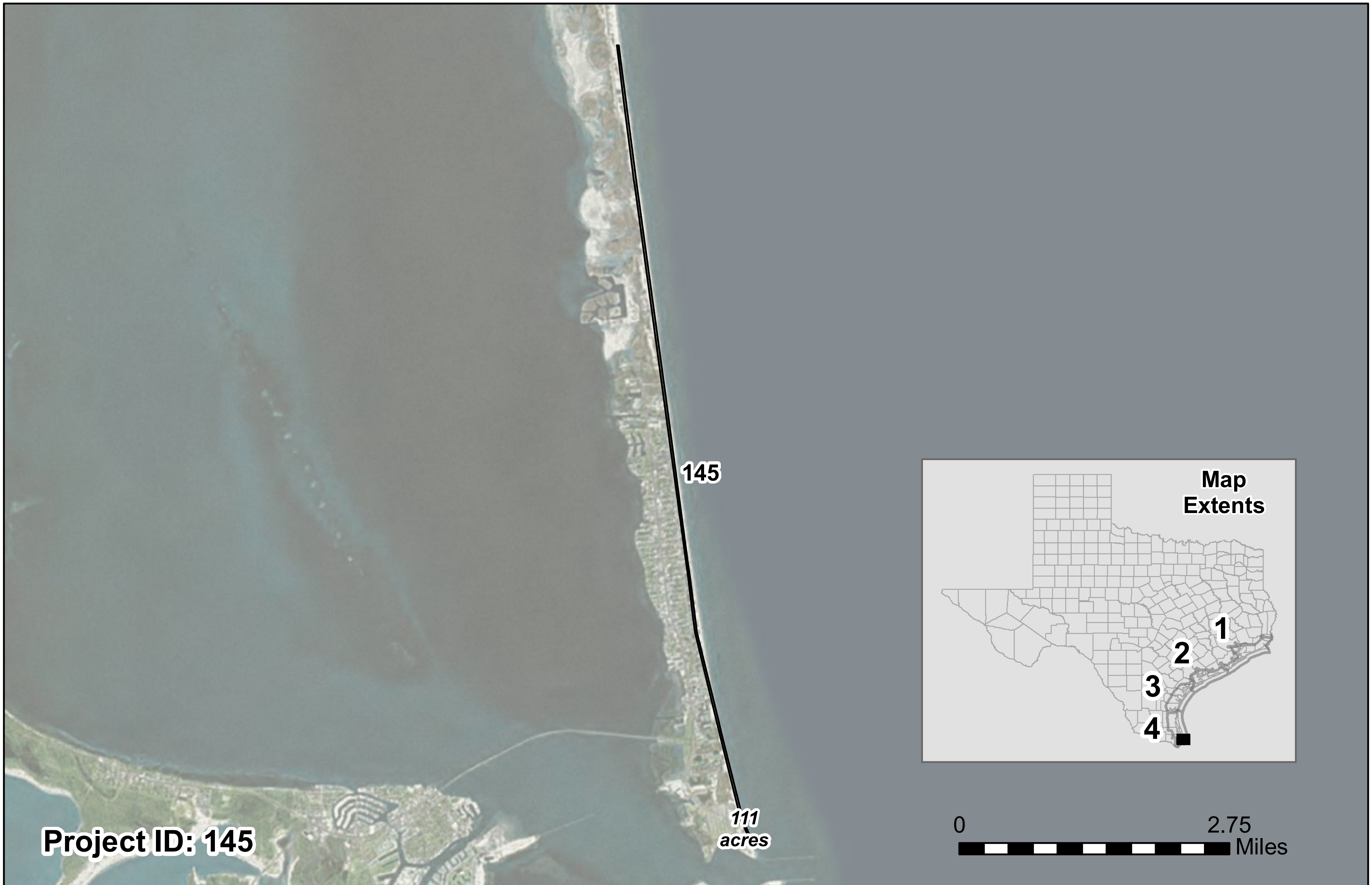

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Erosion Rates

Project ID	Project	County	Estimated Avg. Erosion Rate (ft/yr)	Estimated Erosion Distance Over 50-Years (acres)	Estimated Land Loss Over 50-Years (acres)	Market Value/Acre	Market Value Land Loss
9	Brazoria National Wildlife Refuge Shoreline Protection	Brazoria	-2.13	-106.25	202.88	$6,681	$1,355,472
21	Galveston Bay Ecosystem Rookery Islands	Galveston	-4.00	-200.00	12.84	$150	$1,926
29	Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)	Chambers, Galveston	-0.25	-12.50	6.08	$215	$1,309
35	McFaddin National Wildlife Refuge Shoreline Protection	Jefferson	-7.98	-399	1,069	$274	$292,455
145	Town of South Padre Island Gulf Shoreline	Cameron	-2.20	-110.04	110.79	$175,580	$19,453,180
252	Bolivar Beach and Dune Restoration	Galveston	-5.26	-262.78	311.51	$1,718	$535,309
315	Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel	Brazoria	-9.70	-484.88	840.62	$23,372	$19,646,881
344	Marsh Restoration, Pierce Marsh, Galveston County	Galveston	-3.00	-150.00	34.76	$148	$5,156
346	Marsh Restoration, IH-45 Causeway, Galveston County	Galveston	-3.00	-150.00	53.21	$3,028	$161,116
380	Gordy Marsh Restoration & Shoreline Protection - Phase 1	Chambers	-1.00	-50.00	67.71	$302	$20,436
418	Sargent Beach Dune/Beach Restoration	Matagorda	-23.19	-1159.35	1221.44	$11,030	$13,472,754
437	Fulton Beach Road Protection	Aransas	-3.20	-160.00	69.85	$203,256	$14,197,179
605	Guadalupe Delta Estuary Restoration	Refugio	-7.77	-388.33	76.98	$1,130	$87,017
607	Moses Lake Wetlands Restoration & Protection	Galveston	-3.00	-150.00	16.42	$965	$15,847
678	Indian Point Shoreline Protection – Phase II	San Patricio	0.00	0.00	0.00	--	--
696	Shamrock Island Restoration – Phase II	Nueces	-6.15	-307.50	12.88	$300	$3,865
9001	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	San Patricio	-0.45	-22.50	4.73	$113,256	$535,476
9006	Dagger Island Shoreline Protection	Nueces	-0.70	-35.00	26.55	$300	$7,964
9026	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	Galveston	-9.81	-490.69	57.03	$52,325	$2,983,938

Market Analysis

GLO PROJECT	PROPERTY ID	GEO ID NO.	#	Type	Description	Acres	Sqft	Eff Front	Eff Depth	Market Value	Prod. Value	Value/acre
9001	61139	2139-0104-0000-016	2	BRNW	BARREN/WASTELAND	10.76	468705.6	0	0	$1,218,635	$323	$113,256
9001	sum					10.76	468705.6			$1,218,635		$ 113,256
605	711895	01000-00361-00012-000000				468.765				$648,770		$1,384
605	103401	01000-00361-00010-000000				14.2				$14,200		$1,000
605	280204	01000-00361-00020-000000				640.7				$640,700		$1,000
605	711498	01000-00361-00015-000000				5.33				$5,330		$1,000
605	280209	01000-00433-00010-000000				26.49				$26,490		$1,000
605	280208	01000-00432-00010-000000				224.65				$224,650		$1,000
605	sum					1380.135				$1,560,140		$ 1,130
437	47661	3650-019-000-005		W	WATERFRONT	0.3616				$315,000		
437	47661	3650-019-000-005		WFE	WATERFRONT EAST	0				$10,500		
437	47661	3650-019-000-005		CENTER	CENTER LAND	0.5553				$24,190		
437	26580	3650-006-000-010		W	WATERFRONT	0.551				$408,000		
437	26580	3650-006-000-010		WFE	WATERFRONT EAST	0				$23,000		
437	26580	3650-006-000-010		CENTER	CENTER LAND	2.088				$54,120		
437	26580	3650-006-000-010		HWY	HIGHWAY FRONTAGE	0.551				$51,000		
437	26580	3650-006-000-010		BRNW	BARREN/WETLAND	0.853				$260		
437	57469	3650-014-000-000		W	WATERFRONT	0.3459				$301,380		
437	57469	3650-014-000-000		WFE	WATERFRONT EAST	0.0045				$10,000		
437	57469	3650-014-000-000		HWY	HIGHWAY FRONTAGE	0.3448				$37,550		
437	57469	3650-014-000-000		CTR	CENTER LAND	1.2458				$43,410		
437	26619	3650-043-000-000		W	WATERFRONT	0.6887				$480,000		
437	26619	3650-043-000-000		WFE	WATERFRONT EAST	0				$20,000		
437	26619	3650-043-000-000		HWY	HIGHWAY FRONTAGE	0.6887				$45,000		
437	26619	3650-043-000-000		CTR	CENTER LAND	1.8926				$49,470		
437	64267	3675-000-097-001		W	WATERFRONT	1.3539				$943,630		
437	64267	3675-000-097-001		WFE	WATERFRONT EAST	0				$39,320		
437	64267	3675-000-097-001		HWY	HIGHWAY FRONTAGE	0.9518				$103,650		
437	64267	3675-000-097-001		CTR	CENTER LAND	7.3643				$1,283,150		
437	19659	2149-020-000-000		W	WATERFRONT	0.602				$420,000		
437	19659	2149-020-000-000		WFE	WATERFRONT EAST	0				$17,500		
437	19659	2149-020-000-000		HWY	HIGHWAY FRONTAGE	0.602				$39,380		
437	19659	2149-020-000-000		CTR	CENTER LAND	2.4948				$65,080		
437	sum					23.5397				$4,784,590		$ 203,256
380	18296	00243-00100-00200-410001				40				$10,000		$250
380	18309	00360-00100-00100-410001				218				$54,500		$250
380	4478	00377-00200-00100-420001				207				$51,750		$250
380	18304	00055-00100-00100-420001				326				$122,500		$376
380	sum					791				$238,750		$ 302
35	139777	300288-000-001000-00000-7				627.13				$188,140		$300.00
35	142202	300705-000-001000-00000-0				627.19				$188,160		$300.00
35	139522	300249-000-001000-00000-9				541.35				$108,270		$200.00
35	394913	300126-000-014000-99999-0				144.62				$36,160		$250.03
35	139521	300248-000-001000-00000-1				640				$192,000		$300.00
35	138849	300192-000-001000-00000-1				136.18				$30,640		$225.00
35	sum					2716.47				$743,370		$ 274
21	R221208	0200-0001-0000-000				40.3				6,050.00		$150.12
21	R221196	0198-0002-0000-000				120				18,000.00		$150.00
21	sum					160.3				24,050.00		$ 150
2311e	169644	0335-0016-110			WATERFRONT	9.767				$500		$51.19
2311e	169656	0335-0019-160			MISC OTHER	0.803				$10		$12.45
2311e	169654	0335-0019-140			PRIMARY SITE	0.42				$550		$1,309.52
2311e	169650	0335-0017-000			FRONT ACREAGE	17.735				$4,430		$249.79
2311e	194836	2280-0310-000			LAKE	0.1581				$2,500		$15,812.78
2311e	194838	2280-0312-000			LAKE	0.1524				$11,950		$78,412.07
2311e	169647	0335-0016-130			WATERFRONT	0.842				$1,100		$1,306.41
2311e	169654	0335-0019-140			PRIMARY SITE	0.42				$550		$1,309.52
2311e	169649	0335-0016-150			WATERFRONT	0.545				$710		$1,302.75
2311e	194859	2280-0333-000			RESERVE	1.19				$2,500		$2,100.84
2311e	sum					32.0325				$24,800		$ 774

Texas Coastal Ecosystem Services

Texas Coastal Ecosystem Services

Ecosystems along the Texas coast provide many benefits to communities called ecosystem services. Ecosystem services are generally defined as the benefits provided by the environment that support, sustain, and enrich human life (Yoskowitz et al. 2010). Below is a description of different ecosystem services provided by oyster reefs, beaches and dunes, rookery islands, and coastal wetlands along the Texas coast.

1. **Oyster Reefs**

Oysters are traditionally viewed as solely a source of food. In 2014, Texas harvested 4.1 million pounds of oysters worth $19 million. Texas has continuously been second in commercial oyster landings among all U.S. states, after Louisiana (NOAA NMFS, 2014). However, in addition to being a commercial fishery commodity, oysters provide many benefits to people including contributing to clearer and cleaner water, removing pollutants and sediment from the water, providing habitat for numerous animals, and recreational opportunities to people.

a. Habitat

Oysters provide an important three-dimensional biogenic habitat for recreationally and commercially valuable species. With their dense assemblages, oysters harbor polychaetes, crustaceans, and other invertebrates which are consumed by juvenile fish and crustaceans, which on the hand use oyster reefs for foraging and as a refuge from predators (Grabowski et al 2012). In fact, a previous study in the Gulf of Mexico found that every 10m^2 of restored oyster reef habitat creates an additional 2.6 kilograms of fish and crustacean production every year. Using these productivity rates and the market price of the expected landings, the provision of habitat by oysters was valued at $3,780/ha/year (USD 2012) (Grabowski et al 2012). Given the provision of this service, oysters also provide recreational opportunities to many fishermen who are looking for places to fish. Recreation provided by oyster reefs has been previously valued in Louisiana at $6.02/ha/year (USD 2012) (NOAA, 2004).

b. Water quality

Oysters lead clearer and cleaner water. They filter suspended materials from the water and remove phytoplankton and sediments from bay waters via filter feeding activities, a process they use to grow (Newell and Jordan 1983). Oysters then deposit the materials filtered on the sediment surface as feces and/or pseudofeces (Grabowski et al 2012, Kellogg et al 2013). They can also help neutralize the increased anthropogenic concentrations of nitrogen in estuaries via denitrification and the absorption of nutrients into their tissue and shells. These filtering activities lead to improved water quality and support neighboring ecosystems, such as seagrass, by reducing water turbidity and depositing nutrients in the bottom of the water column (Grabowski et al., 2012). One studied quantified the rates of nutrient removal and found that oysters have an hourly rate during the day of 236 micromoles of nitrogen removed per square meter (m^2). Using the price of $28.23 per kg of nitrogen removed, which is the current average trading price for nitrogen removal in estuarine ecosystems in the North Carolina nutrient offset Credit program, the value of nitrogen removal by oysters can be valued at \$4,130/ha/year (Grabowski et al., 2012).

c. Erosion control

Oyster reefs are natural structures that interact with tidal and wave energy. They slow waves down and increase sedimentation rates. As a result, oyster reefs can serve as natural protection against shoreline erosion and property damage and loss along many estuarine shorelines (Grabowski et al., 2012). Traditionally, the standard practice for inshore shoreline protection is the use of man-made shoreline stabilization structures such as breakwaters, bulkheads, or jetties. However, because oysters can grow vertically faster than expected rising sea levels, one can argue that oysters are more resilient to sea level rise than fixed man-made structures, and consequently have a higher value as shoreline stabilizers. One study used the cost of building man-made structures as the proxy for the value of oyster reefs in protecting the shoreline. The authors valued oyster reefs at \$5,900/ha/year (USD 2012) (Grabowski et al., 2012) in locations where homeowners demanded shoreline protection services and oyster reefs worked as perfect substitute for man-made structures. Since this economic valuation method is driven by demand of the service, the value of oyster reef restoration in shoreline stabilization will be positively affected by the proximity to property that people want to protect from erosion.

d. Carbon sequestration

Another important service provided by oysters is their ability to sequester carbon from the water, including phytoplankton, zooplankton, and detritus, as they filter the water and form and grow their shells. All the carbon that is sequestered is not completely removed from the system and part of it is recycled in organic and inorganic form through the process of respiration, feces, and pseudofeces. Particulate carbon is deposited as feces and pseudofeces at the sediment-water interface, where it can be re-suspended in the water column. The part that is not re-suspended is either buried to deep, inactive sediments and isolated from the water column, or respired and returned to the water column in the form of carbon dioxide. As such, oysters can become important players in alleviating the increasing amounts of carbon dioxide in the ocean, especially as global warming may affect the amount of carbon absorbed by the ocean. One study estimated that oysters filtered 164 tons of carbon per year (tC/year) from the water column, of which 15.2 tons were buried to deep sediments and 13 tons were buried in the form of shell (Cerco, 2014). Another study estimated that oyster aquaculture was responsible for 0.83tC/ha/year (hectare = ha). If we use the social cost of carbon to monetize this sequestration rate, then the value of oysters in sequestering carbon is \$122/ha/year.

Table 1: Potential ecosystem services value provided by oyster reef restoration and conservation

Ecosystem Service	Value (2012 USD)	Value (2012 USD)
Habitat	\$3,780/ha/year[1]	\$1,530/acre/year
Recreation	\$6.02/ha/year[2]	\$2/acre/year
Water quality/nutrient regulation	\$4,130/ha/year[3]	\$1,671/acre/year
Erosion Control	\$5,900/ha/year[4]	\$2,388/ha/year
Carbon sequestration	\$32.37/ha/year[5]	\$13/acre/year

2. Beaches and Dunes

Coastal beaches and dunes have provided many benefits to people including the provision of raw materials and ornamental resources (e.g., shells, driftwood, corals, sea glass), protection against storms, erosion control, water catchment and purification, maintenance of wildlife, carbon sequestration, tourism and recreation, science and education opportunities, and aesthetic views.

a. Raw materials

Beaches and dunes provide raw materials in the form of sand that has been mined for centuries for multiple uses, including extraction of minerals such silica and feldspar for glass and ceramic production, infill for development, amendments for agriculture, and base material for construction products. Although sand is a valuable resource, its extraction through mining can have obvious negative effects, especially on coastal protection and aquifers

b. Storm protection

Coastal protection is arguably one of the most valuable services provided by beach and dune ecosystems especially in the face of extreme storms, hurricanes, and sea level rise. As waves reach the shoreline, they are attenuated by the beach slope and, at high tide, also by the dunes. Beaches vary in their ability to attenuate waves depending on their extent and width. Dunes' ability to attenuate waves also varies depending on the dunes' height and width, which is determined by the presence of vegetation and sand supply from the beach (Hesp 1989; Hacker et al., 2012). In South Carolina, storm

[1] Grabowski, J.H., Brumbaugh, R.D., Conrad, R.F., Keeler, A.G., Opaluch, J.J., Peterson, C.H., Piehler, M.F., Powers, S.P., Smyth, A.R., 2012. Economic Valuation of Ecosystem Services Provided by Oyster Reefs. BioScience 62, 900–909.
[2] NOAA, L.D.O.W.A.F. 2004. Louisiana's Oyster Shell Recovery Pilot Project. Socioeconomics Research and Development Section and Marine Fisheries Division, 1-432.
[3] Grabowski, J.H., Brumbaugh, R.D., Conrad, R.F., Keeler, A.G., Opaluch, J.J., Peterson, C.H., Piehler, M.F., Powers, S.P., Smyth, A.R., 2012. Economic Valuation of Ecosystem Services Provided by Oyster Reefs. BioScience 62, 900–909.
[4] Grabowski, J.H., Brumbaugh, R.D., Conrad, R.F., Keeler, A.G., Opaluch, J.J., Peterson, C.H., Piehler, M.F., Powers, S.P., Smyth, A.R., 2012. Economic Valuation of Ecosystem Services Provided by Oyster Reefs. BioScience 62, 900–909.
[5] Cerco, C.F., 2014. Calculation of Oyster Benefits with a Bioenergetics Model of the Virginia Oyster. DTIC Document.

protection by beaches has been valued at $271/per foot and in New Jersey at $81,900/ha/year or $33,144/acre/year (2012 USD) (Pompe and Rinehart, 1999; Liu et al., 2010).

c. Erosion Control

Beaches and sand dunes provide sediment stabilization and soil retention in vegetation root structure, thus controlling coastal erosion and protecting recreational beaches, tourist-related businesses, ocean front properties, land for aquaculture and agriculture, and wildlife habitat. Although this service has not been valued directly, there has been a growing number of studies that value the benefits gained from erosion control programs that either preserve or “nourish” existing beaches and dunes (Landry et al., 2003; Kriesel and Landry, 2004; Huang et al., 2007; Whitehead et al., 2008; Morgan and Hamilton’ 2010). Such programs are often an alternative to property owners building their own erosion protection structures, such as seawalls and groins, which can inadvertently accelerate the degradation of the coastal environment (Landry et al., 2003; Kriesel and Landry, 2004). In New Hampshire and Maine, a coastal erosion program that preserves five miles of beach is estimated to have net benefits of $4.45/household, adjusted for the costs associated with disturbance to wildlife habitat, deterioration of water quality, and the risk of injury to swimmers from the program measures (Huang et al., 2007). Landry et al. (2003) found that a one meter increase in beach width, or equivalently, the prevention of one meter of beach erosion, increased oceanfront and inlet-front property values by $233 on Tybee Island in the U.S. state of Georgia. Lastly, a study in California valued erosion control by beaches at $83,000/ha/year or $33,589/acre/year (2012 USD) (Raheem et al., 2012).

d. Provision of Habitat

Coastal dunes and beaches provide important habitat for fish, shellfish, birds, and rodents, which have been an important source of food to many communities.

e. Carbon Sequestration

Dunes that encourage vegetation growth and productivity will also be responsible for carbon sequestration, although this process varies with the type of vegetation, sediment deposition and subsidence, and coastal geomorphology.

f. Recreation and Tourism

Beaches and dunes provide important recreational benefits. Boating, fishing, swimming, scuba diving, walking, beachcombing, and sunbathing are among the numerous recreational and scenic opportunities that are provided by beach and dune access. In the USA alone, 70% of the population visits the beach on vacation, and 85% of total tourism dollars come from beach visits. An analysis of North Carolina beaches shows that implementation of a beach replenishment policy to improve beach width by an average of 100 feet would increase the average number of trips by visitors in the subsequent year from 11 to 14, with beach-goers willing to pay $166/trip or $1574 per visiting household per year. In Texas, recreation provided by beaches has been previously valued at $153-$401/visit, $97.20/trip, $36.7/person/year, and $4,911/person/year (Freeman III, A. M., 1995; Parsons and Kang, 2007).

Table 2: The potential ecosystem services values provided by beach and dunes restoration and conservation

Ecosystem Service	Value (2012 USD)	Value (2012 USD)
Storm Protection	$81,900/ha/year[6]	$33,144/acre/year[6]
Erosion Control	$83,000/ha/year[7]	$33,589/acre/year[7]
Recreation	$153/visit[8] $401/visit[8] $4,811/person/year[8] $36.7/person/trip[9] $97.2/trip[9]	

3. Rookery Islands

Rookery islands are communal nesting ground for birds including herons, egrets, and cormorants. Historically, Texas has supported many colonial water bird nesting islands; however, changes in the bays such as relative sea level rise and sediment management practices have resulted in fewer nesting areas for waterbirds (TPWD, 2015; Stanzel, 2015). Some of these islands were created as a consequence of navigation channels construction and are made of dredge materials, while others were created naturally, like in the case of natural oyster reef islands (other materials include coquina reef rock and cobble, shell, and sand) (TPWD, 2015).

Rookery islands are threatened by land loss associated with tides, winds, vessel traffic, storms, and predicted sea level rise. It is important to restore rookery islands to make sure they are able to respond to such threats and continue to exist. Some of the benefits rookery islands provide include protecting the shoreline and navigation channels from erosion and providing important habitat for waterfowl and water birds, two of the most commonly watched birds by Texan bird watchers. Bird tourism or avitourism is also an important industry and source of revenue to the state of Texas, which means the restoration of rookery islands can have significant economic impacts to the local and state economies.

In 2011, there were a total of 2,238,000 birders[10] in Texas, of which 95% were state residents, who spend approximately 132 days a year birding (Carver, 2013). Two of the most commonly watched birds were waterfowl, such as ducks and geese, and other water birds such as herons and shorebirds. Rookery islands provide important habitat to these birds and their preservation becomes increasingly important

[6] Liu, S., Costanza, R., Troy, A., D'Aagostino, J., Mates, W. 2010. "Valuing New Jersey's Ecosystem Services and Natural Capital: A Spatially Explicit Benefit Transfer Approach" Environmental Management, 2010

[7] Raheem, N., Colt, S., Fleishman, E., Talberth, J., Swedeen, P., Boyle, K.J., Rudd, M., Lopez, R.D., Crocker, D., Bohan, D., O'Higgins, T., Willer, C., Boumans, R.M., 2012. Application of non-market valuation to California's coastal policy decisions. Marine Policy 36, 1166–1171.

[8] Freeman III, A. M. 1995. The benefits of water quality improvements for marine recreation: a review of the empirical evidence. Marine Resource Economics, 10(4), 385–406.

[9] Parsons, G. R., Kang, A. 2007. Valuing Beach Closures on the Padre Island National Seashore. Retrieved from http://pubpages.unh.edu/~jell/parsonsrevisedfall2007/parsons.pdf

[10] A birder, or birdwatcher, according to the National Survey, is any individual that has either taken a trip one mile or more from home for the main purpose of observing birds and/or closely observed or tried to identify birds around the home (https://www.fws.gov/southeast/economicimpact/pdf/2011-birdingreport--final.pdf).

as changes in the bays have resulted in fewer nesting areas for waterbirds. Several studies conducted in the Galveston Bay estuary have found a link between water bird populations and wetland areas; as the latter decreases so do water bird populations.

Birders spend money on a variety goods and services for their trip-related and equipment-related purchases. In 2011, approximately 47 million of birders in the U.S. spent an estimated $15 billion on their trips[11] and $26 billion on equipment[12]. If we consider that of the 47 million of birders in the U.S., 4.7% or 2.2 million are Texans or visit Texas for their trips, one can also assume that 4.7% of the $41 billion spent in 2011, *i.e.* $1.9 billion, was spent in Texas in 2011 by birders (Carver, 2013). Thus, bird tourism in Texas has a significant economic impact in local and state economies and can beneficiate from the conservation and restoration of prime bird habitat provided by rookery islands.

4. Coastal Wetlands

Wetlands are lands in between terrestrial and aquatic systems where the water table is frequently at or near the surface or the land is covered by shallow water (Cowardin et al. 1979). They are one of the most productive ecosystems and are responsible for a series of benefits to people such as clean water, recreational opportunities, harvestable fish, and protection against storms (Barbier et al., 2011).

a. **Coastal Marsh** (salt, brackish, and freshwater)

Coastal marshes are a common feature of temperate estuaries throughout the world. Besides being one of the most productive plant communities in the world, coastal marshes are important elements of estuarine ecosystems that provide a food source to numerous estuarine and coastal consumers, serve as habitat for large numbers of juvenile and adult organisms, and play an important role in estuarine chemical cycles (Day et al. 1989). According to the outputs of the first Gulf of Mexico Ecosystem Services Workshop (Yoskowitz et al. 2010), the most important ecosystem services provided for marshes are storm protection, recreation, aesthetics, nutrient cycling, soil retention, and water quality. These services are discussed below.

i. Habitat

Marshes act as a refugium, nursery, and spawning ground for resident and migratory species, including many different species of insects, crustaceans, plants, reptiles, mammals, birds, and fish. These wetlands help maintain fisheries by increasing the production of economically and ecologically important species such as clams, shrimp, oysters, and fish. As an example, salt marshes are thought to account for 25% of the blue crab and 66% of the shrimp production in the Gulf of Mexico (Barbier et al., 2011). Due to their closely packed plant structure, they offer habitat that is mostly inaccessible to large fish, thus providing shelter and protection for young fish, shrimp, and shellfish (Barbier et al., 2011). Many birds also use

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[11] Trip-related expenditures include food, lodging, transportation, and other incidental expenses. For trip expenditures, 52 percent was food and lodging, 34 percent was transportation, and 14 percent was other costs such as guide fees, user fees, and equipment rental.

[12] Equipment-related expenditures consist of binoculars, cameras, camping equipment, and other costs. Equipment expenditures were relatively evenly distributed among wildlife watching equipment (29 percent), special equipment (37 percent), and other items (30 percent).

marshes as feeding and resting habitat during migrations, as well as for foraging and breeding (Bird Observations, 2012). Other animals that use coastal marshes include alligators that are known residents of freshwater marshes and act as large predators on birds and mammals (Weller, 1994) and blue crabs, which are an important commercial species in Texas and use marsh as nursery habitat. Given the variety of species that use wetlands, the provision of this service is vital not only for those animals, but also for the provision of other services such recreational fishing, birding, and hunting. In 2011, a total of 2.2 million people observed birds in Texas and there was a total of $1.8 billion in wildlife-watching related expenditures showing that the provision of this service can have a significant economic impact (Carver, 2013; USFWS, 2011). In Texas, habitat provided by marshes has been previously valued at $7,910/ha/year (2012 USD) (Feagin et al., 2010).

ii. <u>Storm Protection</u>

Marshes protect coastal populations from damaging extreme weather events such as floods, droughts, or hurricanes, due to their water-storage capacity and vertical structure. They act as buffers by collecting floodwaters, slow their courses, and reduce their peak water levels (Zedler and Elliot, 2006). Consequently, these habitats reduce flood-danger and damage to infrastructure resulting from winds and water surge. In addition, as sea level rises, the risk for flooding increases and marshes become crucial factors in dampening those risks. In Texas, the storm protection service of marshes has been previously valued at $7,370/ha/year (2012 USD) (Feagin et al., 2010).

<u>Water Quality</u>

Marshes contribute to improved water quality by removing and breaking down nutrient and non-nutrient compounds and materials (Farber et al., 2006). Organic wastes are frequently introduced into coastal and marine ecosystems and marshes can help filter and decompose those materials (Millennium Ecosystem Assessment, 2005). An indicator of this service is the maximum amount of chemicals that can be recycled or halted on a sustainable basis by ecosystems (de Groot et al., 2009). In Galveston Bay, the ability of marshes to filter non-nutrient compounds has been previously valued at $418/ha/year (USD 2012) (Ko, J. Y. and Johnston, S.R., 2007).

The ability of marshes to store, process, and acquire nutrients, such as nitrogen and phosphorus, is an component that leads to improved water quality. Balanced levels of nutrients are directly related to things important to communities, such as water quality and clarity, food production, and the presence of fish. Contrarily, alterations to nutrient levels resulting in nutrient surplus, cause eutrophication of soils and water bodies and nutrient deficit cause soil exhaustion and loss of fertility (Lavelle and Berhe, 2005). Unsustainable agricultural practices, such as soil fertilization, release excessive levels of nutrients in aquatic systems leading to eutrophication, the depletion of oxygen in the water, and consequently in the reduction of fish populations and degradation of water quality (Lavelle and Berhe, 2005). Healthy ecosystems are dependent upon efficient cycling and availability of nutrients and marshes are important players in cycling nutrients and maintaining healthy nutrient levels in aquatic systems.

iii. <u>Recreation</u>

Marshes provide opportunities for recreational activities such as fishing, birding, and hunting. Wildlife-related recreational activities play a significant role in Texas economy. In 2011, there were approximately 6.3 million people in Texas who participated in wildlife-associated recreational activities (including fishing, hunting, and wildlife watching), spending roughly $6.2 billion in wildlife-associated expenditures. Texas was the fourth state with the highest wildlife-associated expenditures, after New York, Florida, and California, with $9.16, $9.12, and $7.65 billion, respectively. Texas is also the state with more hunters (a total of 1.147 million of residents and non-residents) and the second with more anglers (2.25 million of residents and non-residents) in the nation (USFWS, 2011). These numbers show how a large portion of recreational expenditures depends upon healthy ecosystems. For this reason, it is in the stakeholders' best interest to protect the well-being and function of these habitats not only from human stressors such as pollution, but also from climate stressors such as sea level rise. In Texas, recreation provided by marshes has been previously valued at $5,170/ha/year (2012 USD) (Feagin et al., 2010).

iv. Food

Food production is a portion of primary production that can be extractable as food. In the case of marshes, the presence of edible plants and animals, like fish and crustaceans, makes these habitats indirect providers of food for humans.

v. Aesthetics

Aesthetics is the appreciation of natural scenery, other than through recreational activities (de Groot et al., 2009). For marshes, the aesthetic quality of the ecosystem would be based on elements such as structural diversity, quality of the water, "greenness," and tranquility. An example of how people appreciate a certain habitat is by looking at the number of houses that border that habitat or the amount of users of scenic routes. A way of valuing this service is by using hedonic price, a method that analyzes variations in house prices that reflect the home owner's willingness to pay to live close to natural areas (Harte Research Institute, 2012). Barrier Islands are a good example of this; despite higher house prices, insurance costs, and probability of being hit by a hurricane, people still want to own a house close to the coast.

vi. Soil retention

Coastal erosion is a serious hazard not only for people living near the coast, but also for organisms living along the coasts in bays, estuaries, and shallow water (Stewart, 2009). Marshes play an important role in controlling coastal erosion by preventing soil loss by wind and runoff and avoiding buildup of silt (Farber et al., 2006). Marsh vegetation is crucial in retaining the soil and consequently it is frequently used as a shoreline erosion control measure (Broome et al.. 1992). This service is directly linked to human well-being since it influences elements such as water quality, water clarity, fisheries, and recreational opportunities. Even if very important to coastal populations, this service is still not frequently valued in the ecosystem services valuation literature (Harte Research Institute, 2012).

vii. Carbon Sequestration

Marshes are able to regulating the chemical composition of the atmosphere and oceans by sequestering carbon. Marshes sequester and store millions of tons of carbon every year by burying it and thereby contributing to alleviate the effects of increasing atmospheric carbon dioxide (Cebrian, 2002; Feagin et al., 2010). In Texas, carbon sequestration by salt marshes has been previously valued at $1,335/ha/year (2012 USD) (Feagin et al., 2010).

Table 3: *Potential ecosystem services values provided by marsh restoration and conservation*

Ecosystem Services	US$ 2012
Habitat	$7,910/ha/year[13]
Storm protection	$7,370/ha/year[13]
Water purification	$418/ha/year[14]
Recreation	$5,170/ha/year[13]
Carbon sequestration	$1,335/ha/year[13]

b. Mangroves

Mangroves are dominated by trees adapted to seawater and changing tides that help maintain water quality by removing pollutants carried to the Gulf from rivers and land runoff. They are also home to many protected bird species such as egrets, herons, and the roseate spoonbill. They provide many benefits to people including carbon sequestration water purification, recreational opportunities, water supply, and erosion control. These benefits are explained below.

a. Carbon Sequestration

Mangroves regulate the chemical composition of the atmosphere and oceans by sequestering carbon from the water and air and deposit it in their biomass and in the soil. Mangrove are among the largest stores of organic carbon, containing on average 1,023Mg carbon per hectare (or approximately 414Mg C per acre) (Alongi, 2002; Donato et al., 2011). This important role in alleviating greenhouse gas emissions is an important argument in favor of mangrove conservation and restoration. In Texas, carbon sequestration by mangroves has been valued at $384/ha/year (USD 2014) (Harte Research Institute, 2014).

b. Habitat

Mangroves are a prime nursery habitat to many animals including different species of insects, plants, reptiles, mammals, birds, finfish, and shellfish. Some of the finfish and shellfish with commercial and/or

[13] Feagin, R. A, M. L Martinez, G. Mendoza-Gonzalez, and Robert Costanza. (2010). “Salt Marsh Zonal Migration and Ecosystem Service Change in Response to Global Sea Level Rise: A Case Study from an Urban Region.” (Appendix) Ecology and Society 15, no. 4: 14.

[14] Ko, J.-Y., Johnston, S.R., 2007. The Economic Value of Ecosystem Services Provided by the Galveston Bay/Estuary System. Texas A&M University at Galveston, Department of Marine Sciences & Center for Texas Beaches and Shores.

recreational value that use mangroves include white shrimp, brown shrimp, blue crab, speckled sea trout, white sea trout, and flounder. Due to their roots and branches, mangroves offer habitat that is mostly inaccessible to large fish, thus providing shelter and protection for young fish, shrimp, and shellfish (Heck et al., 2003; Minello et al., 2003; Barbier et al., 2011). In South Florida, mangroves are thought to account for 75% percent of the game fish and 90% of the commercial species (Asokan, 2012). There is no equivalent study in Texas. In Mexico, the contribution of mangroves to shrimp harvest has been previously valued at $2,450/ha/year or $991/acre/year (2012 USD) (Barbier and Stand, 1998).

c. Water Purification

Mangroves contribute to improved water quality by removing nutrients and pollutants from the water. This leads to clearer and cleaner water and to improved aesthetic and recreational opportunities, as more people will visit places with clean water versus polluted and murky water. Mangroves retain, remove, and cycle pollutants and nutrients from land-based sources before they reach neighboring habitats such as submerged aquatic vegetation and coral reefs. Their root system slows the water flow enabling the deposition of sediment on the bottom; toxins and nutrients are moved to sediment particles and then removed during sediment deposition (Saenger, 2002). This service has not been valued in Texas or the United States, but in Mexico it has been valued at $1,680/ha/year or $679.87/acre/year (USD 2012) (Cabrera et al., 1998).

d. Recreation

Recreational activities in mangroves is associated with fishing, boating, kayaking, swimming, birding, and hunting. Given the variety of animals that live or visit mangroves, it is no surprise people seek this habitat for their recreational activity. This service has not been previously valued in Texas or in the United States; in Mexico however, recreation provided by mangroves has been valued at $177/ha/year or $72/acre/year (USD 2012) (Mendoza-González et al., 2012).

e. Storm protection

Storm protection is the role mangroves play in reducing the effects of extreme weather events such as storms and hurricanes by slowing wave energy and fast moving waters. Mangroves with its water-storage capacity and strong roots that trap sediment, protect humans from flood damages and act as a buffer by collecting floodwaters, slowing their courses, and reducing their peak water levels (Zedler and Elliot, 2006). This service has not been valued in Texas or the United States. In Mexico, it has been valued at $3,690/ha/year or $1,493/acre/year (USD 2012) (Valdez et al., 2013).

f. Erosion control

The ability of mangroves to stabilize sediment and retain soil in their roots helps reduce shoreline erosion and damage. Despite the importance of this service to coastal communities and infrastructure, this service has not been previously valued in Texas or the United States. Most valuation studies took place in Asian countries where mangroves are more prominent.

Table 4: Potential ecosystem services values provided by mangroves restoration and conservation

Ecosystem Services	**US$ 2012**	**US$ 2012**
Carbon Sequestration	$384/ha/year[15] (2014 US$) $373/ha/year (2012 US$)	$155/acre/year (2014 US$) $150/acre/year (2012 US$)
Habitat	$2,450/ha/year[16]	$991/acre/year
Water purification	$1,680/ha/year[17]	$679.87/acre/year
Recreation	$177/ha/year[18]	$72/acre/year
Storm Protection	$3,690/ha/year[19]	$1,493/acre/year

c. Coastal prairies Wetlands

Coastal prairies along the Texas Gulf Coast provide a variety of ecosystem services including gas regulation, water quality, and bird habitat. Once covering over 6.5 million acres of Texas land, prairies now occupy less than 1% of these lands, or only 65,000 acres (Baldwin et al., 2007).

i. Gas Regulation

Prairies have extensive root systems that can go as deep as 15 feet underground. With these systems, they are able to store carbon both in their roots and in the soil, as they grow and form new soil (Hale et al., 2014). Studies have shown that natural prairie and grassland ecosystems hold much more carbon in their soils than agricultural lands. On the other hand, the stored carbon can be released in the air if prairies are degraded or converted into agricultural land. One study estimated that in the United States, 5,000 million metric tons of carbon have been released into the air from the conversion of natural land to agricultural land (Hale et al., 2014). A previous study by Potter et al. (1999) found that restored grasslands could sequester 428 pounds of carbon (lbs. C) per acre per year, or 0.48 tons C/ha/year. Using the social cost of carbon, which puts a value of $40 per ton of carbon dioxide sequestered, this translates into $70/ha/year or $28.5/acre/year (2014 US$). Another study by Sims and Bradford (2001) found that native prairie grass could sequester on average 623 lbs. C per acre per year, which translates to $103/ha/year or $41.48/acre/year (2014 US$) using the same method.

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[18] Mendoza-González, G., Martínez, M.L., Lithgow, D., Pérez-Maqueo, O., Simonin, P., 2012. Land use change and its effects on the value of ecosystem services along the coast of the Gulf of Mexico. Ecological Economics 82, 23–32.

[19] Valdez, V.C., Ruiz-Luna, A., Ghermandi, A., Nunes, P.A.L.D. 2013. Valuation of Ecosystem Services provided by coastal wetlands in northwest Mexico. Ocean & Coastal Management.

ii. Habitat

Prairies provide habitat to a variety of animals, including birds such as sparrows and flycatchers. The presence of vegetation provides nesting cover for these grassland birds. A study by Rudolph et al. (2014) conducted winter bird surveys to assess the link between restored prairies and bird population. They found over 30 different species of grassland birds and particularly grassland sparrow populations increased dramatically post-restoration. For this reason, coastal prairies attract birders from all over the country to view their unique assemblage of species. Additionally, they provide appealing, aesthetic views and their bird populations keep insect populations under control in the surrounding area.

iii. Water Quality

Prairies contribute to improved water quality by filtering and storing nutrients. Coastal prairies wetlands are significant sinks for nutrients such as inorganic nitrogen and phosphorus, and by capturing and controlling the release of these nutrients, coastal prairies wetlands help regulate and improve water quality. A study by Forbes et al. (2012) found that prairies retained 7.36 lbs./acre/year of incoming nitrogen and filtered a total of 0.54 lbs./acre/year of phosphorus. It is important to consider these important prairie wetlands because without them, significantly higher levels of nutrients would reach the bays and affect recreational and commercial activities that depend on healthy bay ecosystems (Enwright et al., 2011). Prairie tallgrass can also store and cycle nutrients in plant biomass and in the soil. A study by Risser et al. (1982) found that prairie grasses could remove 22 lbs./acre/year of nitrogen through the shoot and root system of the prairie grass, and then transfer it to the soil.

Table 5: *Potential ecosystem services values provided by prairie wetlands restoration and conservation*

Ecosystem Services	US$ 2012	US$ 2012
Carbon Sequestration	\$70 - \$103/ha/year (2014 US\$)[20,21,22] \$68 - \$100/ha/year (2012 \$)	\$28.5 -\$41.49/acre/year (US\$ 2014) \$27.6 - \$40.2/acre/year (2012 \$)

d. Hardwood bottomland forest wetlands

Texas bottomland hardwood forests are vast areas of riparian and coastal forests along the central coast of Texas that provide important benefits to coastal populations, despite being under continuous threat due to fragmentation, agricultural development, and urban expansion. Bottomlands went from 700,000

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acres to about 150,000 acres from 1997 to 20013 (USFWS, 1997; Carver, 2013). This unique system is composed of freshwater flow from the upstream rivers, bayous, sloughs, wetlands, banks, floodplains, and diverse hardwood forest. Some of the ecosystem services provided by these forests include provision of raw materials and water supply, protection against storms, water quality, carbon sequestration, recreational and aesthetic opportunities, and provision of habitat.

i. Storm protection

Hardwood forests have the ability to retain significant amounts of water, which in a severe storm surge flooding event can be very beneficial as these forests are able to buffer and mitigate storm surge that would otherwise flood neighboring areas and create significant damage. Hardwood forests are also found along rivers and their floodplains, which makes them an important resource in absorbing flood waters and overbank flow from rivers. This ability of retaining water for long periods of time and then slowly releasing it into the Gulf is also responsible for maintaining balanced estuaries, salt water marshes, and other wetlands that also provide storm protection services (Hale et al., 2014).

ii. Water Quality

Harwood forests are able to retain and filter nutrients such as nitrogen and phosphorous and other pollutants that when in excess, degrade the water quality. Thus, by keeping the levels of nutrients and non-nutrient compounds balanced, forested wetlands provide an important service essential for the wellbeing of all living things in any ecosystem. One study on riparian forests in Georgia found denitrification rates that ranged between 1.2 lbs. N/acre/year, 27.6 lbs. N/acre/year and 263 lbs. N/acre/year, depending on nitrate and carbon loads in the area. The difference in rates showed that riparian forests exposed to higher levels of nutrient pollution will have a higher retention rate than those subject to lower loads (Hale et al., 2014).

iii. Carbon Sequestration

The tree composition of the bottomlands in Texas is very unique and there is a lack of carbon data for this type of forest (Sugarberry, American elm, and Green ash). Nonetheless, bottomland forests store large amounts of carbon in their trees and soils and sequester high rates of carbon each year through vegetation growth and soil formation. A study estimated that bottomlands can accumulate carbon at a rate of 2,086 lbs. C/acre/year, or 1.04 tons C/acre/year (Hale et al., 2014).

iv. Habitat and Recreational Opportunities

Every year, neotropical songbirds migrate from Central and South America to North America. Bottomlands provide food, shelter, water, and a resting place for millions of these birds (Hale et al., 2014). As a consequence, these forests attract thousands of wildlife viewers and birders. In addition to migrating birds, these forest are also home to many resident birds that spend all year in this habitat. Waterfowl are also residents and some areas of the bottomlands are open to duck hunting, providing important economic and recreational opportunities (Hale et al., 2014). In 2011, birding generated 666,000 jobs and $31 million in employment income and $6 billion in State tax revenue, showing that bottomland forests can have significant economic impact in the state (Carver, 2013).

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Project Alternatives Economic Impact Analysis

Project Alternatives Economic Impact Analysis

The economic impact analysis of different project alternatives was conducted and is presented below. This analysis was performed using IMPLAN© (Impact Analysis for PLANning), a software program that traces spending by a project or program through the economy in a given time period. The cumulative effects of the specific projects are estimated monetarily and are short-term in duration. The estimated impacts begin with the start of the project and end with its completion, thus not accounting for any activity that may occur once the project is completed.

Results show *direct effects*, *indirect effects*, and *induced effects*. Direct effects represent the impacts for the expenditures specified as direct final demand changes. Indirect effects are the impacts caused by industries purchasing from industries as a result of the direct final demand changes. Induced effects include all the impacts on all local industries caused by the expenditures of new household income generated by the direct and indirect effects of direct final demand changes. Value-added, as seen in some of the tables below, include employee compensation, proprietary income (payments received by self-employed individuals as income), other property type income (payments to individuals in the form of rents, royalties, dividends), and indirect business taxes. Lastly, the total output is provided in dollars and represents the value of an industry's total production.

Assumptions that were made in order to execute the model include the following:

1. Each county in which the construction occurs has the employment capacity to satisfy all direct labor requirements.

The State of Texas captures the total effects of construction spending, including direct, indirect, and induced effects. The five different project alternatives include:

1. **Barrier Island Restoration**
2. **Beach Nourishment and Dune Restoration**
3. **Marsh Restoration and Shoreline Protection**
4. **Oyster Reef Restoration**
5. **Rookery Island Restoration**

1. Barrier Island Restoration

Project #320- GIWW Barrier Island Restoration, Old River and Hickory Cove

Project type: Habitat Creation and Shoreline Stabilization
Description: 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.
Region: 1
County: Orange
Cost of the project: $8,373,374
Multiplier effect in the county: 1.33
Total multiplier effect in the whole State: 1.73

IMPLAN Analysis Summary

The completion of project #320 generates a total output of $8.47 million to Orange County (Table 1). For every dollar spent on this project in Orange County, $1.33 are generated in the county's economy. These results are based on the assumption that the county has the necessary skillset to satisfy the requirements for the construction of the project. However, because not all materials and services needed to complete this project can or will be purchased in the county, we have analyzed the impact the project can have in other parts of the state. To do this, we conducted a multi-region analysis with Orange County being the main study region and the second region being the State of Texas (excluding Orange County). Thus, in addition to the $8.47 million generated in Orange County, an added $2.59 million are generated in the state (Table 3), which adds up to a total of $11.2 million (Table 5). This means that overall, for every dollar spent on project #320, $1.73 are generated in the state (Orange County included). There are also approximately 76 jobs (full- and part-time jobs) created and/or supported (Table 5). The top ten industries impacted by project #320 can be found in tables 2 and 4. Lastly, since it is assumed that Orange County has the capacity to provide what is needed to complete the project, the direct impacts are only accrued to Orange County and not to the rest of the state (Table 3).

Table 1: Economic Impact to Orange County

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	44.1	$2,207,711	$2,756,769	$6,377,208
Indirect Effect	10.9	$413,368	$671,333	$1,159,635
Induced Effect	7.9	$241,886	$551,409	$935,713
Total Effect	63	$2,862,964	$3,979,510	$8,472,556

Table 2: Top Ten Industries impacted in Orange County

Sector	Description	Employment	Labor Income	Value Added	Output
58	Construction of other new nonresidential structures	23.8	$1,454,055	$1,809,601	$4,293,615
449	Architectural, engineering, and related services	7.5	$425,201	$361,922	$819,711
395	Wholesale trade	2.6	$144,500	$369,251	$569,021
62	Maintenance and repair construction of nonresidential structures	1.8	$108,009	$132,286	$343,419
414	Scenic and sightseeing transportation and support activities for transportation	3.4	$25,608	$66,666	$330,279

462	Office administrative services	7.2	$160,490	$182,639	$329,508
441	Owner-occupied dwellings	0	$0	$172,515	$243,428
433	Monetary authorities and depository credit intermediation	0.6	$29,058	$60,005	$109,095
440	Real estate	0.8	$4,670	$76,012	$108,654
445	Commercial and industrial machinery and equipment rental and leasing	0.2	$27,657	$62,423	$80,385

Table 3: Economic Impact to the State (in addition to Orange County)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	0	$0	$0	$0
Indirect Effect	8.2	$565,543	$950,895	$1,899,849
Induced Effect	4.5	$225,411	$384,029	$690,991
Total Effect	12.7	$790,954	$1,334,924	$2,590,839

Table 4: Top Ten Industries Impacted in the State (in addition to Orange County)

Sector	Description	Employment	Labor Income	Value Added	Output
395	Wholesale trade	1.1	$101,034	$193,043	$273,342
156	Petroleum refineries	0	$8,427	$52,523	$222,530
20	Extraction of natural gas and crude petroleum	0.1	$30,383	$74,459	$96,991
449	Architectural, engineering, and related services	0.5	$49,149	$44,824	$76,280
411	Truck transportation	0.4	$24,330	$27,253	$62,006
440	Real estate	0.4	$9,663	$45,109	$61,506
441	Owner-occupied dwellings	0	$0	$42,001	$59,266
454	Management consulting services	0.4	$31,812	$32,272	$52,076
427	Wired telecommunications carriers	0.1	$8,438	$23,404	$44,872

49	Electric power transmission and distribution	0	$5,780	$11,738	$44,498

Table 5: Total Economic Impact of project #320 to the State of Texas

Impact Type	Employment	Labor Income	Value Added	Total Output
Direct Effect	44.1	$2,207,711	$2,756,769	$6,377,208
Indirect Effect	19.1	$978,911	$1,622,228	$3,059,484
Induced Effect	12.4	$467,297	$935,438	$1,626,704
Total Effect	75.7	$3,653,918	$5,314,434	$11,063,395

2. Beach Nourishment and Dune Restoration

Project #145 - Town of South Padre Island Gulf Shoreline
Project type: Beach Nourishment and Dune Restoration.
Description: This project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline.
Region: 4
County: Cameron
Cost of the project: $7,211,719
Multiplier effect in the county: 1.58
Total multiplier effect in the whole State: 1.98

IMPLAN Analysis Summary

The completion of project #145 generates a total output of approximately $11.4 million in Cameron County (Table 6). For every dollar spent on this project in the county, $1.58 are generated in the county's economy. In addition, since not all materials and services will be purchased in the county, we have analyzed the impact the project can have everywhere else in the state. Thus, in addition to the $11.4 million generated in Orange County, an added $2.87 million are generated in the state (Table 8), which adds up to a total of $14.25 million (Table 10). This means that overall, for every dollar spent on project #145, $1.98 are generated in the state's economy. There are also approximately 104 jobs (full- and part-time jobs) created and/or supported (Table 10). The top ten industries impacted by project #145 can be found in tables 7 and 9.

Table 6: Economic Impact to Cameron County

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	53.5	$1,672,936	$2,305,232	$7,208,811
Indirect Effect	23	$608,251	$1,343,713	$2,530,958

Induced Effect	14.9	$466,908	$904,611	$1,633,535
Total Effect	91.3	$2,748,094	$4,553,556	$11,373,305

Table 7: Top Ten Industries Impacted in Cameron County

Sector	Description	Employment	Labor Income	Value Added	Output
58	Construction of other new nonresidential structures	40.2	$1,238,427	$1,838,738	$6,013,402
395	Wholesale trade	2.5	$99,944	$313,761	$505,142
449	Architectural, engineering, and related services	4.9	$201,105	$159,571	$459,404
414	Scenic and sightseeing transportation and support activities for transportation	2.8	$78,214	$112,437	$333,216
62	Maintenance and repair construction of nonresidential structures	2	$65,309	$91,245	$316,014
462	Office administrative services	5.5	$157,164	$174,053	$286,443
441	Owner-occupied dwellings	0	$0	$161,723	$228,201
440	Real estate	1.7	$13,023	$159,916	$227,202
407	Retail – Non-store retailers	2.2	$17,822	$96,931	$197,073
403	Retail - Clothing and clothing accessories stores	2.1	$31,387	$86,918	$154,580

Table 8: Economic Impact to the State (in addition to Cameron County)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	0	$0	$0	$0
Indirect Effect	7.7	$593,495	$1,013,011	$2,128,941
Induced Effect	4.8	$242,507	$416,690	$745,161
Total Effect	12.5	$836,003	$1,429,701	$2,874,102

Table 9: Top Ten Industries Impacted in the State (in addition to Cameron County)

Sector	Description	Employment	Labor Income	Value Added	Output
156	Petroleum refineries	0	$16,721	$104,213	$441,531
20	Extraction of natural gas and crude petroleum	0.2	$58,725	$143,816	$187,324
395	Wholesale trade	0.6	$59,444	$113,375	$160,435

449	Architectural, engineering, and related services	1.1	$102,920	$93,872	$159,673
454	Management consulting services	0.4	$39,784	$40,358	$65,084
441	Owner-occupied dwellings	0	$0	$44,364	$62,600
440	Real estate	0.4	$8,599	$39,968	$54,480
209	Other concrete product manufacturing	0.2	$11,589	$16,509	$45,845
464	Employment services	0.8	$28,793	$36,020	$43,874
437	Insurance carriers	0.1	$10,381	$18,342	$40,625

Table 10: Total Economic Impact of project #145 to the State

Impact Type	Employment	Labor Income	Value Added	Total Output
Direct Effect	53.5	$1,672,936	$2,305,232	$7,208,811
Indirect Effect	30.7	$1,201,746	$2,356,724	$4,659,899
Induced Effect	19.7	$709,415	$1,321,301	$2,378,696
Total Effect	103.8	$3,584,097	$5,983,257	$14,247,407

3. Marsh Restoration and Shoreline Protection

Project #380- Gordy Marsh Restoration & Shoreline Protection - Phase 1
Project type: Habitat creation and restoration
Description: This project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1,700 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.
Region: 1
County: Chambers
Cost of the project: $24,826,773
Multiplier effect in the county: 1.20
Total multiplier effect in the whole State: 1.61

IMPLAN Analysis Summary

The completion of project #380 generates a total output of approximately $28.66 million in Chambers County (Table 11). For every dollar spent on this project in the county, $1.20 are generated in the county's economy. In addition, we have analyzed the impact the project can have anywhere else in the state. Thus, in addition to the $28.66 million generated in Chambers County, an added $9.7 million are generated in the state (Table 13), which adds up to a total project impact of $38.8 million (Table 15). This means that overall, for every dollar spent on project #380, $1.61 are generated in the state's economy. There are also approximately 202 jobs (full- and part-time jobs) created and/or supported (Table 15). The top ten industries impacted by project #380 can be found in tables 12 and 14.

Table 11: Economic Impacts to Chambers County

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	120.8	$11,016,676	$12,471,802	$23,837,512
Indirect Effect	15.8	$780,038	$1,404,206	$2,294,761
Induced Effect	15.9	$544,121	$1,569,267	$2,525,471
Total Effect	152.5	$12,340,835	$15,445,275	$28,657,744

Table 12: Top 10 Industries Impacted in Chambers County

Sector	Description	Employment	Labor Income	Value Added	Output
58	Construction of other new nonresidential structures	96.2	$9,194,310	$10,631,160	$20,722,551
449	Architectural, engineering, and related services	10.6	$951,961	$862,362	$1,513,438
62	Maintenance and repair construction of nonresidential structures	4.4	$389,137	$447,592	$958,039
441	Owner-occupied dwellings	0	$0	$665,978	$939,734
462	Office administrative services	11.4	$648,783	$683,726	$919,981
440	Real estate	3.3	$136,044	$420,152	$552,761
395	Wholesale trade	2.3	$156,898	$355,761	$531,491
445	Commercial and industrial machinery and equipment rental and leasing	0.8	$58,072	$185,023	$249,936
411	Truck transportation	1.2	$47,262	$55,998	$160,010
502	Limited-service restaurants	2.3	$39,691	$72,456	$122,413

Table 13: Economic Impact to the State (in addition to Chambers County)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	0	$0	$0	$0
Indirect Effect	31.9	$2,154,931	$3,634,234	$7,186,827
Induced Effect	17.4	$850,667	$1,439,102	$2,559,853
Total Effect	49.3	$3,005,598	$5,073,336	$9,746,680

Table 14: Top 10 Industries Impacted in the State (in addition to Chambers County)

Sector	Description	Employment	Labor Income	Value Added	Output
395	Wholesale trade	3.9	$367,472	$702,238	$994,404
156	Petroleum refineries	0.1	$36,785	$229,269	$971,366
20	Extraction of natural gas and crude petroleum	0.5	$129,412	$317,106	$413,063
449	Architectural, engineering, and related services	2	$195,524	$178,305	$303,531
411	Truck transportation	1.5	$96,216	$107,774	$245,159
441	Owner-occupied dwellings	0	$0	$159,628	$225,244
440	Real estate	1.5	$34,679	$162,165	$221,135
209	Other concrete product manufacturing	1	$47,589	$67,820	$188,454
464	Employment services	3.2	$108,065	$135,332	$164,956
454	Management consulting services	1.1	$95,565	$96,948	$156,472

Table 15: Total Economic Impact of Project #380 to the State of Texas

Impact Type	Employment	Labor Income	Value Added	Total Output
Direct Effect	120.8	$11,016,676	$12,471,802	$23,837,512
Indirect Effect	47.7	$2,934,969	$5,038,440	$9,481,588
Induced Effect	33.3	$1,394,788	$3,008,369	$5,085,324
Total Effect	201.8	$15,346,433	$20,518,611	$38,404,424

4. Oyster Reef Restoration and Shoreline Stabilization

Project #19- East Galveston Bay Ecosystem Oyster Reefs
Project type: Habitat creation and restoration and shoreline stabilization
Description: 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.
Region: 1
County: Galveston
Cost of the project: $15,043,640
Multiplier effect in the county: 1.50
Total multiplier effect in the whole State: 1.97

IMPLAN Analysis Summary

The completion of project #19 generates a total output of approximately $14.7 million in Galveston County (Table 16). For every dollar spent on this project in the county, $1.50 are generated in the local economy. In addition, we have analyzed the impact the project can have anywhere else in the state and found that besides the $28.66 million generated in Galveston County, an added $4.6 million is generated in the state (Table 18), which adds up to a total project impact of $19.3 million (Table 20). This means that overall, for every dollar spent on project #19, $1.97 are generated in the state's economy. There are also approximately 123 jobs (full- and part-time jobs) created and/or supported (Table 20). The top ten industries impacted by project #19 can be found in tables 17 and 19.

Table 16: Economic Impact to Galveston County

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	60.5	$3,773,865	$4,701,307	$9,808,866
Indirect Effect	19.9	$728,894	$1,349,264	$2,520,723
Induced Effect	19.2	$626,790	$1,347,677	$2,391,059
Total Effect	99.7	$5,129,549	$7,398,248	$14,720,647

Table 17: Top 10 Industries Impacted in Galveston County

Sector	Description	Employment	Labor Income	Value Added	Output
58	Construction of other new nonresidential structures	32.2	$2,162,207	$2,642,813	$6,003,687
395	Wholesale trade	5.6	$397,833	$875,510	$1,296,879
449	Architectural, engineering, and related services	10.5	$629,747	$540,913	$1,183,844
414	Scenic and sightseeing transportation and support activities for transportation	5.6	$180,401	$247,776	$682,925
62	Maintenance and repair construction of nonresidential structures	2.9	$202,569	$241,664	$582,135
462	Office administrative services	7.3	$405,693	$428,060	$579,183
441	Owner-occupied dwellings	0	$0	$310,138	$437,623
440	Real estate	2.9	$20,253	$276,153	$393,316
156	Petroleum refineries	0	$7,121	$79,161	$357,323
437	Insurance carriers	0.7	$48,463	$87,998	$198,537

Table 18: Economic Impact to the State (in addition to Galveston County)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	0	$0	$0	$0
Indirect Effect	14.1	$976,733	$1,615,215	$3,105,219
Induced Effect	9.4	$492,972	$841,022	$1,496,746
Total Effect	23.5	$1,469,705	$2,456,238	$4,601,964

Table 19: Top 10 Industries Impacted in the State (in addition to Galveston County)

Sector	Description	Employment	Labor Income	Value Added	Output
395	Wholesale trade	1.8	$169,806	$324,374	$459,267
20	Extraction of natural gas and crude petroleum	0.4	$102,637	$251,166	$327,124
411	Truck transportation	0.9	$57,647	$64,558	$146,713
441	Owner-occupied dwellings	0	$0	$77,648	$109,566
440	Real estate	0.7	$16,476	$76,446	$104,190
438	Insurance agencies, brokerages, and related activities	0.5	$32,943	$42,186	$92,174
156	Petroleum refineries	0	$3,687	$21,555	$90,424
62	Maintenance and repair construction of nonresidential structures	0.4	$30,086	$35,348	$81,219
449	Architectural, engineering, and related services	0.5	$48,060	$43,841	$74,524
427	Wired telecommunications carriers	0.1	$13,924	$38,602	$74,002

Table 20: Total Economic Impact of Project #19 to the State of Texas

Impact Type	Employment	Labor Income	Value Added	Total Output
Direct Effect	60.5	$3,773,865	$4,701,307	$9,808,866
Indirect Effect	34	$1,705,627	$2,964,479	$5,625,942
Induced Effect	28.6	$1,119,762	$2,188,699	$3,887,805
Total Effect	123.2	$6,599,254	$9,854,486	$19,322,611

5. Rookery Island Restoration and Shoreline Stabilization

Project #72- Long Reef Shoreline Stabilization and Habitat Protection
Project type: Habitat creation and restoration and shoreline stabilization
Description: 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.
Region: 3
County: Aransas

Cost of the project: $1,915,228
Multiplier effect in the county: 1.42
Total multiplier effect in the whole State: 1.88

IMPLAN Analysis Summary

The completion of project #72 generates a total output of approximately $2.7 million to Aransas County (Table 21). For every dollar spent in the county on this project, $1.42 are generated in the local economy. In addition, we have analyzed the impact the project can have anywhere else in the state and found that an additional $881,689 is generated (Table 23), adding up to a total project impact of $3.6 million (Table 25). This means that overall, for every dollar spent on project #72, $1.88 are generated in the state's economy. There are also approximately 24 jobs (full- and part-time jobs) created and/or supported (Table 25). The top ten industries impacted by project #72 can be found in tables 22 and 24.

Table 21: Economic Impacts to Aransas County

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	13	$545,498	$691,080	$1,894,875
Indirect Effect	4.6	$132,524	$265,409	$493,719
Induced Effect	2.6	$71,389	$174,348	$300,710
Total Effect	20.2	$749,411	$1,130,837	$2,689,305

Table 22: Top 10 Industries Impacted in Aransas County

Sector	Description	Employment	Labor Income	Value Added	Output
58	Construction of other new nonresidential structures	9.6	$387,844	$531,104	$1,528,826
449	Architectural, engineering, and related services	2	$75,158	$57,939	$182,176
395	Wholesale trade	0.6	$16,802	$67,535	$113,189
414	Scenic and sightseeing transportation and support activities for transportation	0.6	$32,778	$40,467	$90,355
62	Maintenance and repair construction of nonresidential structures	0.5	$19,972	$26,061	$78,910
440	Real estate	0.6	$5,954	$54,724	$77,100
462	Office administrative services	0.8	$53,137	$55,615	$72,446
441	Owner-occupied dwellings	0	$0	$43,260	$61,042
407	Retail – Non-store retailers	0.4	$3,621	$19,041	$38,557
411	Truck transportation	0.3	$5,359	$7,809	$37,058

Table 23: Economic Impact to the State (in addition to Aransas County)

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	0	$0	$0	$0
Indirect Effect	2.7	$183,924	$328,005	$662,678
Induced Effect	1.4	$70,820	$122,042	$219,011
Total Effect	4.2	$254,744	$450,047	$881,689

Table 24: Top Ten Industries Impacted in the State (in addition to Aransas County)

Sector	Description	Employment	Labor Income	Value Added	Output
156	Petroleum refineries	0	$4,024	$25,079	$106,256
395	Wholesale trade	0.2	$18,978	$36,264	$51,351
20	Extraction of natural gas and crude petroleum	0.1	$14,157	$34,697	$45,198
445	Commercial and industrial machinery and equipment rental and leasing	0.1	$9,052	$23,216	$30,500
449	Architectural, engineering, and related services	0.2	$16,020	$14,609	$24,866
209	Other concrete product manufacturing	0.1	$4,915	$7,004	$19,463
441	Owner-occupied dwellings	0	$0	$13,531	$19,093
49	Electric power transmission and distribution	0	$2,464	$5,005	$18,977
440	Real estate	0.1	$2,871	$13,405	$18,278
437	Insurance carriers	0.1	$4,659	$8,232	$18,237

Table 25: Total Economic Impact of Project #72 to the State of Texas

Impact Type	Employment	Labor Income	Value Added	Total Output
Direct Effect	13	$545,498	$691,080	$1,894,875
Indirect Effect	7.3	$316,448	$593,414	$1,156,397
Induced Effect	4	$142,209	$296,390	$519,721
Total Effect	24.4	$1,004,155	$1,580,884	$3,570,994

Appendix E. Regional Physical & Risk Assessments

Physical and Risk Assessment Results

Given the scope and schedule of the planning process, a desktop assessment was used in place of detailed project modeling to assess how implemented projects would respond and interact in the coastal system. Each region (and its applicable Resiliency Strategies) was evaluated based on primary vulnerabilities and projects under consideration. Salt Bayou and the Bahia Grande (Regions 1 and 4, respectively) were evaluated as individual systems due to their overall size and specific needs.

Region 1 Results

Region 1 Contents

A. Restoration of Beaches and Dunes

I. What vulnerability was assessed and what are the risks?

The erosion of beaches adversely impacts the resilience of ecological systems in the Gulf. Eroded beach and dune structures and systems, many of which have been removed or altered due to navigation or tourism, cannot effectively serve as storm surge defenses. Such systems permit saltwater intrusion into inland coastal habitats, further reducing vegetative buffers that would otherwise function as wave dissipaters during extreme weather events. In addition, the loss of sediment on beaches has negative impacts on the tourism industry, particularly on Galveston and South Padre Islands.

The Texas coast is characterized by a general lack of beach-quality sand sources in terms of grain size and minerology. As placement areas reach capacity, however, USACE and private entities may be willing to sell sand from maintenance dredging activities to the State for beach restoration purposes. For instance, in 2015, USACE worked with the Galveston Island Park Board to bring high quality dredged materials from the Houston Ship Channel for use as beach nourishment.

Within Region 1, there are several areas that have exhibited severe erosion per the shoreline change rates from the Bureau of Economic Geology at the University of Texas:

1. Between the Brazos River Entrance and Quintana, the erosion rate is generally high, and goes up to about 6.5 m/year of retreat using the rates from 1930s to 2012 (Figure 1);
2. On the south side of Follets Island, the community of Surfside has experienced significant and persistent erosion;
3. Areas on the north side of Follets Island are extremely erosive, with rates near the Treasure Island community as high as 6.5 m/year (Figure 2);
4. Just west of the end of the Galveston Seawall, erosion can be as high as 2.5 m/year (Figure 3);
5. Near High Island, east of Bolivar Peninsula, erosion rates can be as high as 3 m/year (Figure 4); and

6. Further toward Jefferson Island, erosion is extremely severe. This area is treated separately in the context of the entire Salt Bayou complex, at the end of this section.[1]

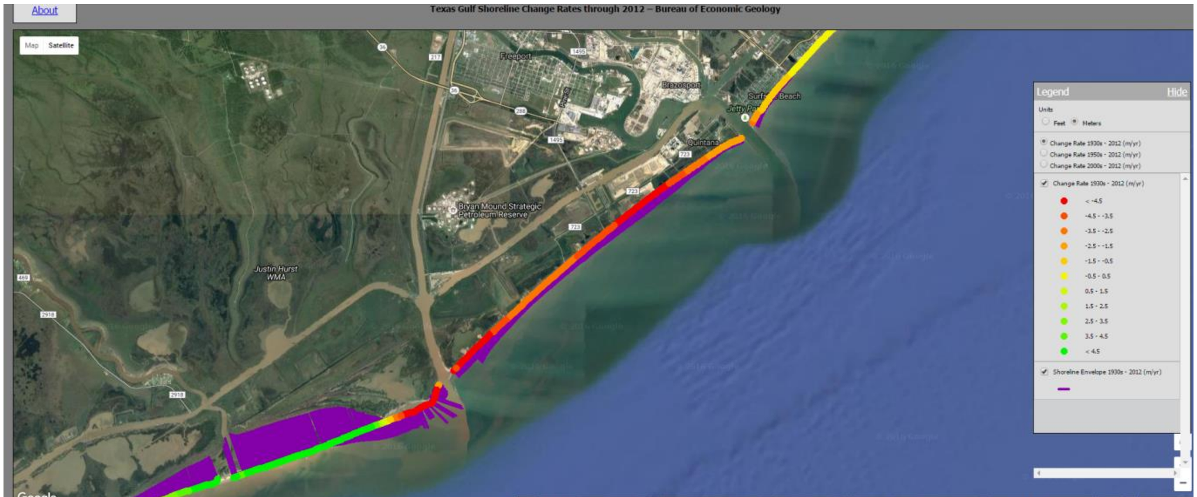


Figure 1. Shoreline Change Rates Between the Brazos River and Quintana from 1930 to 2012[1]

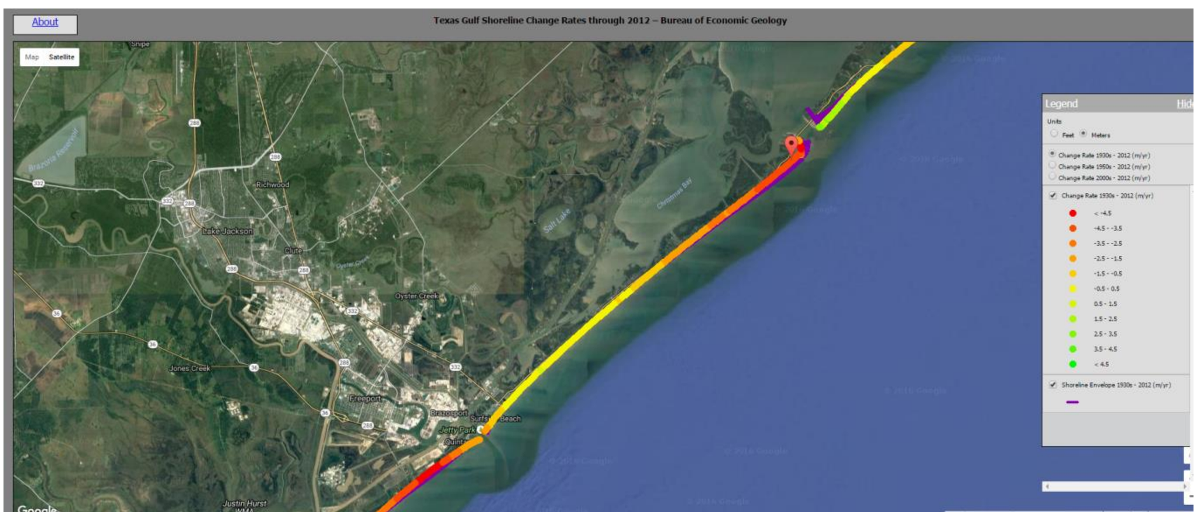


Figure 2. Shoreline Change Rates on Follets Island from 1930-2012[1]

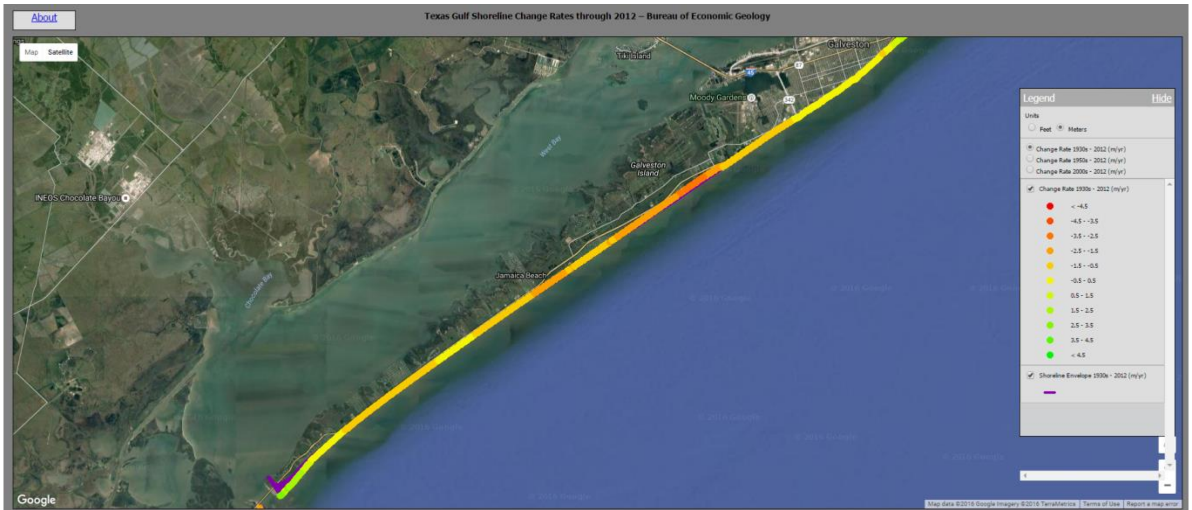


Figure 3. Shoreline Change Rates on Galveston Island West End from 1930-2012[1]

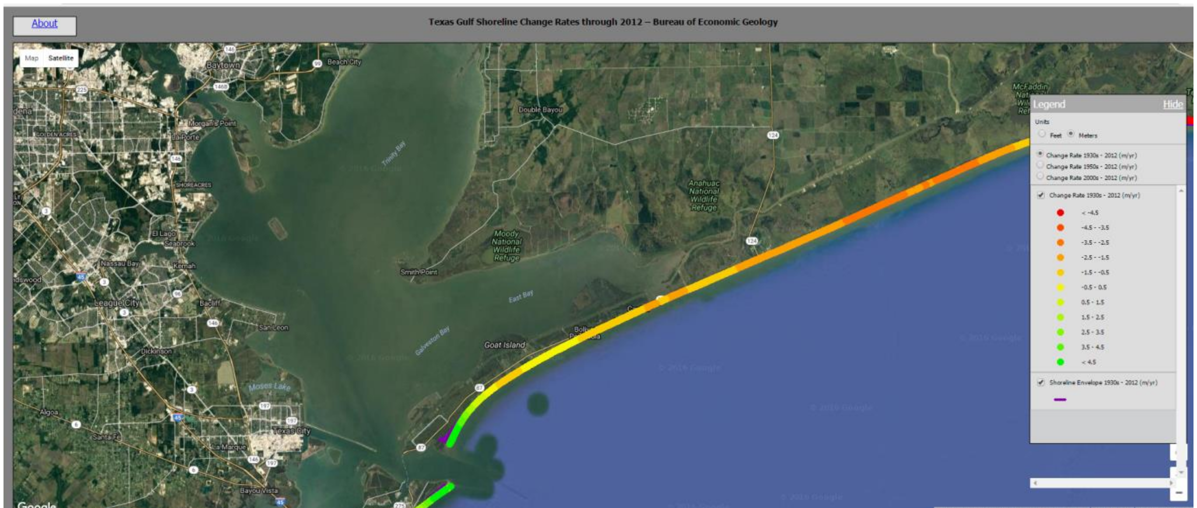


Figure 4. Shoreline Change Rates on Bolivar Peninsula from 1930-2012[1]

II. What are the Physics of the System that Drive this Vulnerability?

Along the Texas coast, a number of physical conditions affect the erosion of Gulf-facing beaches. These beaches typically undergo natural cycles of erosion and accretion due to prevailing forcing conditions (e.g., storms, waves, fluctuations in sediment supply). The Texas coast has, in general, been in a persistent state of erosion for many decades due to changes in sediment supply, changes to the natural littoral system on account of man-made infrastructure, and the effects of subsidence and sea level rise.

Within Region 1, littoral transport is primarily directed to the southwest. Historically, sediment sources have included migration of offshore sand deposits, as well as sediments from riverine deltas such as the Mississippi River delta. Waves in the area typically come in from the southeast, coinciding with dominant winds. Wave Information Studies (WIS) modelled waves were extracted along the region's coastline (Figure 5), and wave conditions were examined with respect to both wind generated waves (seas) and longer period waves (swells). The seas and swells from the model were differentiated using a frequency cutoff, and Figure 6 through Figure 8 show the resulting conditions for the five stations relevant for Region 1.

In Region 1, the three southern stations indicate that primary waves come from out of the southeast. Wind-generated seas come in from a slightly more southerly direction, and swells come in from a slightly more easterly direction. On the upper two stations, swell conditions tend to come in from more of a southerly direction, and wave climate is weaker.

The southern part of this region is subject to unique conditions. Near Surfside and Quintana, the natural source of sediment from the Brazos River has been diverted southward, thereby starving these areas of sediment. In addition, the jetties here may be causing localized erosion problems near Surfside. The jetties also impede sediment from bypassing of the channel in both directions, and the shoal offshore of the jetties ends up as a sink for much of the natural sand transport in the area.

Figure 5. Location of WIS Stations Relevant to Region 1[2]

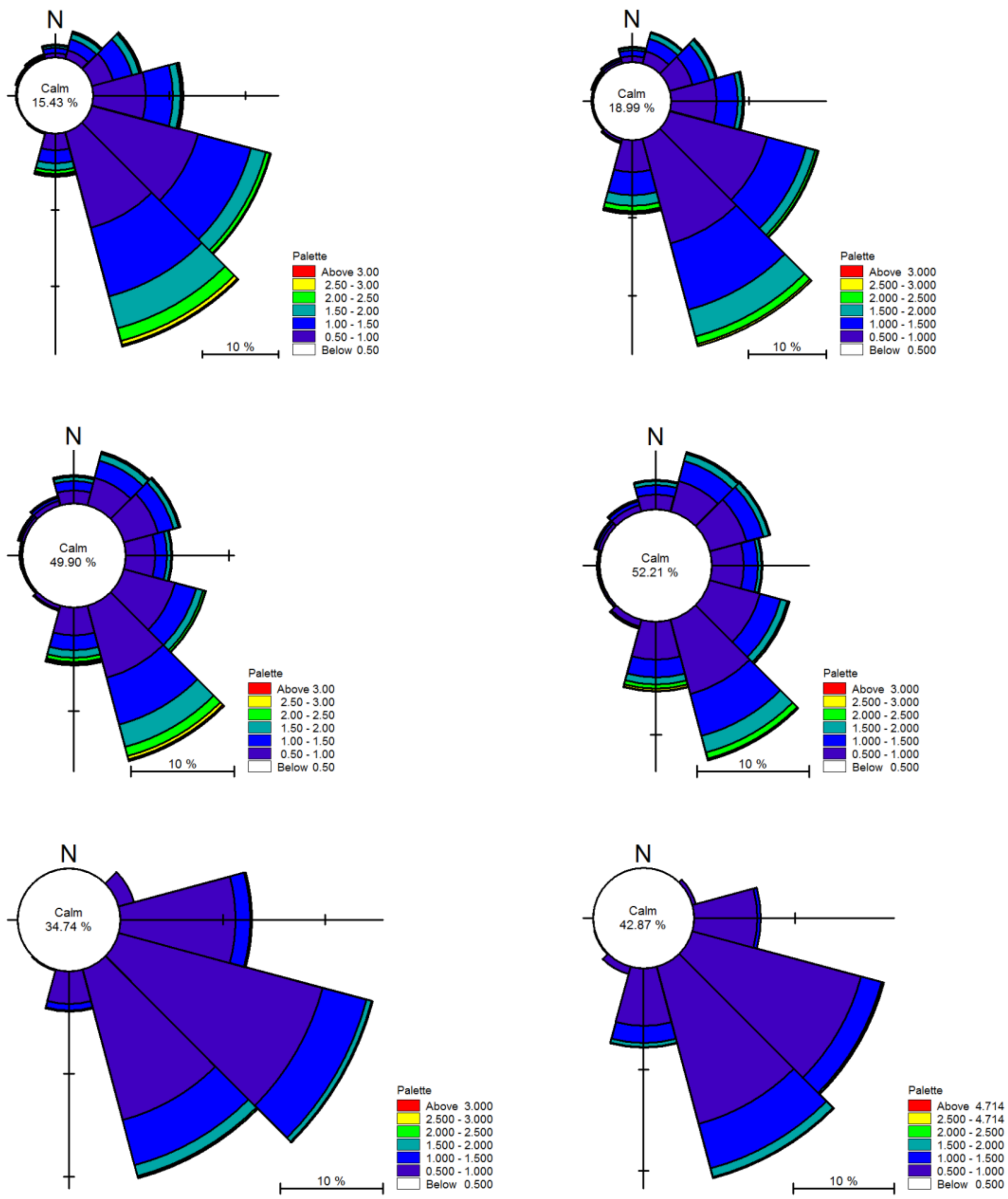


Figure 6. Wave Conditions for WIS Stations 73049 (left) and 73059 (right); Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom)[2]

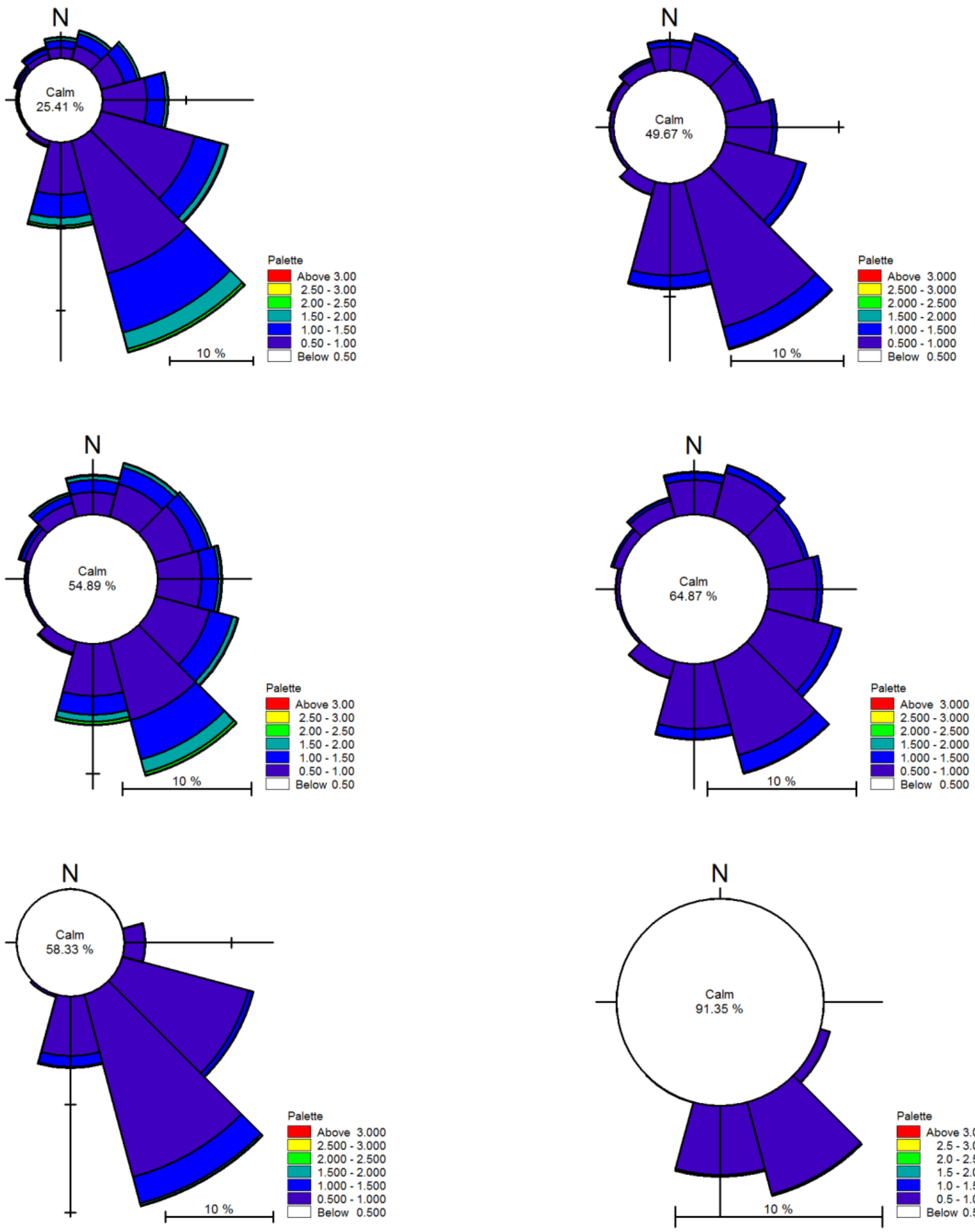


Figure 7. Wave Conditions for WIS Stations 73067 (left) and 73077 (right); Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom) [2]

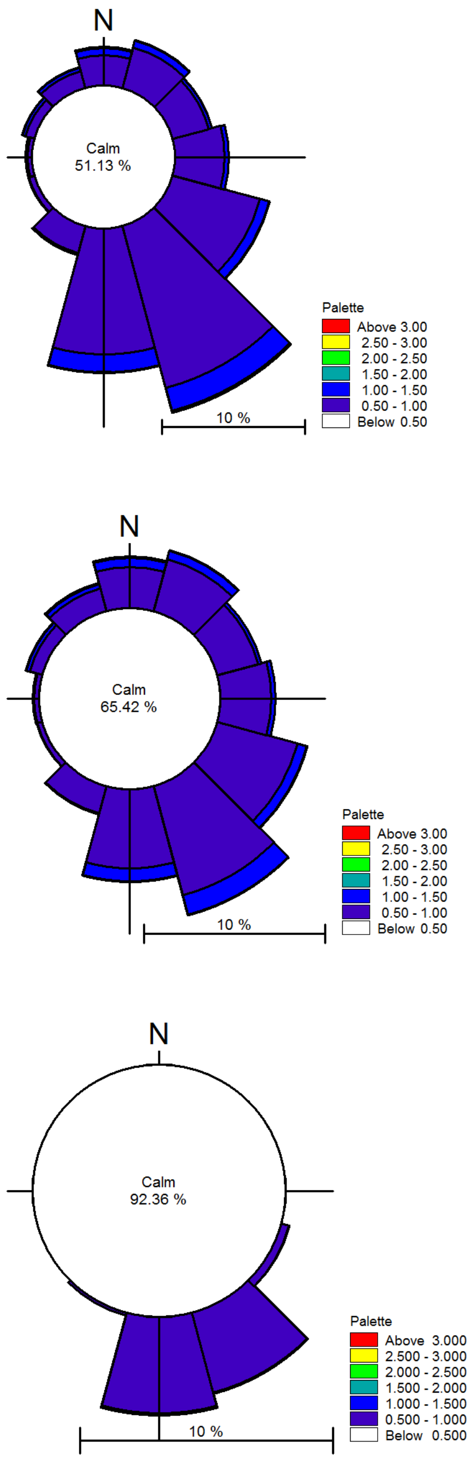


Figure 8. Wave Conditions for WIS Station 43088; Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom) 2

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Within Region 1, numerous projects address this vulnerability; most are a combination of dune and beach nourishment. Table 1 and 2 describe the projects related to the Gulf beaches in Region 1. The project number given in these tables are the unique project identification for each proposed project used throughout this Report. The project descriptions are the original project descriptions documented.

Table 1. Proposed Projects for Follets Island and Bolivar Peninsula

Project Number	Project Name	Project Description
Follet's Island		
112	Treasure Island Nourishment Project	The project focuses on developing alternatives for a beach nourishment project in the vicinity of the revetment and fishing pier area to widen the beach and provide a buffer to reduce storm impacts to the existing shoreline.
132	Village of Surfside Beach Nourishment and Dune Restoration	The project includes approximately 4 miles of beach nourishment and dune restoration along the Gulf shoreline of the Village of Surfside Beach.
308	Dune Restoration and Beach Nourishment, San Luis Pass to Surfside	This measure would restore approximately 10.2 miles of shoreline in Brazoria County. The areas protected by the shoreline would include the narrow barrier peninsula of Follet's Island and its extensive bayside marsh system, the community of Treasure Island, and other scattered residential developments. Follets Island also protects a series of extremely productive bays (Bastrop, Christmas, and Drum Bays) and the Brazoria National Wildlife Refuge.
309	Dune Restoration and Beach Nourishment, Surfside to Brazos River	This measure would restore approximately 1.9 miles of shoreline extending eastward from the Freeport East Jetty. The area protected by the shoreline is the City of Surfside.
318	Groin at State Highway 332	This measure would construct a groin extending into the Gulf at State Highway 332, in conjunction with the placement of beach nourishment, to keep the sediment in the system near eroding portions of Surfside Beach. This measure would only be implemented in conjunction with Project 309, "Dune Restoration and Beach Nourishment, Surfside to Brazos River" in order to retain the sediment placed as part of those efforts.
315	Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel	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.
133	Gulf Shoreline from Quintana Beach to FM 1495	The project involves approximately 2.75 miles of beach nourishment and dune restoration from Quintana Beach to FM 1495. The project area will include critical areas such as South Lake Drive, the dune system west of Cortez Drive, and an overwash area between 16th and 8th Streets.
Bolivar Peninsula		
252	Bolivar Beach and Dune Restoration	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.
305	Dune Restoration and Beach Nourishment, High Island to Galveston East Jetty	This measure would restore approximately 25.4 miles of shoreline in Galveston County. The area protected by the shoreline includes the entire Bolivar Peninsula and several beach communities such as Gilchrist, Crystal Beach, and Port Bolivar.

Table 2. Proposed Projects for Galveston Island and Quintana Area

Galveston Island		
307	Dune Restoration and Beach Nourishment, West Galveston Island	This measure would restore approximately 18.4 miles of Galveston Island west of the Galveston Seawall. The area protected by the shoreline includes the communities or neighborhoods of Pirates Beach, Jamaica Beach, the Silverleaf Seaside Resort, Vista Del Mar, Terramar, and Baywater.
314	Erosion Control Structures, West Galveston Island to San Luis Pass	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.
1052	West Galveston Island Repair and Beach Nourishment	This is based on a proposed Hurricane Ike repair project adjacent to four subdivisions on the far west end of Galveston Island between Jamaica Beach and San Luis Pass. The restoration of the beach to pre-storm condition will help to provide the necessary conditions for the development of a natural dune system.
9026	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	The project proposes to provide shoreline stabilization along the Gulf beach of Galveston's West End and the creation of a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road through natural transport.
9017	Continuous Dune System Creation on Galveston Island	This project proposes the creation of a continuous dune system with dune walkovers and restricted vehicle access on Galveston Island.
Quintana		
310	Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel	This measure would restore approximately 6.3 miles of shoreline. The area protected by this shoreline includes two popular recreation areas at Quintana and Bryan Beaches and several industrial facilities and placement areas.

IV. How does the project or grouping mitigate the vulnerability?

All of these projects add beach width and dune features to the coastal barrier island. For developed areas, these projects add new sand that can reduce or eliminate the erosion of the existing island. Effectiveness will vary based on project location.

Follets Island

Projects 132, 308, 309 and 318

On Follets Island, most of the projects focus on the Surfside area, immediately north of the jetties, and Treasure Beach, just south of San Luis Pass. Projects overlap in these locations; evaluations should focus on which project – or set of projects – is the most critical in terms of longevity, funding, and benefit. Figure 9 shows three overlapping nourishment projects near Surfside (i.e., 132, 308, 309). The groins proposed in Project 318 would only be constructed if paired with Project 309. Assuming that all projects are designed properly and renourished at appropriate intervals, they are likely to be successful in rebuilding beaches and providing additional protection from storm surge and other extreme weather events. All projects are expected to have greater benefits if paired with dune restoration efforts. Given the effect of the jetties on transport in the vicinity of Surfside, structural alternatives that either retain sediment or promote more natural bypassing of sediment may be beneficial.

Figure 9. Projects Near Surfside on Follets Island[3]

Projects 112, 308 and 315

Projects 308 and 315 extend the length of Follets Island, nourishing beaches along the entire island. In general, such large scale projects tend to be particularly effective , as they provide large quantities of sand that enhance system resiliency. A structural measure (e.g., groin) with a nourishment campaign, is proposed to retain the placed sediment on Follets Island. This is a possibility, but should be studied and carefully designed. These two projects overlap with Project 112, which entails a nourishment plan that addresses high erosion rates in the Treasure Beach area.

Texas A&M University-Galveston recently researched the morphodynamic response of Follets Island to Hurricane Ike, an effort that a yielded an understanding of the transport mechanisms of the hurricane and subsequent recovery.[4] Leveraging this work as project designs are tested and refined will enhance project effectiveness.

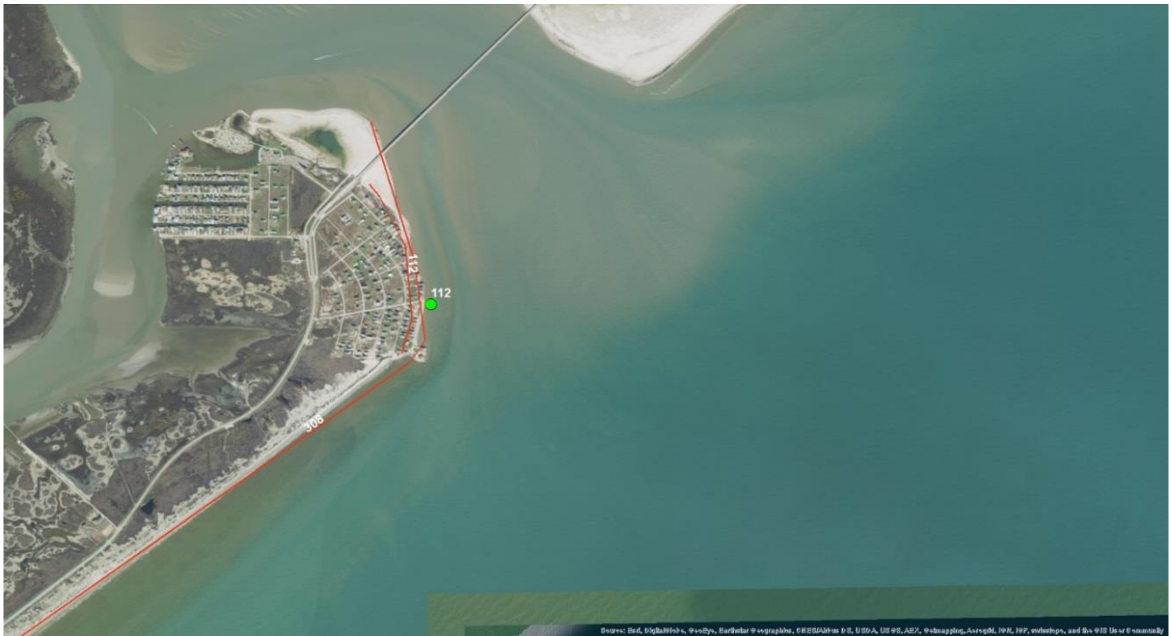


Figure 10. Projects Near Treasure Beach Area on Follets Island[3]

Bolivar Peninsula

Projects 252 and 305

The two projects proposed for Bolivar Peninsula address beach and dune erosion. Project 252 focuses on a limited area with high erosion rates, while Project 305 covers the entire peninsula. Both projects add beach width and dune features. Nourishment is likely to provide more benefit when combined with the construction of a healthy dune system.

Galveston Island

Projects for Galveston Island focus largely on the area west of the end of the Seawall and, as with other areas, these projects overlap in scope. There are a number of projects that span most of the west end of the island:

Projects 307, 314 and 9017

Project 9017 provides for a continuous dune system with walkovers and restricted vehicle access that runs the entire length of the West End from the Seawall to San Luis Pass. This is a particularly important area, as a continuous dune system provides significant protection for flood risk and also contributes to the sediment balance on barrier islands. The dune walkover and restricted vehicular access features are important for this type of project, as they preserve this continuous line of protection from extreme weather events.

Project 307 is also a large scale project involving dune restoration and beach nourishment from the Seawall to San Luis Pass. This project overlaps with Project 9017 in establishing a continuous dune system; pairing these projects will enhance the resiliency of the entire continuous dune system.

Project 314 is large as well, and provides for a structural measure (e.g., rock based groins) in conjunction with a nourishment campaign and sand fence. The goal of this project is to keep sand within the beach zone. As with any structural measure, planning and design must be considered carefully, as such measures can interrupt natural sediment movement. This may have adverse impacts under storm conditions or impact downdrift sites such as the already sediment-starved Follets Island.

Projects 1052 and 9026
Two additional projects are proposed for Galveston Island. The first, Project 9026, proposes the creation of a feeder beach between the Seawall and 8 Mile Road. Given the predominant littoral transport to the southwest, this beach will provide sediment to communities further west as it reaches equilibrium. This project is particularly promising in that it provides a sediment source to other areas on the island without the mobilization costs of a large scale nourishment campaign. In addition, this project provides for shoreline stabilization in the area just west of the Seawall; an area of high erosion. Development of an appropriate, well-researched design is essential, however, to ensure that the benefits of shoreline stabilization in one area are not negated by sediment deficits in another.

Figure 11. Projects Near the End of the Galveston Seawall[3]

Project 1052 proposes to restore the beach front adjacent to four subdivisions between Jamaica Beach and San Luis Pass. This project largely overlaps with the broader beach and dune projects for the West End (i.e., 307, 9017, 9026). While localized nourishment may provide immediate benefit to specific subdivisions, larger scale projects that result in the restoration and/or construction of a continuous dune line are more effective in achieving coastal resiliency.

Quintana Area
Projects 133 and 310
Two beach nourishment projects are proposed within the Quintana Area: Project 133 and Project 310 (Figure 12). The former covers the area adjacent to Quintana, while the latter covers the entire area from the Brazos River opening to Quintana.

Based on a comparison of shoreline change data, erosion rates from 2000-2010 indicate that erosional problems are most pronounced near the entrance to the Brazos River. Nearer to Quintana (Figure 13), a state of accretion has been noted in recent years. Therefore, Project 310 is more relevant in addressing critical issues.

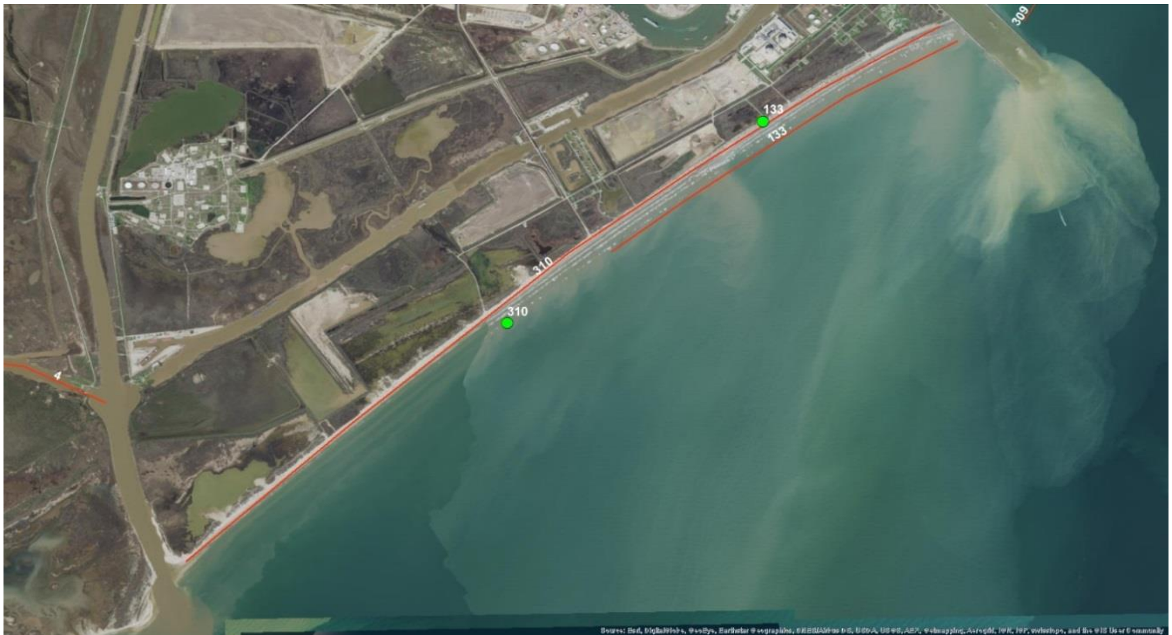


Figure 12. Projects Near Quintana[3]

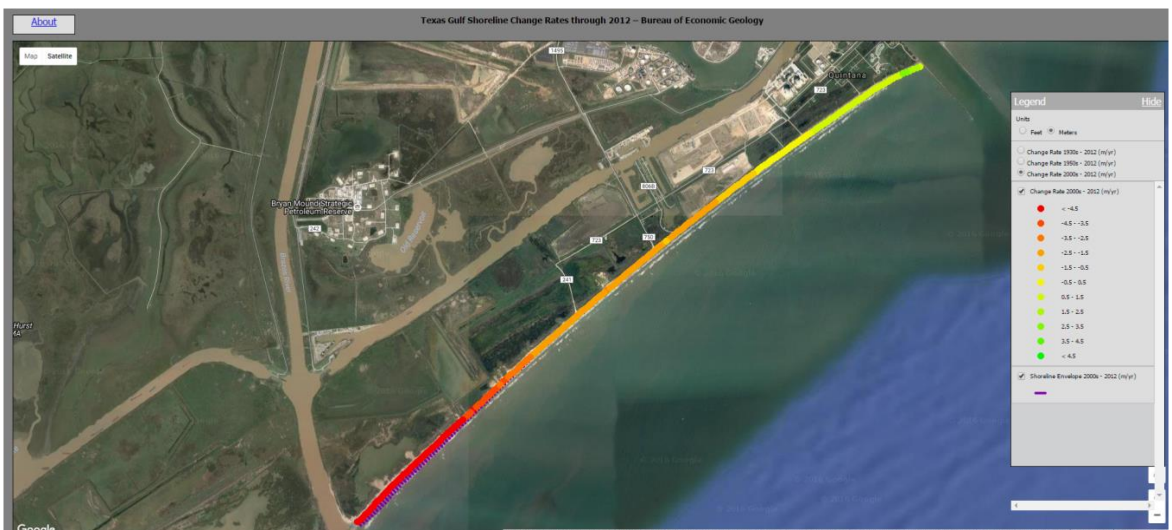


Figure 13. Shoreline Change Near Quintana from 2000-2012[1]

V. IS THE PROJECT OR GROUPING EFFECTIVE AT MITIGATING THE VULNERABILITY?

Nourishment is generally effective at enhancing beach width for the life of the project, recognizing that renourishment at regular (and sometimes frequent) intervals is required in most situations. An understanding of sand pathways, coupled with careful design, will maximize benefits. Further, as previously noted, large scale beach nourishment projects resulting in a continuous line of beach restoration over an extended area tend to be more effective than smaller, localized projects.

Dune construction provides valuable habitat, offers a degree of protection from the effects of extreme weather events and sea level rise, and can serve as a significant natural sediment source to the system, as in the case of overwash.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

Beach nourishment does not address the underlying cause of erosion along the northern Texas coast, which is largely a lack of sand supply. However, it is an effective mitigation alternative when maintenance requirements are reasonable. In some highly erosive areas, the frequency of renourishment may be prohibitive and, in those instances, structural alternatives may merit consideration if they can provide a more stable beach condition while avoiding adverse impacts.

VII. What are the recommendations for a resilient coastline?

Recommended beach nourishment projects are provided in the Plan, and will mitigate the vulnerabilities to developed areas, but will require continued maintenance to sustain their effectiveness. In those instances where structural measures warrant investigation, their impact on sediment conditions at a broader regional scale must be evaluated. A continuous dune line provides a valuable habitat and sand resource, along with a degree of protection from storm surge and other extreme weather events. Continuous dune lines are most resilient when planned with no breaks and when vehicular access is limited.

B. Bay Shoreline Stabilization and Estuarine Wetland Restoration

I. What vulnerability was assessed and what are the risks?

Coastal erosion and land loss in many of the Texas bay systems has intensified over the past several years, driven in part by increased vessel traffic in Texas navigation channels and attendant wake impacts. Degradation of vegetative buffer zones, reef structures, and barrier islands (due to coastal storms, relative sea level rise and human activity) also contribute to the problem. Shoreline erosion along the coast has major, negative implications for future projections of flooding and storm surge damages to coastal communities, with associated impacts on public safety, infrastructure, and habitat loss and degradation. When coupled with projections of sea level rise, these damages increase measurably.

Erosion along the Texas coast has contributed to marsh degradation and reductions in habitat diversity, as evidenced by loss of nursing and nesting grounds for birds, as well as loss of suitable fish spawning habitat. Large structures installed in bay systems (e.g., flood gates) can significantly alter sediment transport mechanisms, which, in turn, lead to marsh loss. If mitigation efforts are not pursued, the loss of marshes and habitat will continue, exacerbated by relative sea level rise and continued coastal development.

II. What are the physics of the system that drive this vulnerability?

Physical mechanisms driving shoreline erosion within Region 1 are generally related to one or more of the following:

- Ship wake from vessels;
- Localized wake due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise;

- Broader scale sediment starved barrier island system; and/or
- A change in sediment supply due to upstream modifications (e.g., dams).

Extreme weather events can destabilize shorelines in bay systems due to elevate water levels and wave action. However, once wetlands are compromised (i.e., fully inundated or flooded), wave action has less impact on sediment mobility than in un-inundated wetlands.

Vessel Induced Ship Wakes

Shipping channels in Region 1 include both deep and shallow draft navigation channels. The major deep draft channel is the Houston Ship Channel (Figure 14). The entrance to the channel is through Bolivar Roads at the northern end of the Galveston Island, and the channel crosses through Galveston Bay. Additional deep draft channels connect the main ship channel to Pelican Island, Bayport, Texas City, Barbours Cut and Anahuac.

The major shallow water draft channel through the region is the GIWW. Shoreline erosion due to barge navigation through the GIWW is of concern, and is addressed separate from Bay Shoreline vulnerabilities.

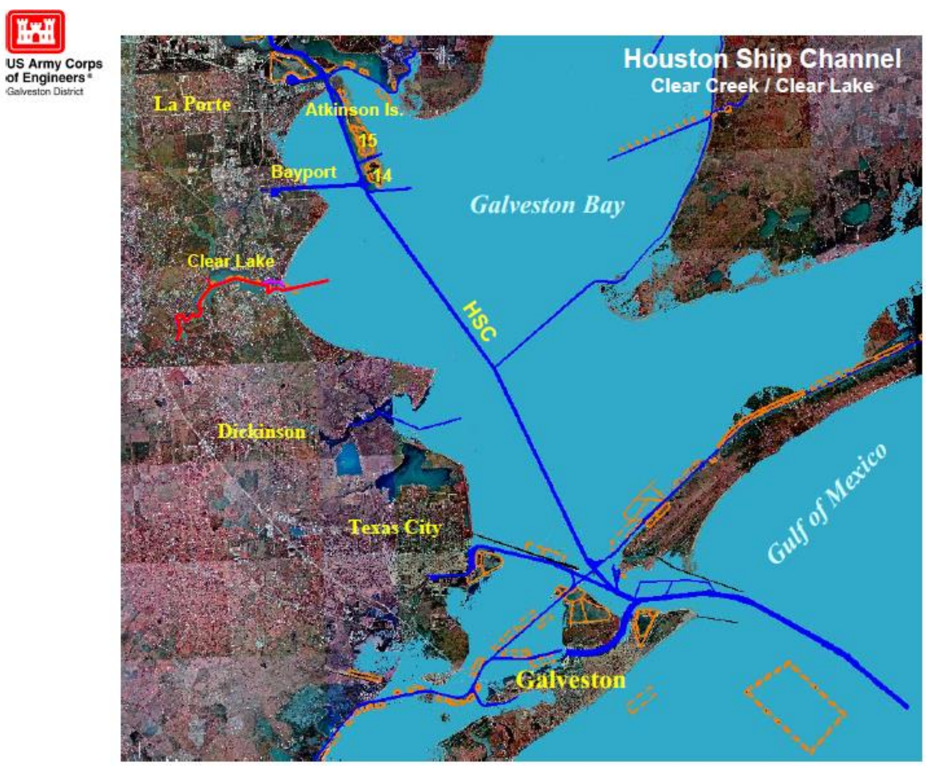


Figure 14. Houston Ship Channel and Other Deep Draft Channels[5]

Localized Wakes Due to Recreational Boating or Jet Skis

Localized shoreline erosion can occur where recreational boating and jet skiing activity is common; attendant wakes can have significant adverse impact on shorelines.

Structural Intervention Disrupting Sediment Transport

Structures such as groins or jetties can disrupt sediment transport and lead to areas with limited sediment supply and pockets of erosion. This is often attributed to Gulf-facing beaches, where littoral transport is evident, but can also be present in bayside shorelines as well. This is best assessed on a project-by-project basis.

Large Fetch and Natural Shoreline Migration

Shorelines are not static; they have cycles of migration responding to factors such as storms, changes in sediment supply, and natural variability in wave conditions. Some shorelines are in a natural state of flux between periods of erosion and accretion. However, disruption of the accretion process, due to factors such as interruptions in sediment supply and/or sea level rise, can place a system into a more continuous state of erosion.

Relative Sea Level Rise

Relative sea level rise is a function of two interacting factors: land subsidence and weather change-induced increases in sea level. Land subsidence is a problem along the entirety of the Texas coast. Subsidence is accepted to occur due to the withdrawal of groundwater and oil and gas. A state wide study of subsidence rates for the USGS and TWDB found that rates in the Houston-Galveston area are historically greater than 0.5 feet.[6] The most significant subsidence levels, between 8.5 and 9 feet, have occurred in the Pasadena-Houston Ship Channel. Subsidence greater than 15 feet was reported at the Moss Bluff Salt Dome area just east of the Trinity River. In the eastern part of Region 1, subsidence from 1918-1977 was generally less than 0.5 feet, but exceeded one foot in localized areas associated to oil, gas, or mining extractions.[6]

Combined with land subsidence, elevated sea levels due to global changes in climate patterns result in an increase to the mean sea level relative to its historic level. Given the relatively flat topography of the Texas coast, even a half a foot of additional relative sea level rise will cause significant land loss. In addition to direct effects, increased water depths adjacent to the shoreline allows for increased erosion from wave impacts.

Change in Sediment Supply

Rivers constitute one of the major sources to sediment supply in the inland coastal bays of Texas. These sources supply much of the sediment that balances natural erosion, and help to feed delta systems that supply shorelines via regional sediment transport. Upriver projects, such as dams, interrupt this natural supply mechanism and can lead to sediment-starved deltas. This causes direct loss of wetland habitat within the deltas and has an adverse impact on surrounding wetlands that depend on regional transport mechanisms. to continue to supply sediment.

Sediment supply can also be affected from the Gulf-facing side of barrier islands. Dune migration and wind weathering on the dunes supply sediment to the bay-facing beaches of barrier islands. As Gulf-facing beaches become increasingly sediment-starved, the impact is also experienced by the bay-facing beaches of the same islands. In Region 1, the Galveston Seawall fully interrupts these sediment transport mechanism.

III. What projects/groupings address this Vulnerability?

Tables 3 through 5 identify Region 1 projects that address Bay Shoreline Erosion issues. The projects are organized into four different sub-areas within Region 1, where projects are clustered and, in some cases, linked.

- In West Galveston Bay, there are 12 proposed projects related to Bay Shoreline Erosion (Figure 15). Eight of these projects (i.e., 344, 346, 348, 349, 350, 351, 352, 842) are similar and are discussed together. Project 15 and Project 801 are linked and are discussed together. Project 10 and Project 181 are discussed individually.
- In the Dickenson Bay/Moses Lake area, three recommended projects are proposed (i.e., 23, 131, 607), and are related to marsh restoration and shoreline stabilization (Figure 16).
- Along the Houston Ship Channel, near the San Jacinto Battlefield, all projects (i.e., 24, 25, 769) propose the beneficial use of dredged material to create or restore eroding lands; the vulnerabilities and solutions are similar and are treated together (Figure 17).
- Within East Bay, four projects (i.e., 27, 340, 341, 380) address Bay Shoreline Erosion (Figure 18). Projects 340 and 341 are similar and are discussed together.

Table 3 Projects Related to Bay Shoreline Erosion Vulnerability in West Galveston Bay

Project Number	Project Name	Project Description
West Galveston Bay		
10	Christmas Bay Marsh Restoration	This project involves the reestablishment of intertidal marsh to stabilize the north shoreline of Christmas Bay. Seagrasses could be reestablished in areas of suitable water depth. Seagrass habitat could be protected by ensuring high water quality and avoiding disturbances. Potential strategies include cleaning up dump sites, planting fringing marsh, restricting access to seagrass beds, and setting aside adjacent lands for conservation as a buffer zone.
15	Chocolate Bay Habitat Restoration and Protection	In the vicinity of the Chocolate Bayou Channel, several small islands were created from dredged material during original channel dredging and subsequent maintenance. Many of these islands are eroding and negatively impacting the bird habitats. This site is a potential candidate for the beneficial use of maintenance dredge material. There is interest in stabilizing the shoreline and providing habitat for wading birds and a variety of estuarine organisms. Potential strategies include raising the elevation of the northeastern shoreline along Chocolate Bay, constructing an artificial reef to serve as a wavebreak, and establishing a fringing marsh.
181	West Galveston Bay Living Shoreline	This project is one of the action items recommended in the West Galveston Bay Regional Sediment Management Plan. The objective is to develop pilot projects using the concept of living shorelines as shoreline protection as part of the restoration initiatives.
344	Marsh Restoration, Pierce Marsh, Galveston County	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.
346	Marsh Restoration, IH-45 Causeway, Galveston County	The proposed 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.
348	Marsh Restoration, Gangs to Oxen Bayou, Galveston County	The proposed project would restore 176 acres of marsh between Gangs and Oxen Bayous and would include a containment dike of 2.4 miles and bay shoreline protection 0.6 miles.
349	Marsh Restoration, Oxen to Mantzel Bayou, Galveston County	The project would restore 390 acres of marsh and include a 4.0 mile containment dike and bay shoreline protection of 1.3 miles.
350	Marsh Restoration, Dana Cove, Galveston County	The project would restore 213 acres of marsh and include a 3.75 mile containment dike, and 1.2 miles of bay shoreline protection.
351	Marsh Restoration, Jumbile Cove, Galveston County	This project will restore 316 acres of marsh and will include an 11.4 mile containment dike and 1.25 miles of shoreline protection.
352	Marsh Restoration, Bird Island to Maggies Cove, Galveston County	Would restore 467 acres of marsh, and include 7.5 miles of containment dike and 2. 1 miles of shoreline protection.
842	West Bay Estuarine Habitat Restoration and Protection Project	The proposed project will restore and protect estuarine marsh habitats including intertidal fringe marsh, salt flat marsh, sand flats, shallow water, and seagrass at 7 locations; Gang's Bayou, Starvation Cove, Dana/Carancahua Coves, Jumbile Cove, Bird Island Cove, and McAllis Point, in West Galveston Bay. The project will use dredged material to expand marsh areas, and will install and repair approximately 38,900 linear feet breakwaters to protect and enhance estuarine marsh and seagrass habitats.
801	West Galveston Bay Marsh Restoration Chocolate Bay	The project involves restoration of approximately 1,600 acres of intermediate marsh on the north side of West Galveston Bay between Halls and Chocolate Bayou's. The project will also include the placement of two large water control structures to drain the marsh and stabilize the project area with rock and other similar materials. This will allow the marsh to function as it did historically by restoring the hydrology to pre-GIWW conditions.

Table 4 Projects Related to Bay Shoreline Erosion Vulnerability in Dickinson Bayou/Moses Lake and the Houston Ship Channel

Dickinson Bayou/Moses Lake		
23	Dickinson Bay Habitat Restoration and Protection	The Dickinson Bayou Wetland Restoration Project proposes to restore emergent marsh topography and habitats to an area that has lost 36 acres of wetlands and transitional intertidal habitats to open water due to erosion and relative sea-level rise. The project will raise subtidal and marsh elevations through the beneficial use of dredge material. Additionally, a hydrologic restriction within the main channel of Dickinson Bayou will be removed to provide the material for the beneficial use activity and improve estuarine functions including hydrologic connectivity, salinity gradients, freshwater flows, and tidal prisms.
131	Galveston Bay Shoreline (Dickinson Bay to Virginia Point)	The project will restore approximately 200 acres of emergent wetlands along the Galveston Bay Shoreline from Dickinson Bay to Virginia Point.
607	Moses Lake Wetlands Restoration & Protection	The third phase of the Moses Lake Wetlands Restoration and Protection project seeks funding for construction of the preferred alternatives developed in the engineering, design, and permitting phase. The alternatives include construction of nearshore segmented breakwater structures in Moses Lake and placement of materials to restore elevations suitable to support emergent vegetation and upland coastal species.
Houston Ship Channel		
24	San Jacinto Battlefield Marsh Restoration	The project would involve restoration of marsh at the San Jacinto Monument as well as shoreline stabilization and beach nourishment through Beneficial Use of Dredged Material. Control of invasive species would also help enhance the habitat.
25	Burnet Bay Marsh Restoration	This project seeks to restore approximately 500 acres of marshes through use of BUDM. Strategies for marsh restoration include the construction of levees for shoreline protection, raising the site elevation with dredge material, and planting marsh vegetation.
769	San Jacinto North Shore Restoration	San Jacinto Battleground State Historic Site preserves 1100 acres of the battleground where Texas won independence from Mexico. This area has experienced the loss of roughly 200 acres of land, including riparian forests and wetlands, fringing wetlands, wet meadows, and marshes due to subsidence and erosion from ship wakes. The North Shore Restoration Project proposes to restore approximately 20 acres of uplands and tidally influenced wetlands using a combination of rock breakwaters, backfilling, marsh restoration, and planting. These efforts would also assist in the recovery of valuable parkland for public access, recreation, and interpretation.

Table 5 Projects related to Bay Shoreline Erosion Vulnerability in East Bay

East Bay		
27	East Bay North Shoreline (Smith Point to Anahuac NWR)	Shoreline erosion abatement projects, which combine restoration of emergent marshes with rock breakwater and/or oyster reef construction, are being implemented but the north shoreline (approximately 118,272 linear feet) of East Bay needs shoreline protection, immediately west of Oyster Bayou to Smith Point.
340	Marsh Restoration, Pepper Grove Cove, Galveston County	The project will restore 294 acres of marsh at Pepper Grove Cove with a containment dike of 4.0 miles and shoreline protection of 1.7 miles.
341	Marsh Restoration, Long Point Marsh, Galveston County	The project will restore 1,661 acres of emergent marsh with a containment dike of 13.2 miles and 9.6 miles of shoreline protection.
380	Gordy Marsh Restoration & Shoreline Protection - Phase 1	This project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1,700 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.

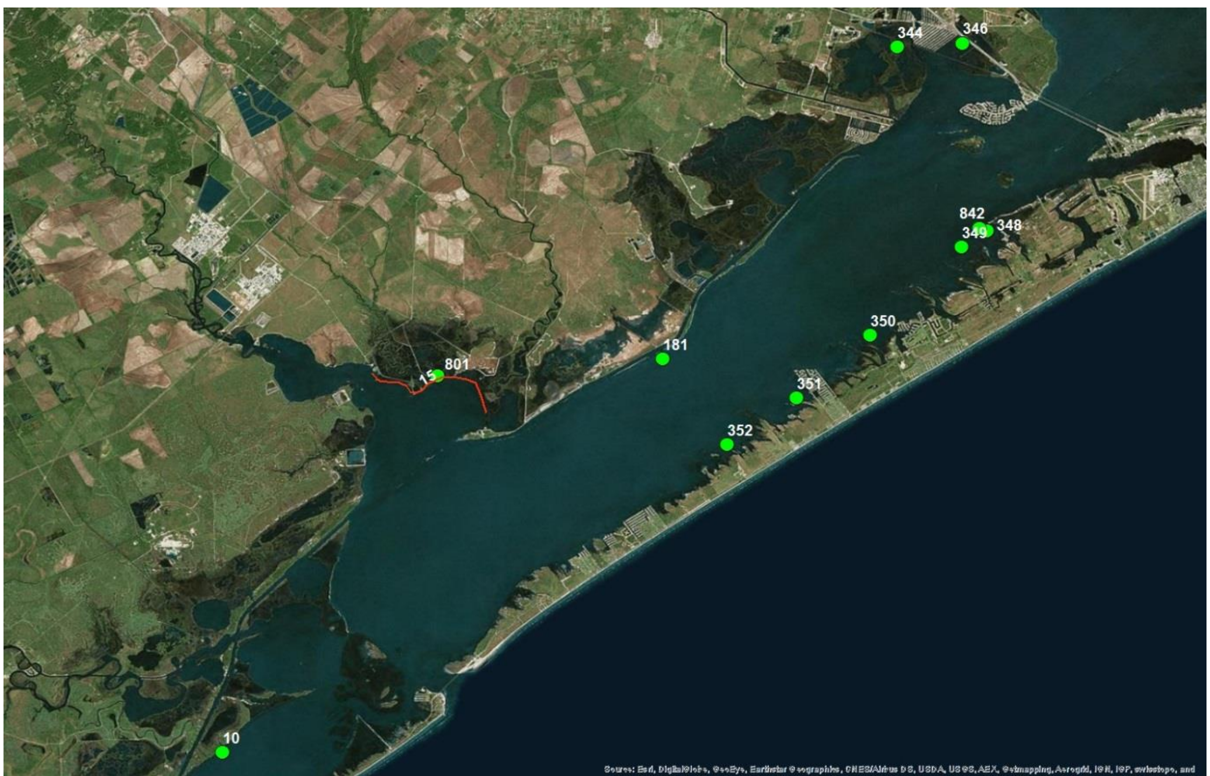


Figure 15. Bay Shoreline Erosion Projects for West Galveston Bay in Region 1[3]

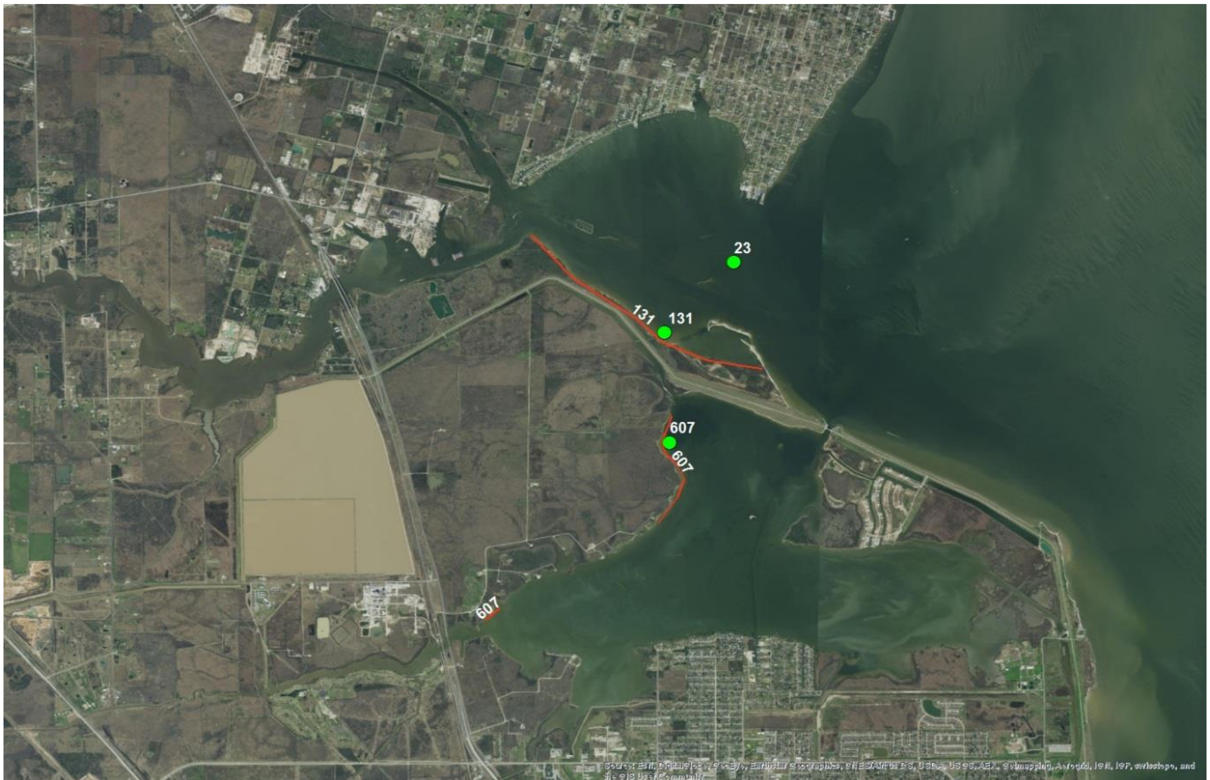


Figure 16. Bay Shoreline Erosion Projects for the Dickenson Bay/Moses Lake Area in Region 1[3]

Figure 17. Bay Shoreline Erosion Projects for the Houston Ship Channel Area Near the San Jacinto Battlefield in Region 1[3]

Figure 18. Bay Shoreline Erosion Projects for East Bay in Region 1[3]

IV. How does the project or grouping mitigate the Vulnerability?

West Galveston Bay

Projects 344, 346, 348, 349, 350, 351, 352 and 842

These projects all involve restoring estuarine wetland habitats including fringe marsh, salt flat marsh, sand flats, shallow water vegetation, and seagrasses. The projects propose beneficially using dredged materials to expand marsh areas, utilizing containment dikes to retain the dredged material, and implementing shoreline protection to mitigate erosion.

The estuarine wetlands in this area are primarily vulnerable to recreational boating, a lack of sediment supply for recovery, the effects of extreme weather events, and relative sea level rise. The natural fetch in West Galveston Bay is not very large in the cross direction, but fetch along the southwest/northeast axis is longer, and therefore larger. Sediment in wetland areas is easily mobilized, and even small waves can have a large impact on overall erosion potential, particularly as sea levels continue to rise. Additionally, human development along Galveston Island, combined with the sediment-starved nature of the shoreline, limits the quantity of sediment resulting from dune overwash during extreme weather events. Significant land area has been lost in West Galveston Bay over the years; Figure 19 shows the marsh area between Gangs Bayou and Starvation Cove from 1954 and 2015. The use of containment dikes to stabilize dredged materials and protect the shoreline will help to ensure that restored wetlands remain in place.

Figure 19. Estuarine Wetland Conditions in West Galveston Bay from 1854 (left) and 2015 (right)[7]

Project 10

This project restores estuarine wetland habitat (including seagrass) along the north shoreline of Christmas Bay to assist in stabilizing the shoreline. Christmas Bay is largely protected from long fetch but is subject to recreational boating impacts that can have an adverse impact on marsh habitats. In addition, relative sea level rise is a factor in continued losses. The project entails restoration of marsh habitat and plants without any structural or fill material. This type of restoration and stabilization requires continued monitoring, and also benefits from limiting recreational activities in the immediate area.

Projects 15 and 801

These projects are in the vicinity of the Chocolate Bayou Channel. Project 15 entails beneficial use of dredged material and also enhances bird habitat. The dredged material could be used to raise the elevation of the shoreline along the northeastern side, an area that has exhibited erosion, likely the result of ship wakes from the GIWW and Chocolate Bayou traffic. In addition, relative sea level rise has an influence on the low-lying marshes. Due to historic erosion, this may be a good candidate for additional stabilization of dredged material with either an artificial reef or living shoreline. This would mitigate shoreline erosion by increasing the height of the marsh while also providing a use for dredged material.

Project 181

Project 181 entails developing living shoreline pilot projects within West Galveston Bay. Any of the recommended projects requiring shoreline stabilization may benefit from a living shorelines design.

Dickenson Bay/ Moses Lake

Projects 23, 131 and 607

Within Dickson Bay, Projects 23 and 131 address vulnerabilities related to relative sea level rise, waves from Galveston Bay, development impacts, and modifications to Dickinson Bayou. These projects restore emergent marshes and stabilize shorelines. Project 23 also entails the removal of a hydraulic restriction in Dickinson Bayou. All placement and restoration of marshes should be considered to still be at risk if not stabilized.

Project 607 within the Moses Lake area appears to be highly vulnerable to relative sea level rise and to fetch driven wave conditions within the lake. The restoration and stabilization of marsh areas should mitigate future losses in areas to be protected. However, adjacent areas will remain subject to similar forces, and should be monitored carefully to determine if future projects are required.

Houston Ship Channel

Projects 24, 25 and 769

All projects within the area of the San Jacinto Battlefield and Houston Ship Channel are subject to the same vulnerability. The area is highly developed, and immediately adjacent to a heavily trafficked deep draft channel. Ship wake induced erosion is a vulnerability throughout this area, as is relative sea level rise. The channel is also subject to frequent maintenance dredging and contends with limited upland disposal areas. Therefore, projects that utilize dredged material are addressing multiple vulnerabilities. All the proposed projects preserve or restore lands or create new habitat via the beneficial use of dredged material. When designed, these projects should be structurally stabilized to prevent erosion due to the persistent ship wakes.

East Bay

Project 340 to 341

These two projects utilize containment dikes as a means to restore emergent marsh on islands on the Bay side of the GIWW near Rollover Pass. These marsh areas have experienced significant land loss due to a lack of sediment supply from Bolivar Peninsula, where sediment transport has been interrupted by the GIWW. In addition, both islands are subject to long fetches across Galveston Bay, and may be impacted by wake effects from the Houston Ship Channel.

Figures 20 and 21 show marsh area degradation over time at Pepper Grove Cove and Long Point Marsh. The use of containment dikes to stabilize dredge material and protect the shoreline will help ensure that marshes remain in place.

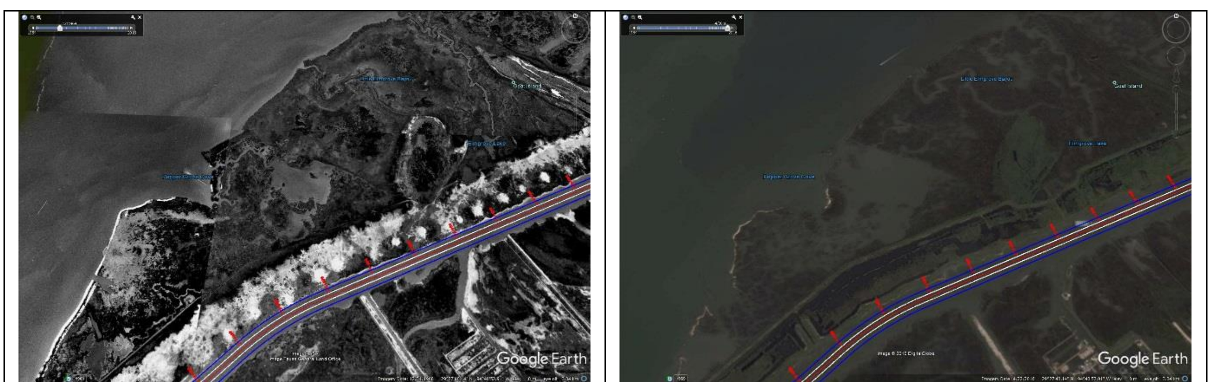


Figure 20. Conditions at Pepper Grove Cove Between 1969 (left) and 2015 (right)[8]

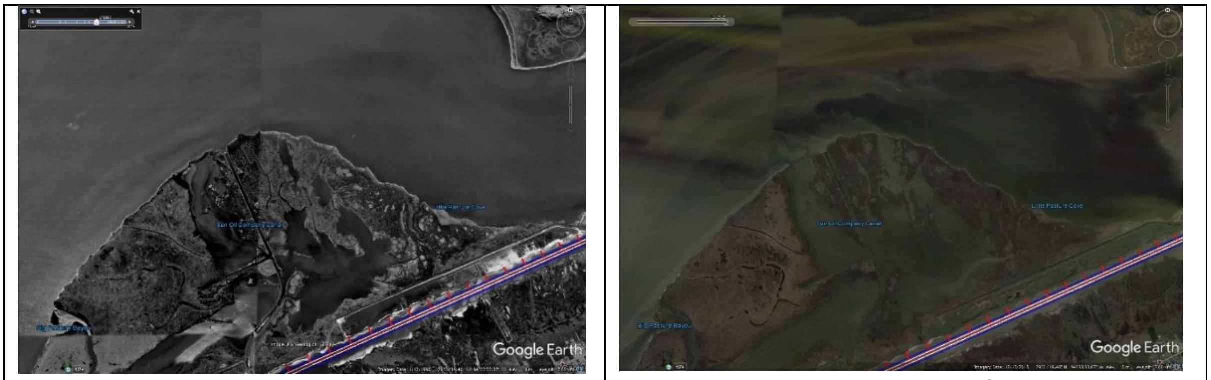


Figure 21. Conditions at Long Point Marsh Between 1996 (left) and 2015 (right)[9]

Project 380

Gordy Marsh was historically protected by offshore barrier islands that have since eroded away. This marsh is located within a high conservation priority area. The long fetches within Galveston Bay, combined with ship wake from the Houston Ship Channel and continued relative sea level rise, has caused persistent erosion in the area (Figure 22). This project addresses the problem through its shoreline protection and marsh restoration components. The exposure of this area of the coastline will benefit from a continuous protection line, which will provide more stability to the marsh area.

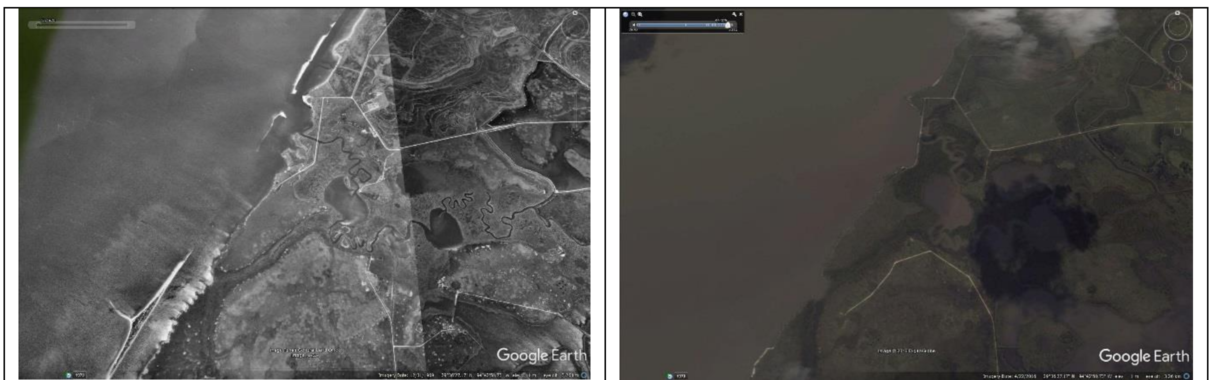


Figure 22 Conditions at Gordy Marsh Between 1970 (left) and 2016 (right)[10]

Project 27

This project features both restoration and shoreline protection components, and its implementation is focused on Oyster Bayou to Smith Point. Marsh degradation in this area is likely a function of relative sea level rise, changes in sediment supply, and wave activity. The project must be designed at an elevation that accounts for future relative sea level rise.

V. IS THE PROJECT OR GROUPING EFFECTIVE AT MITIGATING THE VULNERABILITY?

The projects are effective at mitigating the vulnerability using a variety of techniques, including rebuilding shorelines using beneficial use of dredged materials and implementing structural shoreline stabilization (e.g., breakwaters). Living shoreline approaches are frequently recommended, which would mitigate estuarine wetland losses noted for the region. In some instances, key areas of breaching or habitat loss are indicated and planned for. Where structural methods are proposed, they should be designed to consider future conditions as well as potential impacts to the surrounding environments.

VI. DOES THE PROJECT ADDRESS THE CAUSATION OF THE PHYSICS DRIVING THE VULNERABILITY, OR DOES IT MITIGATE THE EFFECTS?

These projects effectively mitigate or plan for the effects of the vulnerability across the board. In some instances, the projects are able to directly address the physics driving the vulnerability (e.g., large fetch), however, many of the physical issues driving the vulnerability are expected to be persistent or even increasing (e.g., vessel wakes). Some of the physics driving the vulnerability may be able to be addressed when multiple Resiliency Strategies are implemented or when system-wide impacts are addressed (e.g., freshwater and sediment inflows). Future projects should consider projections of change along the coast, such as in the case of relative sea level rise and shifting weather patterns, to ensure that projects remain viable in the long term.

VII. WHAT ARE THE RECOMMENDATIONS FOR A RESILIENT COASTLINE?

A regional assessment of wave conditions within the Galveston Bay system would provide more information on critical areas, and inform the selection of projects to enhance resiliency. Such a regional assessment would also have larger applications in examining the effects of relative sea level rise on waves and shoreline erosion in the bay environments.

For shorelines affected by ship wake in the vicinity of the Houston Ship Channel and other deep and shallow draft channels, development of a wave model that supplements existing data and information would provide valuable guidance in identifying and designing projects to enhance coastal resiliency.

Given that sediment supply is often a continuous vulnerability, the continued application of beneficial use of dredged material, appropriately stabilized, could be an effective way to mitigate this vulnerability.

C. STABILIZING THE TEXAS GULF INTRACOASTAL WATERWAY

I. WHAT VULNERABILITY WAS ASSESSED AND WHAT ARE THE RISKS?

Man-made navigation channels are a large driver of ecosystem instability and degradation along the Texas coast. The GIWW is separated from adjacent bays, lakes, and other ecosystems by a series of small islands that shield inland ecosystems from vessel wakes, salt water intrusion and turbidity impacts. Over time, these islands have eroded due to channel use and maintenance. Inland marshes, wetlands, lakes, and their habitats are no longer protected from erosive vessel wakes, fetch and salt water intrusion resulting from (or exacerbated by) GIWW navigation activities. Neighboring seagrass beds are periodically inundated with sediment from maintenance dredging activities, and associated marsh and wetland degradation compromises wildlife habitat. An increased susceptibility of breaching for lakes and peninsulas that neighbor the GIWW is expected to lead to further degradation of existing ecosystems. Further, the GIWW has altered the natural hydrology of bays and wetlands near the channel. This change in hydrologic conditions is reflected in higher salinity level scenarios and reductions in freshwater inflows.

II. What are the physics of the system that drive this vulnerability?

The GIWW runs through Region 1, with a significant portion fronted by dredged material islands or cut through land. Since construction, the GIWW has eroded to several times its original width, due in large part to the wakes generated by the barges. This has led to direct loss of wetland habitats, and associated environmental and storm surge protection benefits. In addition, this has led to increased exposure of interior shorelines to erosion. It can also lead to difficulties in navigation, as the currents and waves acting on the vessels in the channel can become more complex and larger in magnitude without the benefit of the island protection.

III. What projects/groupings address this Vulnerability?

A number of projects within Region 1 address the vulnerabilities associated with the GIWW. These projects are clustered into three geographic areas:

- Upper Sabine Lake;
- Bolivar Peninsula; and
- West Galveston Bay.

Upper Sabine Lake

Table 6 and Figure 23 show the five proposed projects (i.e., 320, 322, 337, 417, 457) that promote stabilization of the GIWW, with a focus on the upper part of Sabine Lake where significant land loss of barrier islands has been observed. This stretch is not only host to GIWW barge traffic, but is also the Sabine River branch of the Sabine Neches Waterway.

Table 6 Projects Identified in the Upper Sabine Area of the GIWW

Project Number	Project Name	Project Description
322	GIWW Barrier Island Restoration, North Pleasure Island	This measure would restore an island that once protected the GIWW at the northern end of Sabine Lake at Pleasure Island. Some island remnants exist.
320	GIWW Barrier Island Restoration, Old River and Hickory Coves	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.
417	GIWW Island Restoration, Orange County	The project involves the creation of 131 acres of new barrier island habitat along the GIWW in Orange County that would include both wetland and vegetated shallows.
457	GIWW Island Restoration, Jefferson County	The proposed project aims to restore 42 acres of island habitat in Jefferson County. The new island habitat would contain special aquatic sites such as wetlands and vegetated shallows.
337	Marsh Restoration, Old River Cove	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.

Figure 23. Projects Identified in the Upper Sabine Area of the GIWW[3]

Bolivar Peninsula

Table 7 and Figure 24 show the four proposed projects (i.e., 28, 29, 127, 324) that promote stabilization of the GIWW in the area near Bolivar Peninsula.

Table 7. Projects Identified in the Bolivar Peninsula Area of the GIWW

Project Number	Project Name	Project Description
324	GIWW Barrier Island Restoration, Bolivar Peninsula, Galveston County	This measure would restore an island that once protected the GIWW in the Bolivar Peninsula.
29	Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)	This project aims to restore marsh habitat along the GIWW using a living shoreline construction. The proposed project area is located along segments of shoreline adjacent to the Anahuac NWR. Of the targeted 9 miles of shoreline, an estimated 12,400 feet faces East Bay and 34,700 feet lies east of Oyster Bayou on the GIWW.
28	East Bay and GIWW Marsh Restoration and Protection	The East Bay and GIWW Marsh Restoration and Protection project would create an estimated 47,100 linear feet of offshore rock breakwaters along the prioritized project areas to: reduce the wave energy impacting approximately 678 acres of saline marsh and promote shoreline stabilization; protect over 10,000 acres of fresh, intermediate, and brackish marshes and upland prairie from additional saltwater intrusion and habitat conversion.
127	Bolivar Peninsula Bay Shoreline Wetland Restoration	The project will restore approximately 415 acres of emergent wetlands along the Bolivar Peninsula bay shoreline in East Galveston Bay.

Figure 24. Location of Projects Identified in the Bolivar Peninsula Area of the GIWW[3]

West Galveston Bay

Table 8 and Figure 25 show the seven proposed projects (i.e., 9, 173, 177, 327, 328, 330, 397) to promote stabilization of the GIWW in the area near West Galveston Bay.

Table 8. Projects Identified in the West Galveston Bay Area of the GIWW

Project Number	Project Name	Project Description
328	GIWW Barrier Island Restoration, West Bay 2, Galveston County	The project would restore a 14 acre island that once protected the GIWW in West Bay. This would be achieved through construction of a 7,600 LF containment levee with riprap armoring on the bay and GIWW sides.
177	GIWW Barrier Island Restoration	The goal of the project is to reduce the rates of shoaling on the GIWW and to protect the marshes on the north side of the channel from storm surges. The proposed solutions are restoration of the barrier island as well as the creation of new placement areas and habitat restoration areas on the south side of the GIWW.
327	GIWW Barrier Island Restoration, West Bay 1, Galveston County	The project would restore a 58 acre island that once protected the GIWW in West Bay. This would be achieved through construction of an 18,900 LF containment levee with riprap armoring on the bay and GIWW sides.
330	GIWW Barrier Island Restoration, West Bay, Brazoria County	The project would restore a 120 acre island that once protected the GIWW in West Bay. This would be achieved through construction of a 33,400 LF containment levee with riprap armoring on the bay and GIWW sides.
397	GIWW Island Restoration, Brazoria County	The project involves creation of a 131 acre island habitat containing special aquatic sites such as wetlands and vegetated shallows, recognized as nationally significant by the Clean Water Act (33 USC 1344). The proposed locaiton of this barrier island would be between the GIWW and Oyster Lake to prevent breaching.
173	Placement Areas 62 & 63 Dredged Material Placement and Marsh Restoration	The purpose of this project is to minimize sea grass impacts from dredging utilizing thin layer depositionThe purpose of this project is to minimize sea grass impacts from dredging utilizing thin layer deposition and winter placement and to nourish emergent land to protect the GIWW, and marshes north of the GIWW, from the strong fetch across West Bay. Without periodic renourishment (approximately every 3 years), the existing sea grass beds would erode to a depth where sea grass growth could not be sustained.
9	Brazoria National Wildlife Refuge Shoreline Protection	The narrow stretch of land separating the Brazoria National Wildlife Refuge GIWW Shoreline from Christmas Bay has been breached by erosion. The project strategies include reinforcing the banks on the Bay side to prevent further erosion, and creating emergent marsh habitat. Dredge material could be used to raise the elevation to the appropriate level for marsh creation. Closer monitoring of erosion along the shoreline, particularly at critical locations such as the narrow sections between the GIWW and Christmas Bay, Drum Bay, and Long Pond, is also recommended.

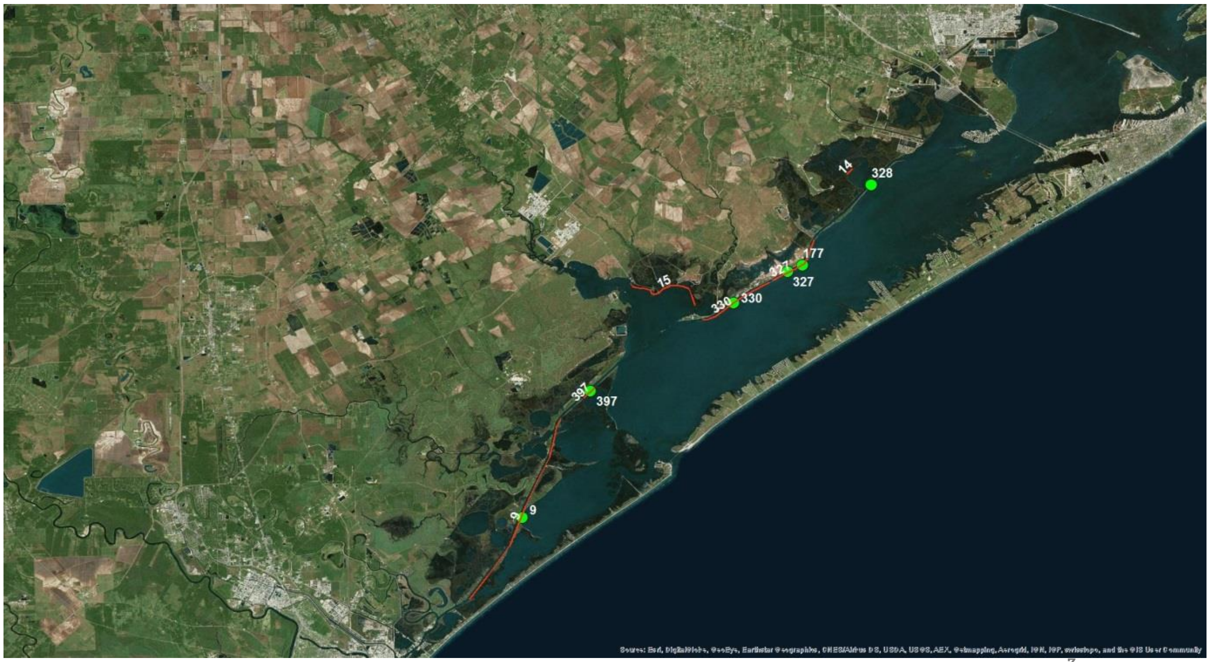


Figure 25. Location of Projects Identified in the West Galveston Bay Area of the GIWW[3]

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

Upper Sabine Lake

Projects 320, 322, 337, 417 and 457

The land between the GIWW and Upper Sabine Lake has been persistently erosive. This is primarily due to barge and ship traffic and wake induced erosion affecting the barrier islands. Almost all of the dredged island barriers between Sabine Lake and the GIWW have been eroded to some degree. This can cause navigation problems as the barges are more exposed to wind, waves, and currents. It also contributes to the loss of wetlands adjacent to the GIWW, as these lands are now exposed to both fetch-generated erosion as well as ship wake induced erosion. Figure 26 shows the erosion of these islands from 1989 to 2015. Sydnes Island, whose land mass is quite pronounced in 1989, is barely visible in the imagery from 2015. The small island near the northern tip of Pleasure Island is also much smaller in in 2015 as compared to 1989.

The projects in this area propose using dredged material to reconstruct islands adjacent to the GIWW and provide shoreline protection and restoration to the marsh at Old River Cove. These projects help mitigate erosion to the islands at this location. Shoreline protection measures for the constructed islands should be designed to address wake conditions to prevent continued erosion.

1989	2015

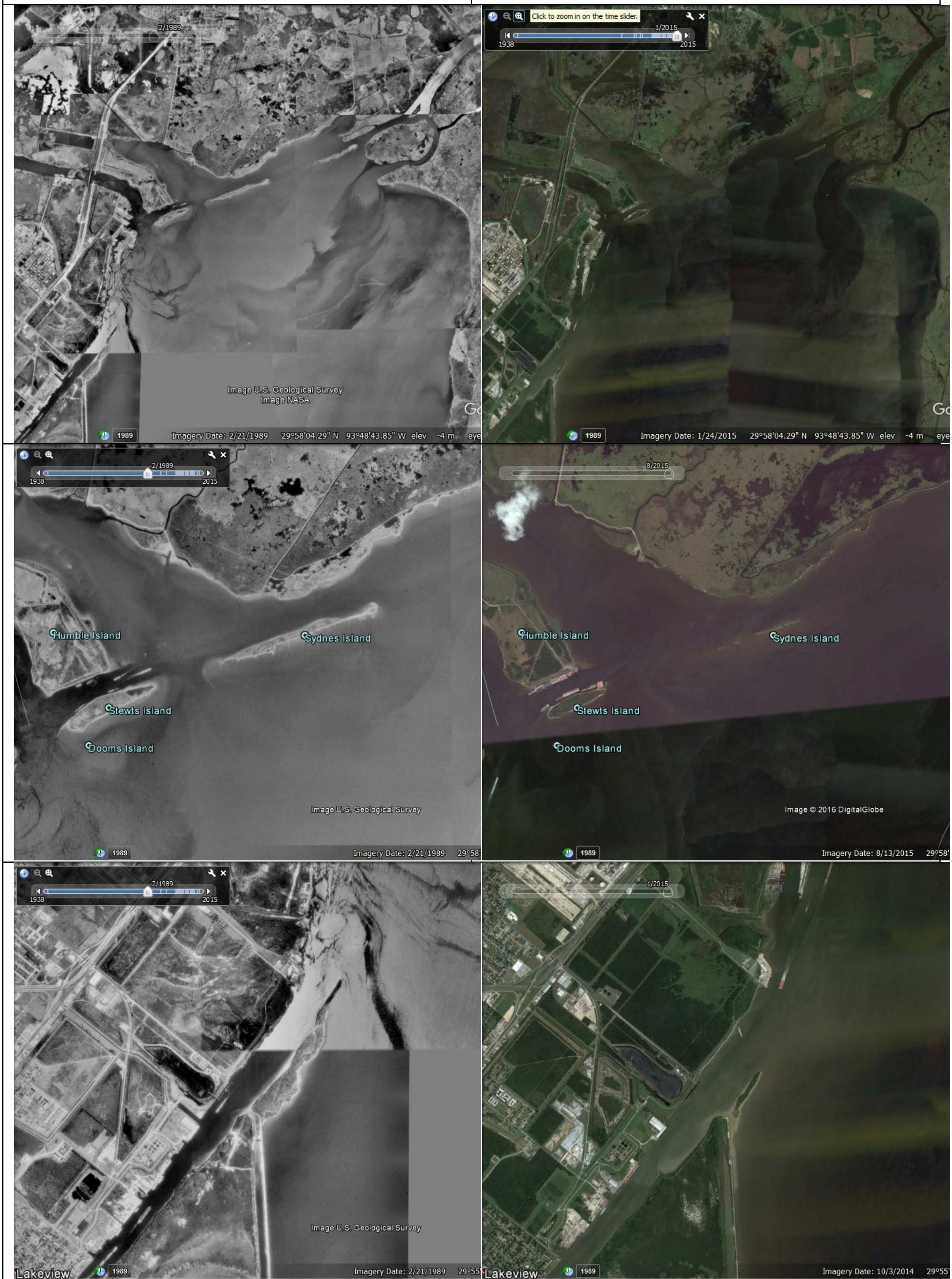


Figure 26. Land Loss of the Islands in Upper Sabine Lake Between 1989 (left) and 2015 (right)[11]

Bolivar Peninsula

Projects 28, 29 and 127

As part of the East Bay Restoration program, a series of breakwaters have been constructed to protect the Anahuac National Wildlife Refuge shoreline from wake erosion (see Figure 27). These structures have been effective, and proposed Projects 28 and 29 will expand the program. Project 127 restores wetland area that is adjacent to the GIWW. Project 28 provides breakwater projection for the wetland restoration in Project 127, which will be more successful if sheltered from the GIWW.

Figure 27. Existing Breakwaters Along the GIWW Adjacent to the Anahuac National Wildlife Refuge[12]

Project 324

Project 324 entails restoration of Goat Island, which has suffered substantial erosion-induced land loss between 1954 and 2016, as depicted in Figure 28. As shown, what used to be a 200 m wide continuous land strip in 1954 has disappeared over time.

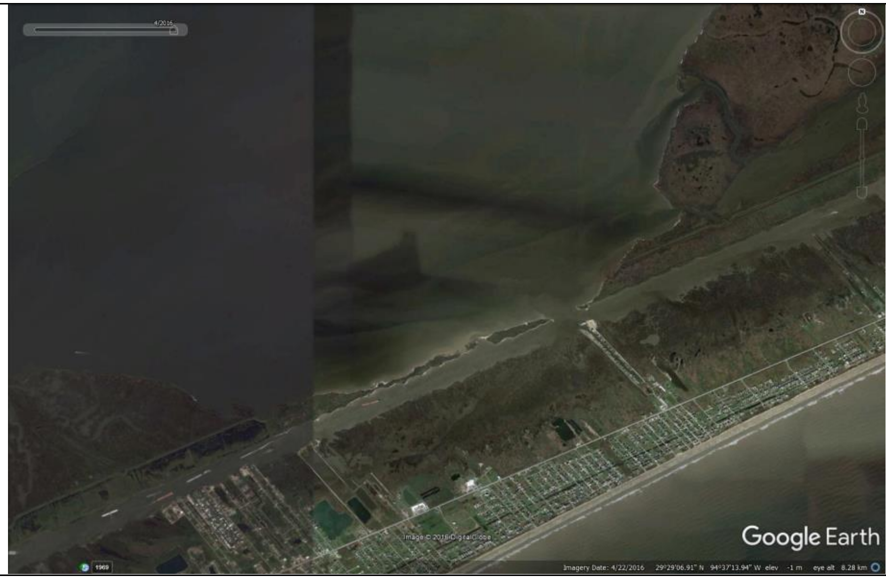
1954	2016
	

Figure 28. Goat Island in 1954 (left) and 2016 (right)[13]

West Galveston Bay

Seven proposed projects focus on the GIWW in West Galveston Bay. They are described below in groupings, given that some are physically located in close proximity and, therefore, interact with one another.

Project 328 and Project 14

Project 328 entails rebuilding an island adjacent to the GIWW that has eroded significantly over the years. In addition to protecting the GIWW navigation channel, this island would provide some protection to Greens Lake, also the focus of Project 14. The latter entails construction of low berms to reduce salinity intrusion and wetland loss to the wetland system north of the lake. The berms will be more effective with the added protection provided by Project 328.

Figure 29 shows the changes in the Greens Lake area between 1969 and 2015. Loss of protection by the island across the mouth of Greens Lake is evident, and has exposed the lake to longer fetches and higher potential erosion. In addition, relative sea level rise also contributes to extensive marsh loss. Project 14 will use dredged material to restore some marsh elevation, although more extensive shoreline protection measures will be required for full marsh restoration.

Given rates of erosion of the GIWW islands, the use of a protective armoring in the construction of Project 328 is advised.

Project 330, 327, and 177

These three projects are linked, as they entail reconstructing islands along the GIWW and utilizing new sites for dredged material.

At the southern end of Project 330, the proposed rebuilt island connects with an existing dredged material disposal site. From 1944 to 1990, aerial photographs show almost complete erosion of the original island. In 1993, the legacy island was rebuilt with dredged material that has since eroded away, when comparing aerial photographs from 1995 and 2015. Figure 30 shows the progression of erosion over time via multiple aerial photographs. This progression suggests that without effective shoreline protection, much of the island material is just likely to end up back in the channel over time.

The construction of the islands noted in Projects 330 and 327 also provide much-needed sites for the disposal of dredged material and, if properly armored, will reduce long term shoaling in the GIWW and protect adjacent marshes. The proposed Project 177, on the northern side of the navigation channel, would have similar impacts but may be a supplementary project once the more seaward islands are constructed.

Project 9

Project 9 stabilizes the shoreline separating the GIWW from Christmas Bay, Drum Bay, and Long Pond. The area has breached in numerous places, with the area separating the bays from the GIWW becoming significantly smaller over time. Figure 31 shows the resulting erosion via aerial photographs taken in 1995 and 2015. From this, it appears that the island has eroded from the bay side (probably due to local waves and subsidence) as well as the GIWW side (likely the result of vessel wakes). Reinforcing the shoreline on the bay side, as well as using dredged material to increase elevations, will help address the land loss problem, although vessel traffic within the GIWW will continue to pose a long-term erosion challenge.

Project 397

Project 397 is adjacent to the GIWW but focuses primarily on erosion vulnerability of the bay shoreline and the critical breaching area between West Galveston Bay and Oyster Lake.

Prevailing winds, currents and hurricanes have resulted in the loss of over 650 feet of shoreline on the West Galveston Bay side, and 150 feet on the Oyster Lake side since the 1940s. The rate of erosion appears to be accelerating, with up to 175 feet of that shoreline lost on the West Bay side and 55 feet from Oyster Lake side since 1995. A multi-phased approach to shoreline protection was implemented in recent years; breakwaters constructed in 2015 are shown in Figure 32. The project consisted of reef ball breakwaters on the West Galveston Bay and Oyster Lake side of the shoreline, as well as limestone rock breakwaters on the West Galveston Bay side. This protects the critical shoreline between the two water bodies. The proposed Project 397 entails construction of additional wetland habitat between the GIWW and Oyster Lake, while also limiting the influence of the GIWW on the lake itself.

Figure 29. Greens Lake Area in 1969 (left) and 2015 (right)[14]

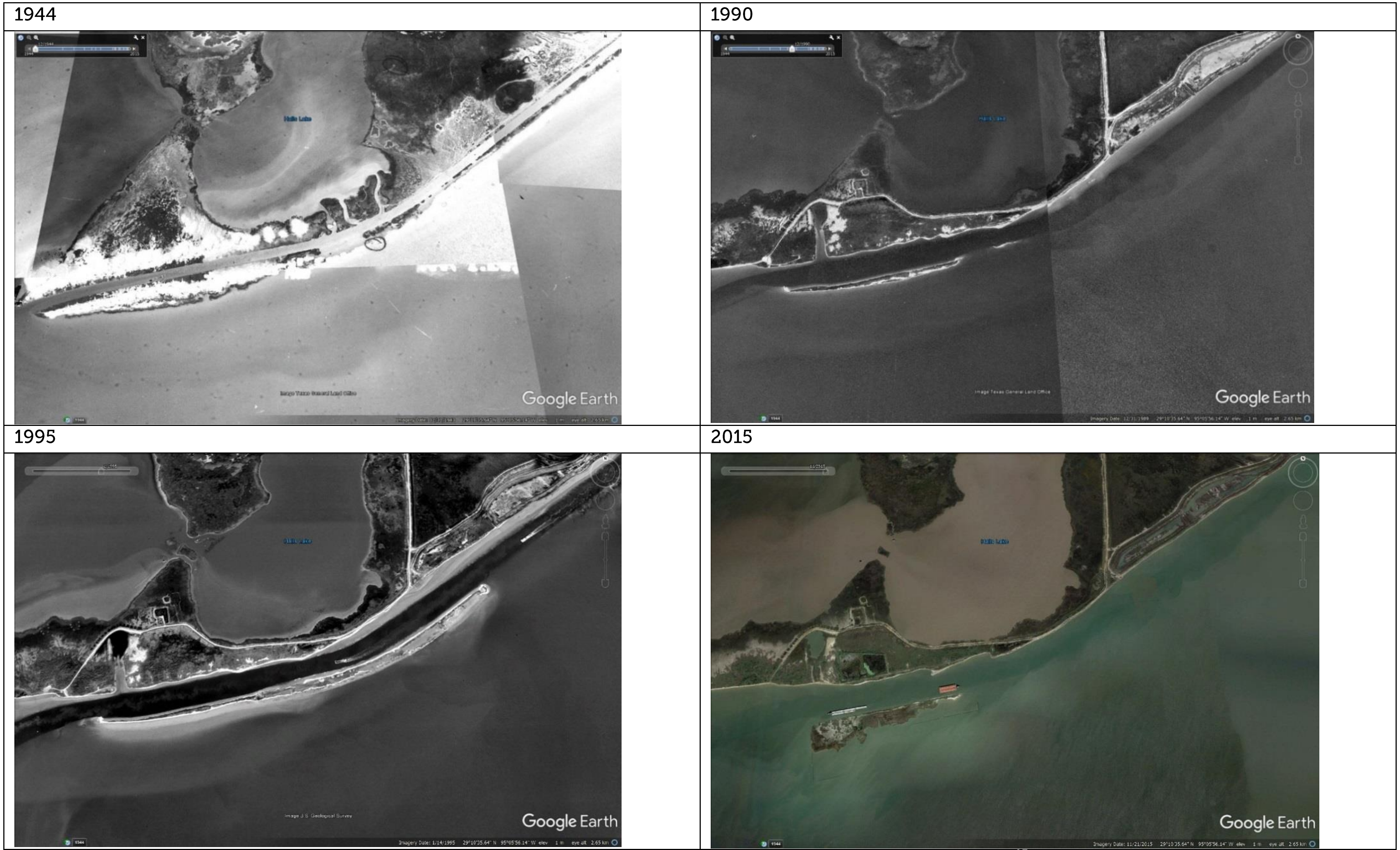


Figure 30. Island Near Halls Lake in 1944 (Top left), 1990 (top right), 1995 (bottom left), and 2015 (bottom right)[15]

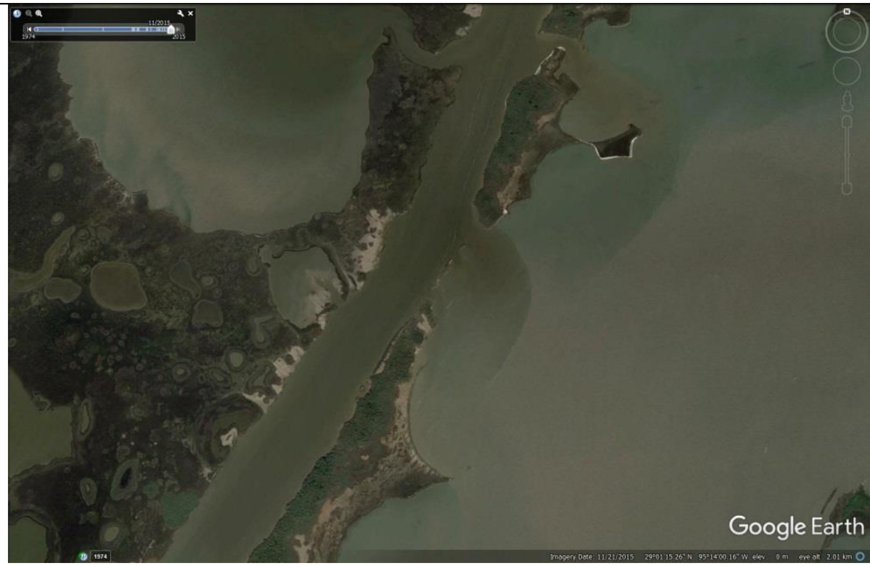
1995	2015
	

Figure 31 Breaching in the Area of Christmas Bay between 1995 (left) and 2015 (right)[16]

1995	2015
	

Figure 32 Conditions in the Vicinity of Oyster Lake in 1995 (left) and 2015 (right)[17]

V. Is the project or grouping effective at mitigating the Vulnerability?

The proposed projects mitigate the shoreline erosion vulnerability along selected reaches of the GIWW. However, this vulnerability is a system-wide issue and is present to varying degrees in other stretches of the channel as well. Therefore, consideration should be given to system-wide monitoring and the future development of projects that address erosion problems in other sections of the GIWW.

VI. Does the project address the causation of the physics driving the Vulnerability, or does it mitigate the effects?

Physical mechanisms driving erosion problems along the GIWW are largely caused by ship wakes from vessels. Impacts are exacerbated by relative sea level rise and island land losses that reduce the ability of the islands to mitigate the impact of wind, waves and extreme weather events. Erosion control measures must recognize and accommodate the fact that commercial navigation activity on the GIWW will continue over time.

VII. What are the recommendations for a resilient coastline?

A review of past erosion control projects and historical shorelines along the GIWW clearly indicates the highly erosive nature of the system and the need to consider various structural measures as an adjunct to placement of dredged material to encourage resiliency. Toward that end, the development and application of a prioritization tool is advised in the interest of identifying future potential projects to address the most vulnerable areas of the GIWW. A wave propagation model that can accurately represent barge wakes could be a useful component of the prioritization process.

D. Freshwater Wetlands and Coastal Uplands Conservation

I. What vulnerability was assessed and what are the risks?

The Texas coast has seen a pronounced decline in wetland numbers and acreage over the years due to their conversion to agricultural, industrial, residential and related uses. Wetland alteration or destruction (e.g., deepening, draining) significantly compromises a range of ecosystem services that naturally functioning wetlands provide. Among others, consequences include adverse impacts on salinity levels of surrounding environments, lost /degraded habitat, and compromised water quality.

II. What are the physics of the system that drive this vulnerability?

Much of the natural habitat along the Texas coast has been altered by human activity, typically leading to habitat degradation and other adverse ecological consequences.

III. What projects/groupings address this vulnerability?

Table 9 shows the 13 proposed projects – all addressing land acquisition- associated with Freshwater Wetlands and Uplands Coastal Conservation in Region 1.

Table 9. Projects related to Freshwater Wetlands and Coastal Uplands Conservation within Region 1

Project Number	Project Name	Project Description
360	West Bay Water Quality Protection Project	The purpose of this project is to protect the water quality of West Galveston Bay through an initiative to conserve farm and ranchlands as well as native coastal habitats in watersheds that drain into West Galveston Bay. The initiative will use conservation easements, purchase of development rights and fee title purchases to conserve properties held by willing land owners.
232	Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation	The project involves purchasing a conservation easement for approximately 3,200 acres or coastal prairie and estuarine marsh habitats adjacent to Green's Lake, near Hitchcock. The easement won't allow public access and Scenic Galveston will manage the property and restore the prairie.
234	Marquette Acquisition Project	The Marquette Acquisition Project will aim to conserve an area of approximately 360 acres on West Galveston Island adjacent to West Bay, an estuary of national significance. Efforts include land acquisition projects and restoration projects on the bayside of Galveston island, stretching from Sweetwater Lake to near San Luis Pass, on the mainland from Virginia Point to Chocolate Bay, and islands in West Bay.
240	Coastal Heritage Preserve â€“ Phase 4	The Settegast Coastal Heritage Preserve project is envisioned as a conservation area on West Galveston Island adjacent to West Bay, which is part of the Galveston Bay system, an estuary of national significance. The next phase of the initiative involves acquisition of 635 acres from one owner and 205 acres from an adjacent owner. This would bring the total preserve area to 1,200 acres.
650	Bolivar Peninsula Habitat Acquisition, Restoration, and Enhancement	The project proposes the acquisition of 200-300 acres of wetlands and upland prairie habitat contiguous to a 1,845 acre ridge and swale wetland complex on the Bolivar Peninsula. Acquiring the targeted parcels will help protect the larger complex from fragmentation. The targeted acquisitions will become part of a productive complex of sand dune swales, mudflats, salt marsh, and transitional uplands known as the Bolivar Flats Shorebird Sanctuary and the adjacent Horseshoe Marsh Bird Sanctuary.
9046	Follets Island Conservation Initiative	The Follets Island Conservation Initiative is a partnership effort to acquire and protect an additional 1,300 acres on the island and transfer title to the Texas Parks and Wildlife Department. Critically important wildlife habitats on the island include tall grass prairies, salt and fresh water marshes, sea grass meadows, oyster reefs, mud flats, sand dunes, and Gulf beaches. The island is important for Kemp's Ridley sea turtles, piping plovers, waterfowl, wading birds and shorebirds. Follets Island helps protect the entire estuary system, including Drum and Christmas Bays, from degradation from storms and allows the natural movement and restoration of habitats after storm events.
20	Clear Creek Watershed Conservation	The goal of the project is to conserve 200-acres of property along Clear Creek in Southern Harris County to link Challenger Park and Johnson Space Center, conserve open space, create habitat sanctuaries, preserve water quality, and develop recreational opportunities.
220	Armand Prairie Land Acquisition	The project will acquire, preserve, and manage 1,300 acres of high quality, coastal tall grass prairie in the highly urbanized Armand Bayou watershed. The parcels are contiguous with existing Harris County protected land and riparian corridors proposed for acquisition and protection by HCFCD. Some of the parcels likely contain remnant populations of endangered Prairie Dawn Flower as well as numerous wetland features critical to maintaining the water quality of Armand Bayou.
241	Sweetwater Preserve Expansion	The project involves the purchase of 275 acres of land situated immediately west of Galveston Bay Foundation's Sweetwater Preserve and adjacent to Sweetwater Lake, West Galveston Bay, and 8 mile road. Key attributes of the subject property include coastal grasslands, brackish and estuarine wetlands, frontage along West Galveston Bay and Sweetwater Lake, and extensive salt barrens and sand flats. Preservation of Galveston Island's marshes, wetlands, and associated habitats promotes clean water and healthy fisheries and preserves the scenic beauty of the area.
713	Middleton Wetlands Creation	The project aims to construct 300 acres of freshwater wetlands in abandoned rice farmland on the Middleton unit of the Anahuac NWR. Included in this project is the creation of a 70 acre reservoir/moist soil unit that will provide water to the wetland units. The improvements will provide wetland habitat to migratory and resident wildlife, including significant numbers of ducks, geese, shorebirds and wading birds.
793	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	The proposed initiative includes a number of measures to rehabilitate several high profile properties owned by the GBF with the purpose of increasing the potential wildlife habitat value. These include creation of 14 acres of ephemeral freshwater wetlands and construction of 2,000 linear feet of erosion control structures along the shorelines of Sweetwater Preserve and Frost-Deen tract. The plan also proposes implementation of best management practices including brush management and prescribed fire in an effort to promote native plant diversity on coastal prairies located in Chambers and Galveston Counties.
870	Brazoria National Wildlife Refuge Habitat Improvement	This large scale native prairie restoration project (15,000 acres) involves multiple aspects such as the elimination of exotic and invasive species, restoration of the irrigation system, construction of 180 acres of wetland/moist soil units and the drilling and installation of a large volume water well on the Brazoria National Wildlife Refuge.

873	Anahuac National Wildlife Refuge Wetlands Creation	The project involves the construction of 550 acres of wetland/moist soil units and the restoration of 100 to 150 acres of native prairie in previously converted farmland of the Anahuac NWR. The constructed wetland/moist soil units will be valuable to waterfowl, shorebirds, grassland birds and wading birds.

IV. How does the project or grouping mitigate the vulnerability?

Most of the projects addressing this vulnerability involve acquiring lands or conservation easements to protect wetland habitat. In some cases, infrastructure removal and restoration efforts are planned.

V. Is the project or grouping effective at mitigating the vulnerability?

Yes; while the effects may not be able to be totally reversed, restoration and protection of lands from human intervention mitigates of the vulnerability.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

Proposed projects addressing this Region 1 vulnerability are primarily focused on mitigating the effects of wetland loss experienced over a number of years. Addressing the causation of the vulnerability will also require actions that 1) prohibit future development in wetlands; and 2) eliminate or minimize the adverse impacts of relative sea level rise, extreme weather events and other climate change-related factors that contribute to wetland loss/degradation.

VII. What are the recommendations for a resilient coastline?

Restoration and protection of lands from human intervention and continued monitoring.

E. Delta and Lagoon Restoration

I. What vulnerability was assessed and what are the risks?

The ecological health of several watersheds within the Texas coastal zone has been compromised by development that has fundamentally altered the hydrology of rivers and deltaic systems. Reducing the natural flow of water toward river deltas, for example, can reduce deposition of minerals and nutrients essential for a healthy system. Similarly, the reduction of freshwater inflows can alter the salinity of deltaic habitats, causing degradation of fresh water marshes and wetlands. Upland development within watersheds can increase the velocities of flows reaching watersheds, exacerbating erosion and decreasing water quality (often due to elevated bacteria levels and low levels of dissolved oxygen). In some instances, channel and outfall closures have been prompted by sediment deposition from dredging activities and waves. Re-opening these systems to re-establish circulation may be required as part of restoration efforts.

Within Region 1, five proposed projects are directed at Delta and Lagoon Restoration, primarily focused on hydrologic solutions. Most are smaller and affect limited areas; one is a large interdisciplinary project addressing the salt marshes in Jefferson County. The latter is addressed separately.

II. WHAT ARE THE PHYSICS OF THE SYSTEM THAT DRIVE THIS VULNERABILITY?

Depending on the hydrodynamics of the system under investigation, this vulnerability is associated with one or more of the following:

- Reductions in freshwater inflows to a deltaic system that directly affect the salt balance within the system. A reduction in flow tends to increase the salinity of delta habitats. In addition, reduction in the discharge rate tends to reduce the sediment load the river carries into the delta. This results in a reduction in marsh growth or marsh loss.
- Man-made or natural excursion of saltwater channels that increases the saltwater volume reaching inland, also affecting the salt balance within the system.
- Obstructions that interfere with natural flow regimes within the system and/or direct flow and sediment loads to locations within the estuary that do not feed historical marsh habitats.

Within Region 1, four hydraulic systems were identified as having vulnerabilities that could be mitigated with hydrologic restoration (aside from Jefferson County, which is addressed separately). These systems included the Trinity-San Jacinto Estuary in Galveston Bay, the Sweetwater Preserve area in Galveston County, the area from Robinson Bayou to Smith Point in Chambers County, and Upper Cow Bayou in Orange County. Given the variability in physics between the systems, each is described briefly.

Trinity-San Jacinto Estuary

The TxBLEND model developed by the Texas Water Development Board is available to aid in understanding the salinity balance within the area. Galveston Bay receives an average of 10.1 million acre feet per year of freshwater inflows from the Trinity River, San Jacinto, San Jacinto-Brazos, Neches-Trinity and Trinity-San Jacinto coastal basins.[18] The Trinity River basin is the largest contributor of freshwater inflows (see Figure 33).[18] While the River has been modified with dams and reservoirs, the freshwater inflow has remained adequate to supply coastal marshes and retain salinity conditions for oyster beds, primarily through a continued discharge of fresh wastewater flows into the river. The Trinity and San Jacinto and Galveston Bay Basin and Bay Expert Science Team report in 2009 noted that USGS gauges indicate that minimum flows along the Trinity River have actually been increasing.[18] It should be noted that critical habitats, such as oyster beds, can be sensitive to long durations of salinity, so the reverse (i.e., too much freshwater inflow) should also be considered a potential vulnerability.

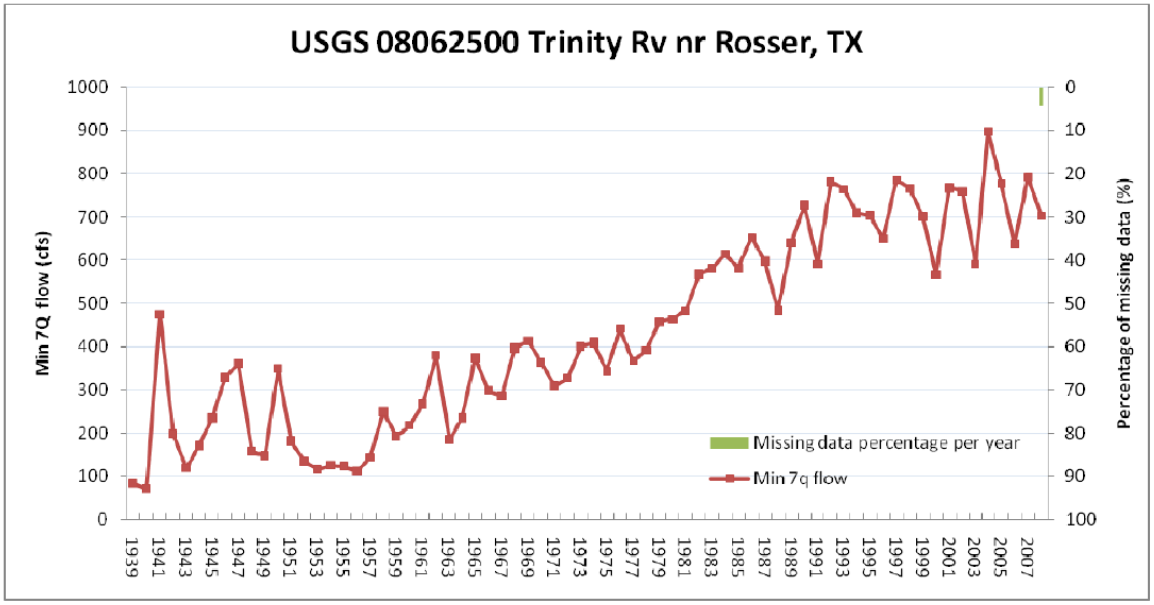


Figure 4 Historical Min7Q Flows at Trinity River near Rosser USGS Gage Site

Figure 33. Minimum Flows at Trinity River Near Rosser, Texas[18]

Sweetwater Preserve

The Sweetwater Preserve area is connected to Galveston Bay on the north side of Sweetwater Lake. Over the years, the connection has deepened and expanded significantly, as shown in the historical imagery between 1969 and 2015 (Figure 34). This has resulted in disturbed upland area and a significant increase in tidal volume.

Figure 34. Sweetwater Preserve Bayou to Galveston Bay in 1969 (top) and 2015 (bottom)[19]

Robinson Bayou to Smith Point

Marsh is the predominant habitat in this area, which is largely a freshwater environment and includes several lakes. These areas are high-value for wintering waterfowl habitats. The uplands in this area are coastal prairie and home to Mima mounds (an historical topographic feature). Farm to Market Road 562 runs along a low ridge that separates drainage between Trinity Bay and East Bay.

Numerous man-made cuts from East Bay into the marsh area contribute to salinity intrusion (Figure 35 through Figure 37). In addition, rising sea levels and shoreline erosion are likely to continue to allow more saltwater into the system.

Figure 35. Channel into Robinson Lake[20]

Figure 36. Channel into Wallis Lake[21]

Figure 37. A Number of Fishing Channels and Cuts From East Bay into the Marsh System Near Smith Point[21]

Cow Bayou

Cow Bayou intersects the Sabine River at Bridge City in Orange County. Historically used as a source of irrigation water for farming, Cow Bayou saw extensive barge traffic in the early 1900s. In 1963, construction was authorized for a 100-foot wide, 13-foot deep channel extending from Sabine River to Orangefield. Only the first seven miles of the channel were ever dredged and, in 1967, it was deepened for navigation and flood control purposes. Cow Bayou experiences low dissolved oxygen and pH, and elevated bacteria. Salinity intrusion also has an impact on this location and the overall health of adjacent wetlands.

III. What projects/groupings address this vulnerability?

Five projects in Region 1 address the Delta and Lagoon Restoration vulnerability, as noted in Table 10. The first two are related to the Trinity-San Jacinto Estuary System with each of the following addressing the Sweetwater Preserve, Robinson Bayou area, and Cow Bayou area, respectively.

Table 10 Projects related to hydrologic restoration in Region 1

Project Number	Project Name	Project Description
44	Trinity - San Jacinto Estuary Fresh Water Inflows	The goal of the project is to acquire and convert some existing water rights from willing sellers for the purpose of freshwater inflow protection. Drought-reliable water rights that are not being fully utilized are potentially available for purchase on a voluntary basis. This project would be designed to provide an additional 100,000 acre-feet/year of drought-secure inflows to Galveston Bay from the Trinity River basin as compared to future conditions without the project.
9024	Maintain Freshwater Inflows to Trinity River Delta	The project proposes to maintain freshwater inflows and sediment transport to the Trinity River Delta, thereby maintaining habitat for Vallisneria and brackish water clams. A study may be required to determine the best methods for maintaining freshwater inflows.
355	Marsh and Bayou Restoration, Sweetwater Preserve, Galveston County	This measure would restore a marsh and bayou system in the Sweetwater Preserve by establishing marsh elevations in disturbed uplands and reducing the width and depth of the bayou to dampen tidal intrusion.
734	Hydrological Restoration of Coastal Marsh (Robinson Bayou to Smith Point)	This project will use funds to model and install a hydrological restoration project that would restore isohaline lines across the damaged landscape. Inflows, tidal prisms, drainage acreages, and rates would be used to develop a long term hydrology restoration plan for these marshes. This would allow vegetative communities to recover naturally, increase the long term productivity of fisheries species, and provide long term habitat for waterfowl, wading birds, and shorebirds.
9018	Hydrologic Restoration of Upper Cow Bayou	The goal of the proposed project is to return Upper Cow Bayou, a tributary to Sabine River, to its natural hydrologic state by restoring meanders and reducing saltwater intrusion. This will in turn protect the existing Cypress-Tupelo habitat. A study may be required to determine the best methodology to restore the hydrology and protect the wetlands.

IV. How does the project or grouping mitigate the vulnerability?

Trinity River

Project 44 and 9024

The two proposed projects propose maintaining drought-secure inflow conditions. Project 44 utilizes land rights acquisition to provide an additional freshwater source, while Project 9024 entails a study to determine best methods for maintaining adequate supply.

Sweetwater Preserve

Project 355

This project controls saltwater intrusion by reducing the width and depth of the bayou, thereby controlling the entering tidal prism. Historical imagery suggests that channel deepening and widening is the natural tendency of this cut, and stabilization measures for the smaller channel may be needed to control its natural tendency to deepen and widen. The stability of any prospective channel modifications should be investigated during the design phase of the project.

Robinson Bayou to Smith Point

Project 734

The proposed project entails a study to determine effective measures for restoring the salinity balance to the region. Study outcomes will identify means to mitigate this vulnerability, which are at this point unclear.

Cow Bayou

Project 9081

As with the previous proposed project, this one entails a study to determine effective measures for restoring the salinity balance to the region. Study outcomes will identify means to mitigate this.

V. Is the Project or Grouping Effective at Mitigating the Vulnerability?

With careful planning and design, the proposed projects can effectively mitigate the vulnerability. Continued monitoring is appropriate, however, to both assess project performance and identify areas where new projects may be needed.

VI. Does the Project Address the Causation of the Physics Driving the Vulnerability, or Does It Mitigate the Effects?

Proposed projects addressing this Region 1 vulnerability are primarily focused on mitigating the effects of delta and lagoon degradation caused by alterations to natural flow conditions upsetting the balance between freshwater and saltwater. Addressing causation is problematic, given that long-standing development practices and structures are primary contributors to this vulnerability. However, projects that limit or prohibit harmful future development can address causation, and coordinating studies in these areas will allow for best mitigation actions to be proposed.

VII. What Are the Recommendations for a Resilient Coastline?

The proposed projects addressing this vulnerability provide for hydrologic solutions to resolve freshwater and saltwater imbalances in selected areas within Region 1. In several instances, studies are required to better understand the system and evaluate alternative measures to maximize effectiveness.

F. Oyster Reef Creation and Restoration

I. What vulnerability was assessed and what are the risks?

Oyster reefs in Texas bays are subject to degradation due to natural and man-made processes that contribute to the loss of oyster habitat. During hurricanes and tropical storms, significant amounts of sediment can inundate, and thereby damage or destroy, existing oyster reefs. An estimated 8,000 acres of oyster reef were lost during Hurricane Ike, for instance, due to excess levels of sediment deposition. Oyster habitats are also susceptible to man-made developments and associated impacts. Salinity gradients and turbidity changes impact the viability of reefs, as oysters are highly sensitive to both. Galveston Bay, along with other coastal bays in Texas, have seen increases in salinity gradients and turbidity due in large part to the construction of navigation infrastructure and ongoing channel dredging. In addition, degradation of marsh and vegetated habitat upstream can increase velocities flowing into bay systems, resulting in adverse impacts on oyster reefs. Vessel wakes and unchecked commercial harvesting can also negatively impact oyster reef viability.

II. What are the physics of the system that drive this vulnerability?

The vulnerability of oyster habitats is related to the following physical processes:

- Increased sedimentation directly on existing beds;
- Increased salinity due to decreased freshwater inflows into bay environments; and/or
- Increased turbidity due to vessel traffic and dredging activities.

III. What projects/groupings address this vulnerability?

Six oyster reef projects (i.e., 19, 414, 641, 794, 855, 9022) are proposed within Region 1; they are shown in Figure 38 and described in

Table 11. All entail the restoration or creation of oyster reefs.

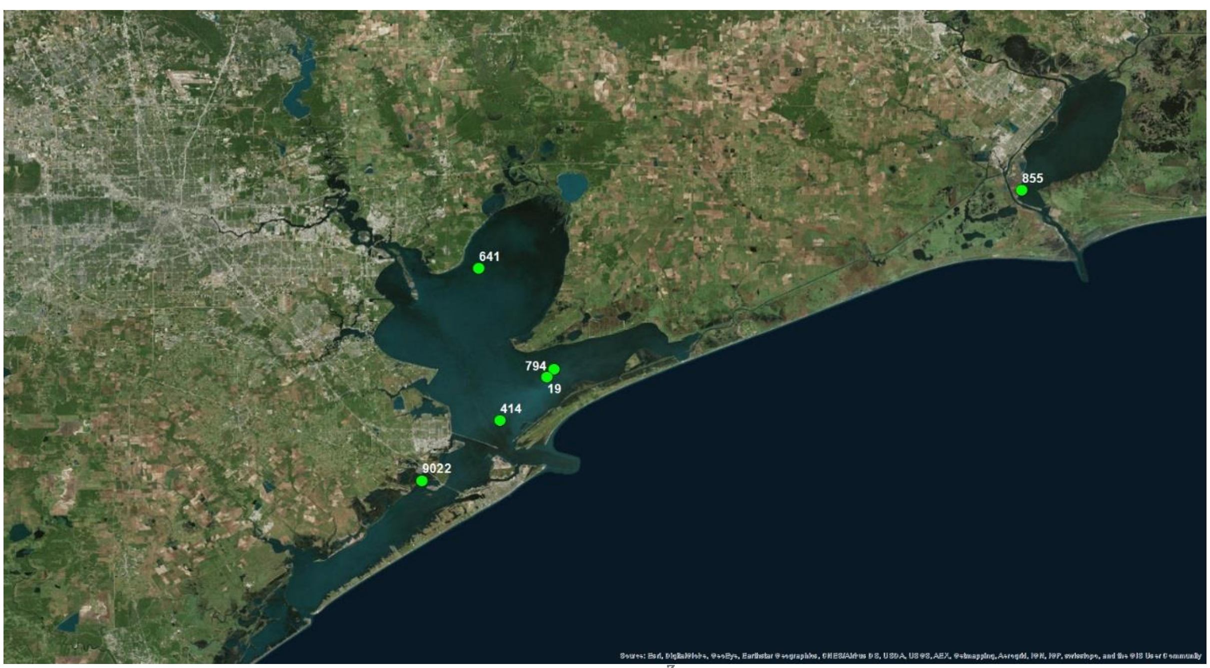


Figure 38. Location of oyster reef projects in Region 1[3]

Table 11. Description of oyster reef projects in Region 1

Project Number	Project Name	Project Description
641	Oyster Reef Restoration in Upper Galveston Bay	This project seeks to restore 150 acres of degraded Galveston Bay oyster reefs using a landscape approach to create a network of spatially separated oyster populations. A network of high vertical relief source and sink oyster reefs will be created in Upper Galveston Bay. This will allow for increased oyster population sustainability and oyster habitat resiliency.
794	Galveston Bay Oyster Reef Restoration and Enhancement	This project would result in the restoration of 400 acres of oyster reef within three areas of Galveston Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
855	Sabine Lake Oyster Reef Restoration and Enhancement	This project will restore oyster reef habitats along the western shore of Sabine Lake. The project area will encompass a total of 40 acres. By placing 1,800 mounded, highly dense reef patches throughout the project area, the structurally complex character of the nearby unfished oyster reefs will be replicated.
9022	Jones Bay Oyster Restoration	The proposed project would restore and/or create oyster reef habitat within the Jones Bay system. Included in the project is a study of the Bay to determine locations with favorable conditions for oyster reef habitat.
19	East Galveston Bay Ecosystem Oyster Reefs	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.
414	Galveston County Oyster Reef Creation	This project will create 100 acres of oyster reef throughout Galveston County.

IV. How does the project or grouping mitigate the vulnerability?

The projects proposed replace or add new oyster habitats to the area, thereby directly addressing the habitat losses noted for oyster reefs in Region 1.

V. Is the project or grouping effective at mitigating the vulnerability?

The proposed projects identify general locations and, in most cases, quantify the acreage of oyster beds to be restored or created. Provided that specific locations are carefully evaluated in light of potentially detrimental factors (e.g., proximity to heavy navigation traffic, salinity and turbidity tolerance levels), the proposed projects do have the potential for mitigating the vulnerability. However, continued monitoring of the presence, health and productivity of oyster beds along the Texas coast is necessary, and future projects are likely needed to augment those identified in this Plan

VI. Does the project address the causation of the physics driving the Vulnerability, or does it mitigate the effects?

Proposed projects addressing this Region 1 vulnerability are primarily focused on mitigating the effects of the ongoing loss of oyster beds in terms of both acreage and productivity. Projects focused on other vulnerabilities associated with Region 1, however, can address causation to the extent that they resolve salinity and turbidity problems that adversely impact oyster beds.

VII. What are the recommendations for a resilient coastline?

Reef placement should be considered carefully and ongoing monitoring is important.

G. Rookery Island Creation and Restoration

I. What vulnerability was assessed and what are the risks?

As with Texas bay shorelines, rookery islands have been subjected to increased erosion due to vessel wakes, wind, and waves. To date, a large number of such islands have experienced significant erosion damage or have degraded completely. Lacking suitable nesting habitat on these islands, shorebirds and migratory birds congregate in nearshore coastal communities and become more susceptible to inland predators. Over time, these bird populations decrease, sometimes to the point of endangerment or extinction.

II. What are the physics of the system that drive this vulnerability?

The physical vulnerability of rookery islands is largely a function of shoreline erosion. Physical mechanisms that drive such erosion within Region 1 are typically are related to one or more of the following:

- Ship wakes from vessels, notably in the GIWW and Houston-Galveston Ship Channel;
- Localized wakes due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise; and/or

- A change in the sediment supply due to upstream modifications (e.g., dams).

III. What projects/groupings address this vulnerability?

Nine projects related to rookery islands in Region 1 are proposed (i.e., 21, 616, 618, 619, 620, 622, 716, 717, 797); they are listed in Figure 39 and described in Table 12. All focus on the restoration of rookery islands, with erosion control and habitat improvements as key elements.

Figure 39 Location of rookery island projects in Region 1[3]

Table 12. Description of Rookery Island Projects in Region 1

Project Number	Project Name	Project Description
616	Alligator Point Island Restoration	To support colonial water bird populations, this project seeks to enhance the existing island to a sustainable elevation and increase its size. The island as currently designed will be similar to its configuration is 1990 of approximately 10 acres in size and at approximately 4 ft. elevation mean tide. The island will be protected by the placement of approximately 4,000 ft. of breakwater and will be planted with desirable plant species that will support platform and ground nesting species.
618	Jig Saw Island Restoration	The project will aim to restore Jigsaw Island to support and sustain the multiple bare ground nesting bird species that inhabit the island. The project will include 2,900 linear feet of reef structures to mitigate erosive wave action and 3.4 acres of restored island habitat, 1.26 acres of which would support ground nesting birds (elevation above 2 feet MTL).
619	Rollover Bay Island Restoration	This project proposes to restore one of the historical islands to an elevation of +4 feet MTL and a size that will sustain colonial bird use into the future. The island would provide approximately 7.5 acres of long-term nesting habitat for waders and pelicans and will be protected by breakwaters segments each approximately 2,200 feet in length.
620	Smith Point Island Restoration	The project will enhance the existing breakwaters and add new components totaling 2,250 feet in length, restore the size of the island to 6 acres and increase its elevation to approximately 4 feet above mean tide level (MTL), and add an oyster cultch berm of approximately 2 acres in size that will serve as intertidal and subtidal reef.
622	Seabrook Habitat Island Restoration	The Seabrook Habitat Island Restoration project aims to restore a historical marsh island on the central western shore of Galveston Bay. The restoration of this island will restore approximately 22 acres of critical wetlands and marsh habitat beneficial to resident and migratory water birds, fish, and other aquatic life.
716	Galveston Bay Bird Nesting Islands Restoration	The objective of the project is to restore various rookery islandsâ€™ footprints to historical size and increase elevations that will better support colonial water birds over the long term. Dredged material will be strategically added to the Vingt-Et-Un Islands to increase elevation and prevent over wash of ground nesting birds. Shrubs and other vegetative plantings will be added to stabilize sediment and provide nesting sites for shrub-nesting colonial water birds. A structure to reduce wave action/intensity will likely be needed.
717	South Deer Island Acquisition and Restoration	The project involves the acquisition and restoration of South Deer Island to ensure that the site is properly managed and to protect the important ecological site to directly benefit the various species that use the island for nesting.
21	Galveston Bay Ecosystem Rookery Islands	The project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-une Islands, Rollover Bay Islands, Chocolate Point Island, West Bay Bird Island, Smith Point Island, North and South Deer Islands, and other rookery islands in the area. The proposed project will create additional acres of potential nesting habitat by reestablishing intertidal marsh and will promote shoreline stabilization.
797	Restore Colonial Water Bird Rookery Habitat in Dickinson Bay	The objective of this project is to restore two 5 to 7 acre colonial water bird rookery island in Dickinson Bay, which will be Phases II and III of the original Dickinson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approximately 5 acres of nesting space for colonial water birds and 2-acres of oyster reef. Approximately 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 and around Dickinson Bay. Partial funding is in place for these phases.

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

The restoration of rookery islands must be considered in the context of the primary vulnerability associated with the location of each proposed project. In many cases, restoration requires additional shoreline stabilization to enhance resiliency in light of erosive forces that contributed to the original erosion of the islands. Islands exposed to long fetches or influences from ship wakes from the Houston-Galveston Ship Channel are particularly vulnerable.

The entirety of Region 1 is subject to relative sea level rise and the resultant degradation of low-lying areas such as rookery islands. Measures to elevate and protect rookery islands must be planned and designed with such factors in mind.

Each of the proposed projects restores or establishes new rookery habitat. Table 13 shows the potential vulnerabilities for the sites in Region 1. Given historical erosion trends at the sites, and the likely inability to reverse the physical conditions contributing to that erosion, some form of structural protection for all of the sites is likely needed.

Table 13. Vulnerabilities for Rookery Island Sites

Project Number	Historical Physical Vulnerability	Future Vulnerability
616	wake from GIWW, RSLR, extreme storm erosion	wake from GIWW, SLR, extreme storm erosion
618	wake from GIWW, extreme storm erosion, RSLR, recreational wake	wake from GIWW, SLR, extreme storm erosion, recreational wake
619	wake from GIWW and Rollover Pass, fetch and wave exposure, extreme storm erosion, RSLR, recreational wake	wake from the GIWW, SLR, large fetch and wave exposure, extreme storm erosion
620	large fetch and wave exposure, subsidence (RSLR), extreme storm erosion	SLR, large fetch and wave exposure, extreme storm erosion
622	Localized high subsidence due to groundwater extraction (RSLR), continued exposure to ship wake, large fetch and wave exposure, extreme storm erosion, recreational wake	SLR, large fetch and wave exposure, extreme storm erosion
716	large fetch and wave exposure, subsidence (RSLR), extreme storm erosion	SLR, large fetch and wave exposure, extreme storm erosion
717	wake from GIWW, extreme storm erosion, RSLR, recreational wake	wake from GIWW, extreme storm erosion, SLR, recreational wake
797	large fetch and wave exposure, ship wake from Houston Ship Channel, subsidence (RSLR), extreme storm erosion	SLR, large fetch and wave exposure, extreme storm erosion, wake from Houston Ship Channel

V. Is the project or grouping effective at mitigating the vulnerability?

If designed appropriately in order to mitigate the historical and future physical vulnerabilities noted in Table 13, these projects are expected to be effective at mitigating the vulnerability.

VI. Does the project address the causation of the physics driving the vulnerability, or does it serve to mitigate the effects?

The proposed projects mitigate the physical effects of erosion on rookery islands. Addressing causation requires a broader focus on factors such as relative sea level rise and extreme weather events.

VII. What are the recommendations for a resilient coastline?

The nine proposed projects focusing on rookery islands are directed primarily at habitat enhancement by restoring islands through erosion control and mitigation In so doing, the set of vulnerabilities presented in Table 13 must be kept in mind to ensure that project designs accommodate the array of issues (e.g., relative sea level rise, extreme weather events, vessel wakes) that will continue to contribute to erosion.

H. Salt Bayou System

The Salt Bayou system was assessed separately from the rest of the Region, due to the special conditions impacting this area, described in detail below.

I. What vulnerability was assessed and what are the risks?

The Salt Bayou area of the Chenier Plain in Jefferson County has been hydrologically altered and, as a result, its natural freshwater marsh system has experienced adverse impacts on habitat, water quality and marsh loss.

II. What are the physics of the system that drive this vulnerability?

The Salt Bayou area of the Chenier plain in Jefferson County (Figure 40) has been subjected to a number of impacts (both natural and man-made) that have adversely affected this natural freshwater marsh system. This area was formed by riverine sediments from the Mississippi River that were deposited into Chenier plain ridge formations. Historically, water from riverine sources supplied marsh areas west of Sabine Lake, and salinity levels typically ranged from 0-0.5 ppt, with. some of the marshes closer to the coastline demonstrating slightly more estuarine conditions. Development activity beginning well over a century ago upset the natural system; a rail line constructed from Beaumont to Sabine Pass is a case in point.

In the early 1900s, dredging and construction activities commenced on what is now known as the Sabine-Neches Waterway and Sabine Pass Ship Channel. Infrastructure development on this waterway continued through the 1960s; it is currently 40 feet deep and 400 feet wide, extending from the Gulf of Mexico to both Beaumont and Orange, Texas through branching channels. The waterway is currently authorized for deepening to a depth of 48 feet (Figure 41).

In the 1930s, construction of the GIWW was directed through the Salt Bayou area, cutting off the lower portions of the watershed from the upper portions and thereby eliminating all freshwater sources to the lower watershed. The construction of the GIWW also provided a conduit for saltwater into the system that had not existed previously. The lower portion of the watershed is now exclusively an estuarine marsh (Figure 42) when, historically, it featured both freshwater and estuarine marsh habitat.

The historical beach ridge along the Gulf coastline of the Salt Bayou area prevented or otherwise limited infiltration of saltwater to the area during the daily tidal cycle and small to mid-range tide events. The beach ridge has eroded over the years due to storm events, and the normal recovery cycle has been interrupted as sediment sources for the Gulf of Mexico (i.e., rivers) have been altered or degraded. As a consequence, this historically low-salinity marsh is inundated with saltwater during normal tidal conditions.

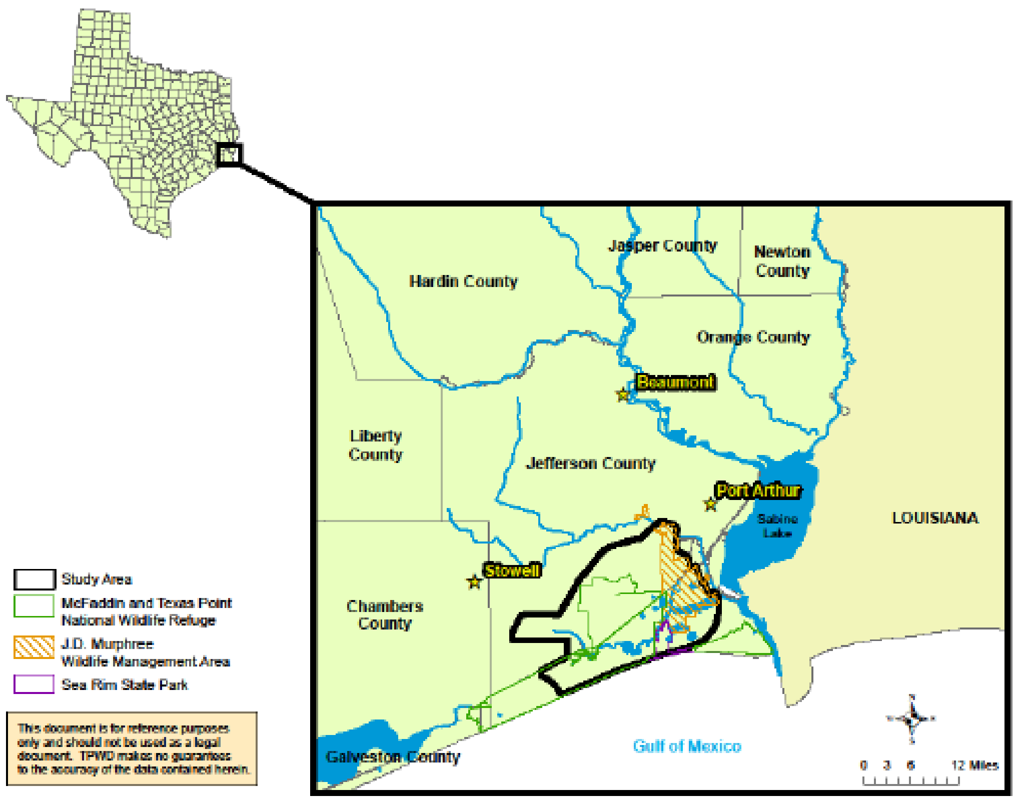


Figure 40. Location of Salt Bayou[22]

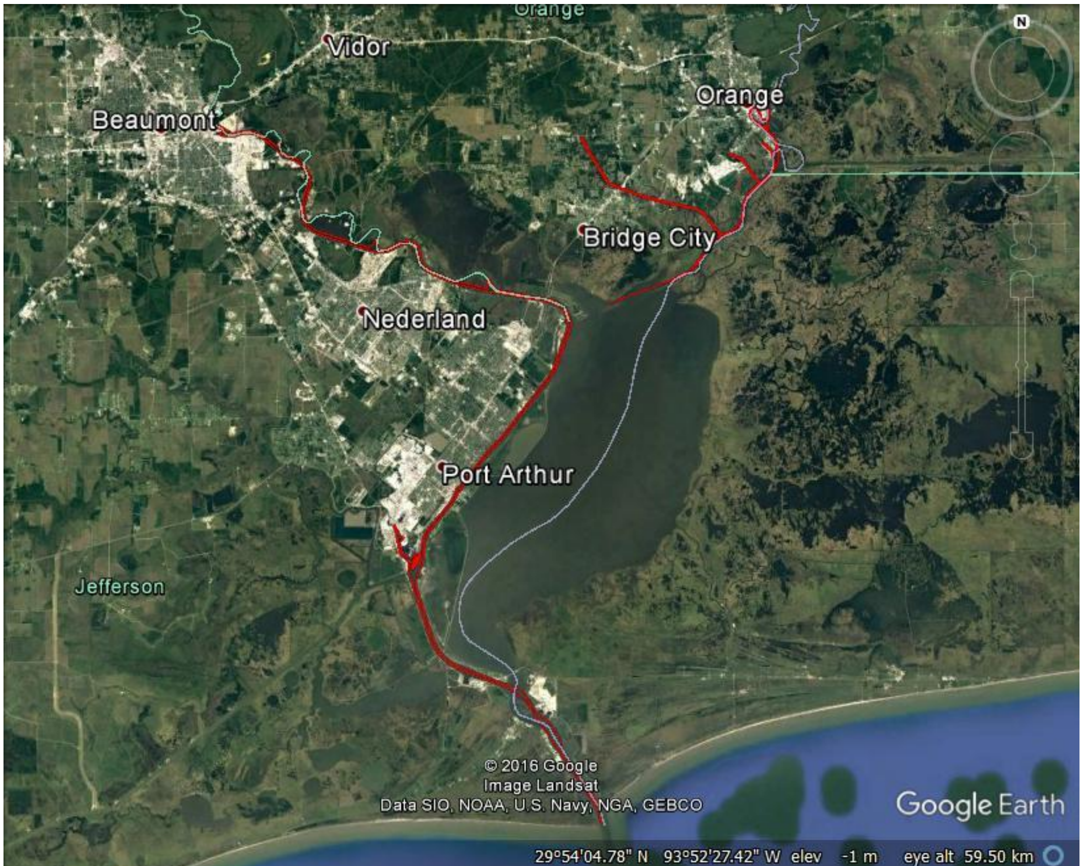


Figure 41. Extents of the Sabine-Neches Waterway[23]

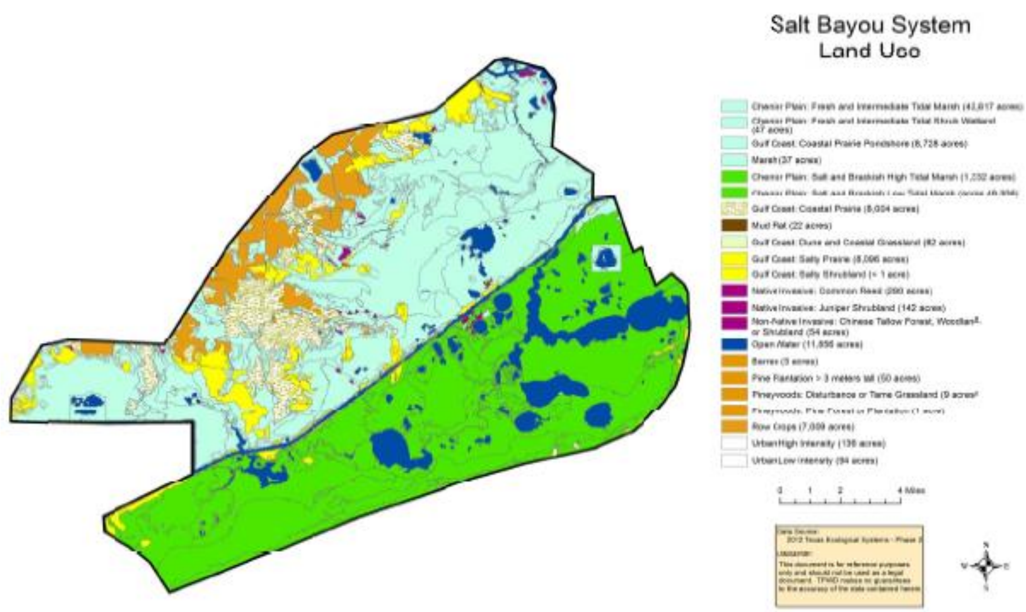


Figure 42. Land Use of Sat Bayou System[22]

III. What projects/groupings address this Vulnerability?

Seventeen projects are associated with the Salt Bayou area, and are shown in Table 13 and Figure 43. The projects generally fall into one of the following categories to mitigate vulnerabilities:

- Restoration of Gulf-facing beaches with the intent to reduce the flow of Gulf waters into marshlands;
- Hydrologic restoration by siphoning water from north of the GIWW to marshlands south of the GIWW; and/or
- Directly restoring degraded or eroded marsh.

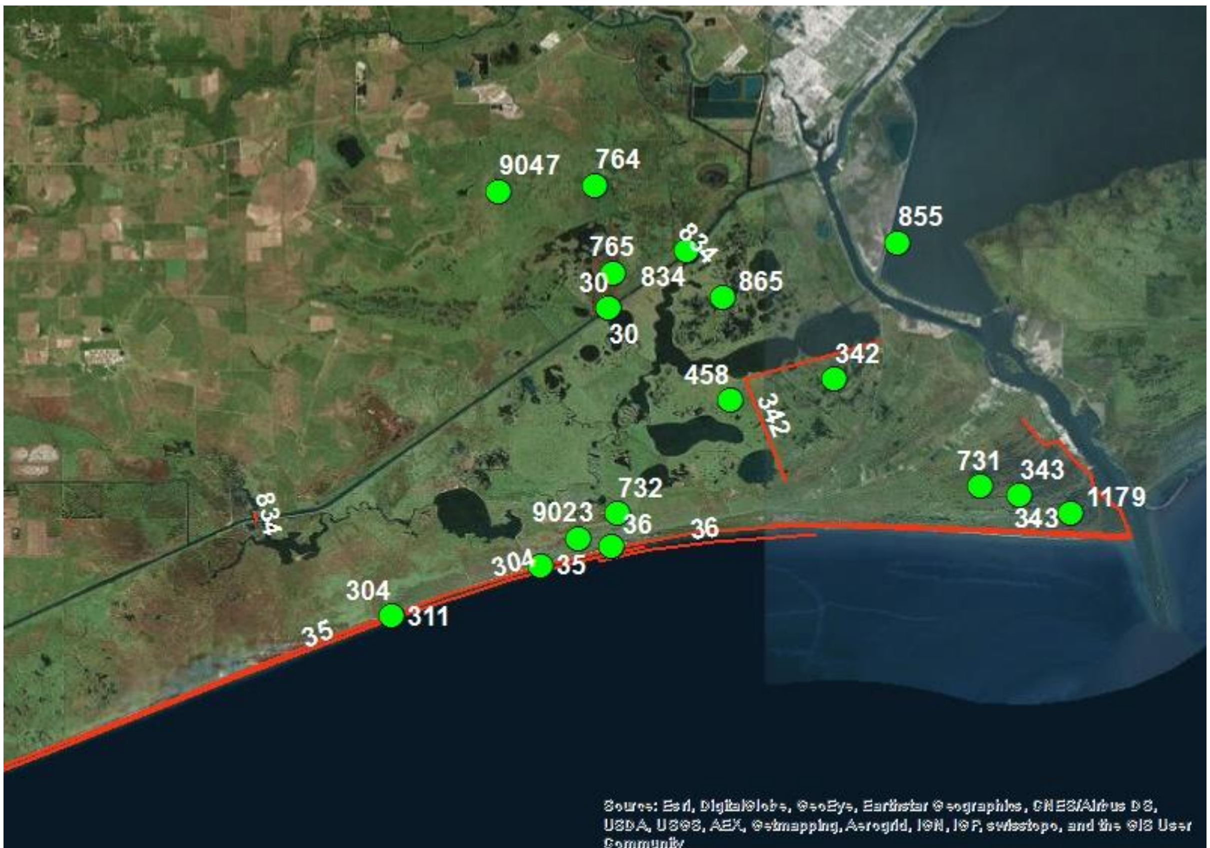


Figure 43. Projects associated with the Salt Bayou area in Region 1[3]

Table 14: Description of Salt Bayou Area Projects in Region 1

Project Number	Project Name	Project Description	Category
35	McFaddin National Wildlife Refuge Shoreline Protection	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. The project would also provide restoration of eroding Gulf-facing shoreline, dunes, and associated wetlands. Nourishing this beach will provide less-costly removal of abandoned oil wells.	Gulf Beaches
36	Sea Rim State Park Dune Restoration and Protection	This project will provide two dune walkovers, 5.2 miles of sand fencing, and dune grass planting. The project will also restore dune habitat in passes at Sea Rim State Park by installing fencing, collecting sand, and planting dune vegetation to help protect interior wetlands.	Gulf Beaches
30	McFaddin National Wildlife Refuge at Willow Lake	The project proposes to construct approximately 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 acres of emergent marsh habitat and protect 3,600 acres of existing coastal marsh from degradation. The project proposes to construct a 1,000-foot-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 Watershed. The proposed siphon would transport freshwater from north of the GIWW to the south, and benefit more than 29,000 acres of coastal wetlands.	Hydrologic Restoration Marsh Restoration
41	Texas Chenier Plain Refuge Complex	The Texas Chenier Plain Refuges Complex supports a collection of National Wildlife Refuges, including Anahuac, McFaddin, Texas Point, and Moody. The project will involve conservation of 65,000 acres of additional riverine, subtidal, freshwater and marine/estuarine wetlands, beach/dune and upland habitats.	Miscellaneous
304	Dune Restoration and Beach Nourishment, Sabine Pass to High Island	This measure would restore approximately 35 miles of shoreline in Jefferson and Chambers Counties. The area protected by the shoreline includes the community of Sabine Pass, the McFaddin and Texas Point National Wildlife Refuges, the J.D. Murphree Wildlife Management Area, and Sea Rim State Park.	Gulf Beaches
342	Marsh Restoration South of Keith Lake	The project will restore 4,132 acres of breaking marsh. A containment levee (approximately 7.5 miles long) would only be needed on the north and west sides of the property due to an existing Chenier Ridge on the southeast side that acts as a natural barrier.	Marsh Restoration
343	Marsh Restoration, Texas Point National Wildlife Refuge	The project will restore 5,172 acres of breaking marsh. A containment levee would be constructed on the east and south sides (total length of approximately 9.7 miles).	Marsh Restoration
458	Marsh Restoration, Jefferson County	The project would involve restoration of 9,304 acres of marsh habitat. Doing so would preserve special aquatic sites such as wetlands and vegetated shallows recognized as nationally significant by the Clean Water Act (33 USC 1344) and would preserve exceptionally scarce and declining estuarine intertidal and emergent marsh as determined by the latest USFWS/NOAA status and trends report.	Marsh Restoration
311	Erosion Control Structures, Sabine Pass to High Island	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.	Gulf Beaches
731	Prescribed Burning in Texas Point National Wildlife Refuge	This project will aim to restore and maintain the intermediate and salt marsh health by mimicking the natural fire occurrence in these critical habitats. This will be done by prescribed burning on a 2- to 3-year rotation dependent on habitat conditions, weather, and water levels. Prescribed burning on this interval will stimulate and improve the root systems of coastal marsh grasses, which will prevent erosion and aid marsh accretion to counter the effects of coastal erosion and subsidence.	Miscellaneous
732	Prescribed Burning in McFaddin National Wildlife Refuge	This project will aim to restore and maintain the intermediate and salt marsh health by mimicking the natural fire occurrence in these critical habitats. This will be done by prescribed burning on a 2- to 3-year rotation dependent on habitat conditions, weather, and water levels. Prescribed burning on this interval will stimulate and improve the root systems of coastal marsh grasses, which will prevent erosion and aid marsh accretion to counter the effects of coastal erosion and subsidence.	Miscellaneous

Project Number	Project Name	Project Description	Category
764	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	This project involves the acquisition of 1,700 acres of non-tidal, fresh water marsh adjacent to the J.D. Murphree WMA. The property supports a variety of wetland plants and provides habitat for species of concern, such as mottled ducks and pig frogs. Acquisition of this property would increase opportunities to conserve and manage valuable coastal habitat and would increase public access and public recreation opportunities.	Miscellaneous
765	Acquisition of Intermediate Marsh Adjacent to the J.D. Murphree WMA	This project involves the acquisition of 325 acres of intermediate emergent marsh adjacent to the J.D. Murphree WMA. The property is dominated by non-tidal marsh that is valuable as habitat for muskrat, marsh birds, and waterfowl. The property supports a variety of wetland plants and provides habitat for species of concern, such as mottled ducks and pig frogs. Acquisition of this property would increase the opportunities to conserve and manage valuable coastal habitat and would increase public access and public recreation opportunities.	Miscellaneous
834	Salt Bayou Siphons	The project involves the placement of siphons at two locations in the Salt Bayou system in southern Jefferson County. These locations are on the J.D. Murphree WMA and the McFaddin NWR. These siphons will restore a hydrologic connection between the freshwater marsh systems north of the Gulf Intracoastal Waterway (GIWW) and degraded marshes south of the GIWW. Hydrologic modeling indicates benefits to at least 4,300 acres of marsh from a siphon set in J.D. Murphree WMA, and up to 22,500 acres of marsh from a siphon set in McFaddin NWR, and up to 43,000 acres of marsh if both siphon sets are installed.	Hydrologic Restoration
865	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	TPWD is currently partnering with Golden Pass LNG Terminal (GPLNG) to restore marsh in the Salt Bayou unit of the J.D. Murphree Wildlife Management Area with dredged material from the shipping berth at the GPLNG terminal. For the current dredging cycle, TPWD has funding from National Marine Fisheries Service to pay for marsh surveys, environmental monitors, and site planting. Additional funding will be needed to retain monitors and to plant the site.	Marsh Restoration
1179	Texas Point National Wildlife Refuge Marsh Restoration	Restoration of eroding Gulf-facing wetlands in the Texas Point NWR through beneficial use of dredged material from the Sabine-Neches Ship Channel.	Marsh Restoration
9047	Sabine Ranch Habitat Protection	Sabine Ranch is a critical, 12,100-acre component of the largest remaining contiguous coastal freshwater marsh system in Texas. Protection of the Sabine Ranch, almost entirely within the McFaddin NWR boundary, is the U.S. Fish and Wildlife Serviceâ€™s (USFWS) top conservation priority for the upper Texas coast. Sabine Ranch's central position within 100,000+ acres of federal and state protected beach and marshland make the permanent protection of this coastal habitat critical to the entire complex. Conserving and restoring these lands will avert further losses of marshland and biological diversity. Sabine Ranchâ€™s coastal marshes, prairies and woodlots provide important habitat for 35 of the 48 avian species that are USFWS Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.	Miscellaneous

IV. How does the project or grouping mitigate the vulnerability?

The ecological integrity of this system is compromised by salt water intrusion and a lack of freshwater inflow of the lower marshes. Factors of causation include the cut-off of freshwater inflow across the GIWW; inundation of marsh system under normal tidal conditions; direct intrusion from the Sabine-Neches Waterway; and direct intrusion from the GIWW.

Primary mitigation mechanisms to address this vulnerability include building up the shoreline (to protect the lower marshes from regular inundation) and siphoning water from upland marshes in an effort to approximate the natural hydrology of the region. Protecting shorelines on the GIWW itself will reduce marsh erosion and degradation. If these measures do not adequately address the vulnerability, additional measures (e.g., saltwater barrier control structure) could be considered to separate the marsh from the Sabine-Neches Waterway.

After the hydrology of the marsh system begins to revert to a more natural salinity regime, and water quality does the same, habitat and marsh restoration efforts are likely to be more effective and sustainable. Dredged material is an effective means of building elevations and, once accomplished, placement of this material can promote native plant growth.

V. Is the project or grouping effective at mitigating the vulnerability?

Singly and collectively, this group of projects will be effective in mitigating the vulnerability. The diversity, interrelatedness and close proximity of these projects, coupled with their inherent complexity, emphasizes the importance of a highly collaborative and integrated design and implementation process. Equally important will be monitoring programs to assess various performance indicators (e.g., salinity of marsh systems, habitat improvements, shoreline protection) and inform any requisite adaptive management actions). As completing all of the projects may be cost prohibitive, the primary projects to consider may be those related to hydrologic restoration and the restoration of the protective coastal dune system, such as projects 35, 36, 304, 30, 311, and 834.

VI. Does the project address the causation of the physics driving the vulnerability, or does it serve to mitigate the effects?

These proposed projects collectively address the causation of the vulnerability, as they focus on restoring freshwater flows to marsh areas and protecting the Gulf-facing dune and ridge structures.

VII. What are the recommendations for a resilient coastline?

The 17 projects in this grouping comprise an array of approaches that enhance coastal resiliency. They provide for shoreline protection, habitat creation and restoration, land acquisition and conservation, marsh creation and restoration, and structural solutions (e.g., breakwaters, hydrologic siphons). Coupled with an integrated approach to design and operation, continuous monitoring and adaptive management, these projects (individually and collectively) can be expected to contribute substantially to coastal resiliency.

A further recommendation to inform all of the above is the development of a hydrodynamic model of the system that can incorporate, among others: rainfall on the grid; flooding and drying of marsh areas; tidal effects; changes in salinity; mesh geometry that adapts to changes within the system; and management techniques such as siphons and diversions.

Such a model can be a useful tool to support adaptive management by testing various alternatives, and identifying project impacts throughout the system. A hydrodynamic model can also be coupled to other models addressing items such as water quality (for instance, the Texas Water Development Board has developed a SELFE model that could be adapted to incorporate some of the marsh areas and other factors noted above) and adapted to be a useful prioritization tool.

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[3] Aerial photographs taken from the project geospatial database, described in the Report.

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[8] "Pepper Grove Cove, Galveston County, TX." 29°27'45.8"N 94°41'22.8"W. Google Earth (accessed Dec. 8, 2016).

[9] "Long Point, Galveston County, TX." 29°31'12.7"N 94°33'38.8"W. Google Earth (accessed Dec. 8, 2016)

[10] "Gordy Marsh, Galveston County, TX." 29°35'52.5"N 94°41'45.3"W. Google Earth (accessed Dec. 8, 2016)

[11] "Sydnes Island, Orange County, TX." 29°58'38.7"N 93°49'31.6"W. Google Earth (accessed Dec. 8, 2016)

[12] "Anahuac National Wildlife Refuge, TX." 29°36'20.5"N 94°25'07.7"W. Google Earth (accessed Dec. 8, 2016)

[13] "Goat Island, TX." 29°28'32.4"N 94°40'05.2"W Google Earth (accessed Dec. 8, 2016)

[14] "Greens Lake, Hitchcock, TX." 29°16'54.5"N 94°59'37.7"W. Google Earth (accessed Dec. 8, 2016)

[15] "Halls Lake, Brazoria County, TX." 29°11'02.0"N 95°06'00.6"W. Google Earth (accessed Dec. 8, 2016)

[16] "Nicks Cut, Brazoria County, TX." 29°01'39.7"N 95°14'01.8"W. Google Earth (accessed Dec. 8, 2016)

[17] "Oyster Lake, Brazoria County, TX." 29°07'21.3"N 95°10'32.5"W. Google Earth (accessed Dec. 8, 2016)

[18] Trinity and San Jacinto and Galveston Bay Basin and Bay Expert Science Team (BBEST). 2009. Environmental Flows Recommendations Report. Texas Commission on Environmental Quality. Available at: https://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/eflows/trinity_sanjacinto_bbestrecommendationsreport.pdf (accessed Dec. 8, 2016)

[19] "Sweetwater Lake, Galveston County, TX." 29°15'51.4"N 94°53'22.7"W. Google Earth (accessed Dec. 8, 2016)

[20] "Robinson Lake, TX." 29°35'12.8"N 94°35'45.1"W. Google Earth (accessed Dec. 8, 2016)

[21] "Wallis Lake, Chambers County, TX." 29°32'41.2"N 94°42'32.5"W. Google Earth (accessed Dec. 8, 2016)

[22] Salt Bayou Marsh Workgroup. 2013. Salt Bayou Watershed Restoration Plan. Texas Parks and Wildlife Department. Available at: http://tpwd.texas.gov/publications/pwdpubs/media/salt_bayou_plan.pdf (accessed Dec. 8, 2016)

[23] "Sabine Neches Canal, Port Arthur, TX." 29°54'18.8"N 93°54'24.7"W. Google Earth (accessed Dec. 8, 2016)

REGION 2 RESULTS

Region 2 Contents

A. Restoration of Beaches and Dunes

I. What vulnerability was assessed and what are the risks?

The erosion of beaches adversely impacts the resilience of the ecological systems of the Gulf. Eroded beach and dune structures and systems, many of which have been removed or altered due to navigation or tourism industry developments, cannot effectively serve as storm surge defenses. Degraded beach and dune systems permit saltwater intrusion into inland coastal habitats, degrading and further reducing the vegetative buffers that would otherwise function as wave dissipaters during extreme weather events.

As described in the Plan, Texas contends with a general lack of beach-quality sand sources (i.e., in terms of grain size and minerology). However, as placement areas are reaching capacity, USACE and private entities may be willing to sell sand from their maintenance dredged materials to the State.

Within Region 2, most of the area between Sargent Beach and the Colorado River is persistently erosive and, in some cases, poses a risk of breaching and/or causing navigation issues on the GIWW (Figure 1).

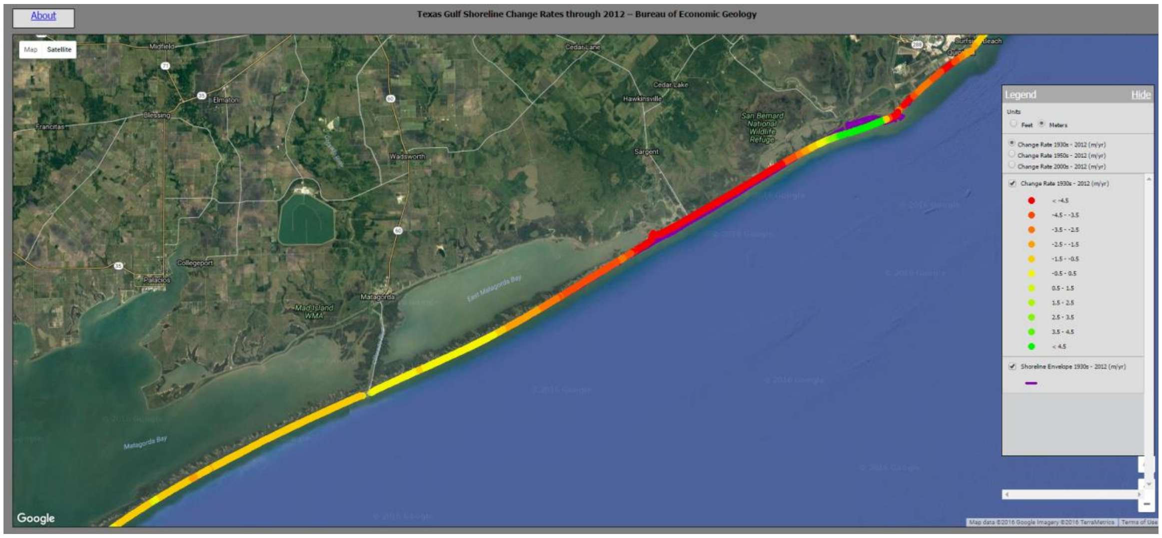


Figure 1. Erosion Along the Shoreline Within Region 2[1]

II. What are the physics of the system that drive this vulnerability?

Within Region 2, the primary cause of the extreme erosion along the Gulf shoreline is the disruption of natural sediment supply from the Brazos River. Littoral transport is primarily directed to the southwest.

The Brazos River originally flowed into the Gulf near Freeport and the legacy shoal served as the sediment source for the Region 2 Gulf coastline. The re-routing of the river and its mouth changed sedimentation patterns along the entire coastline. In addition, upstream dams decreased sediment loads to the river. The re-routed Brazos River outlet is now further south than its original location, and closer to the San Bernard River entrance channel. The latter river's limited flowrate does not allow Brazos River sediment to bypass the San Bernard River mouth. Consequently, the river mouth acts as a sediment sink, further interrupting sediment supply to downdrift beaches. Figure 2 through Figure 4 show some of the migration of the San Bernard mouth.

The mouth of the San Bernard River intermittently closes due to sedimentation within the entrance channel. There is also evidence that some sediment remains in a "loop," traveling through the GIWW and back out the Brazos River channel. The gates and locks in place on the GIWW exacerbate this problem, and navigation issues are common.

Figure 2. Brazos-San Bernard System in 1995[2]

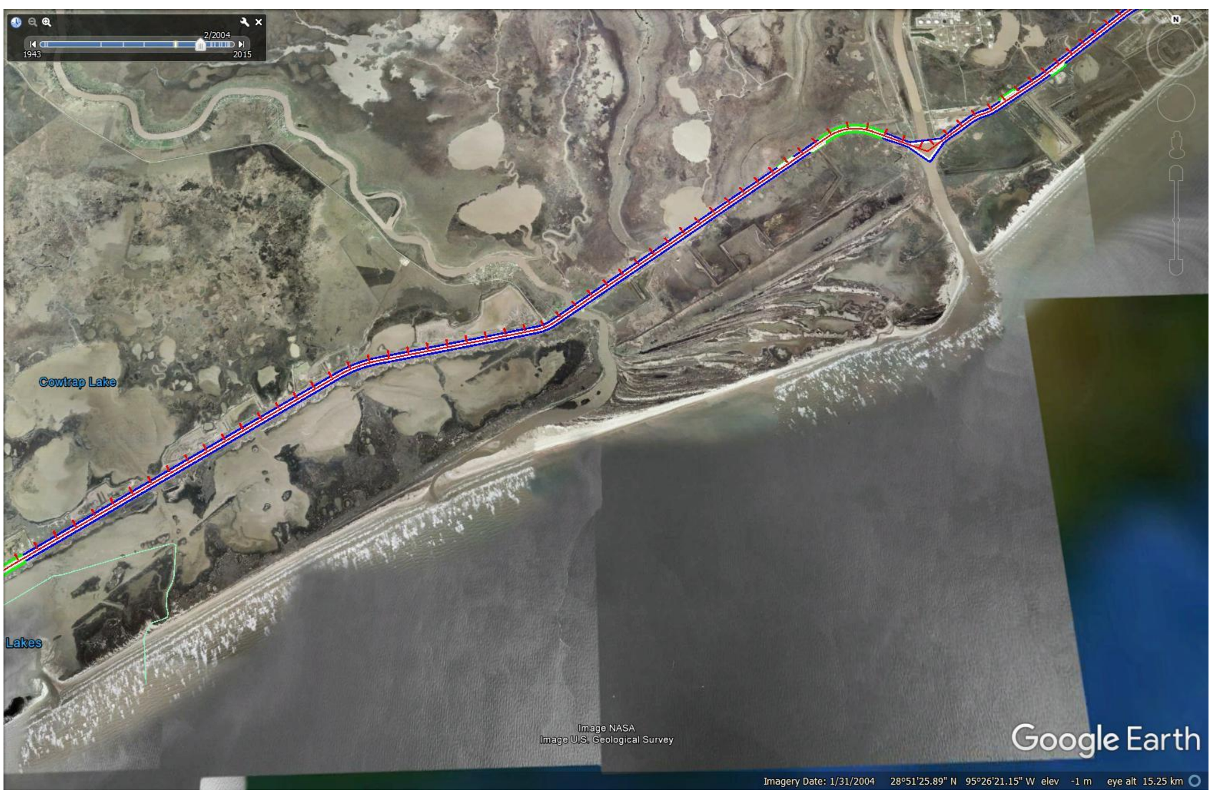


Figure 3. Brazos-San Bernard System in 2004[2]

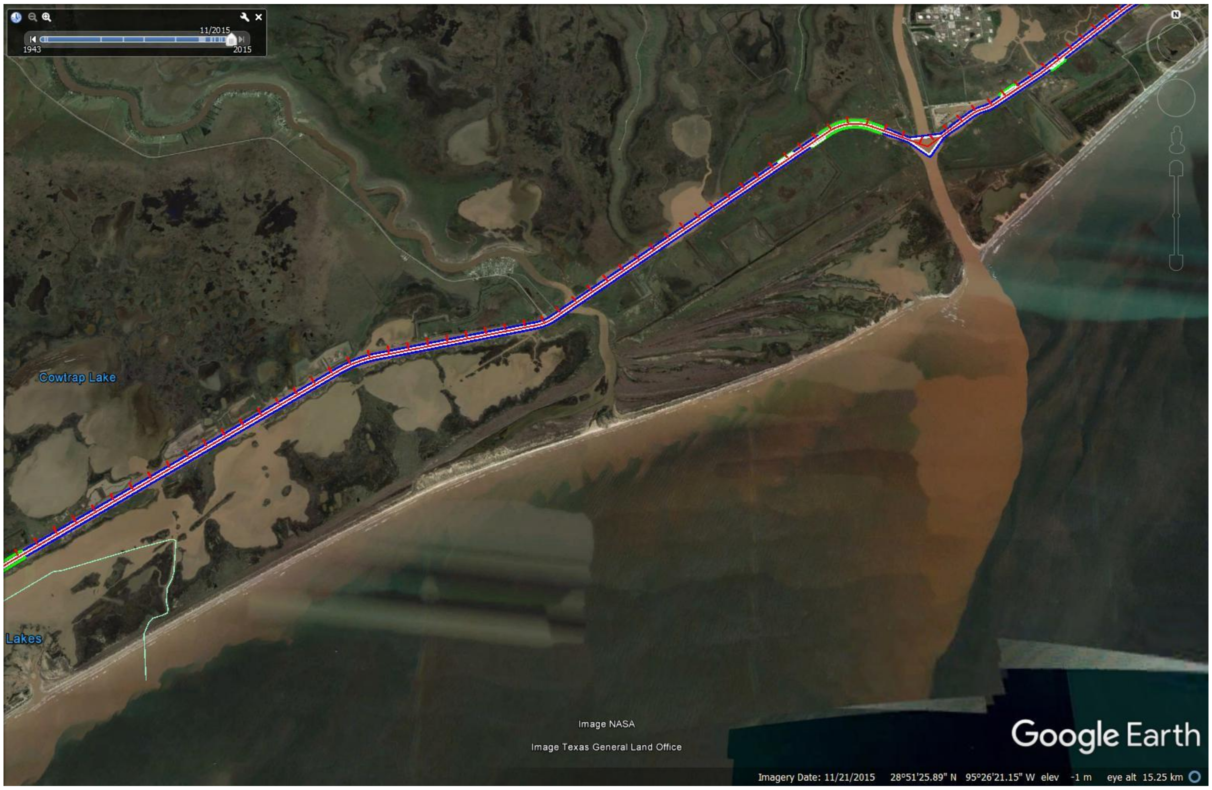


Figure 4. Brazos-San Bernard System in 2015[2]

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Within Region 2, five projects (i.e., 136, 196, 418, 917, 9056) address this vulnerability, and most are a combination of dune and beach nourishment. Figure 5 shows the projects in Region 2, and

Table 1 describes the projects related to the Gulf beaches in Region 2.

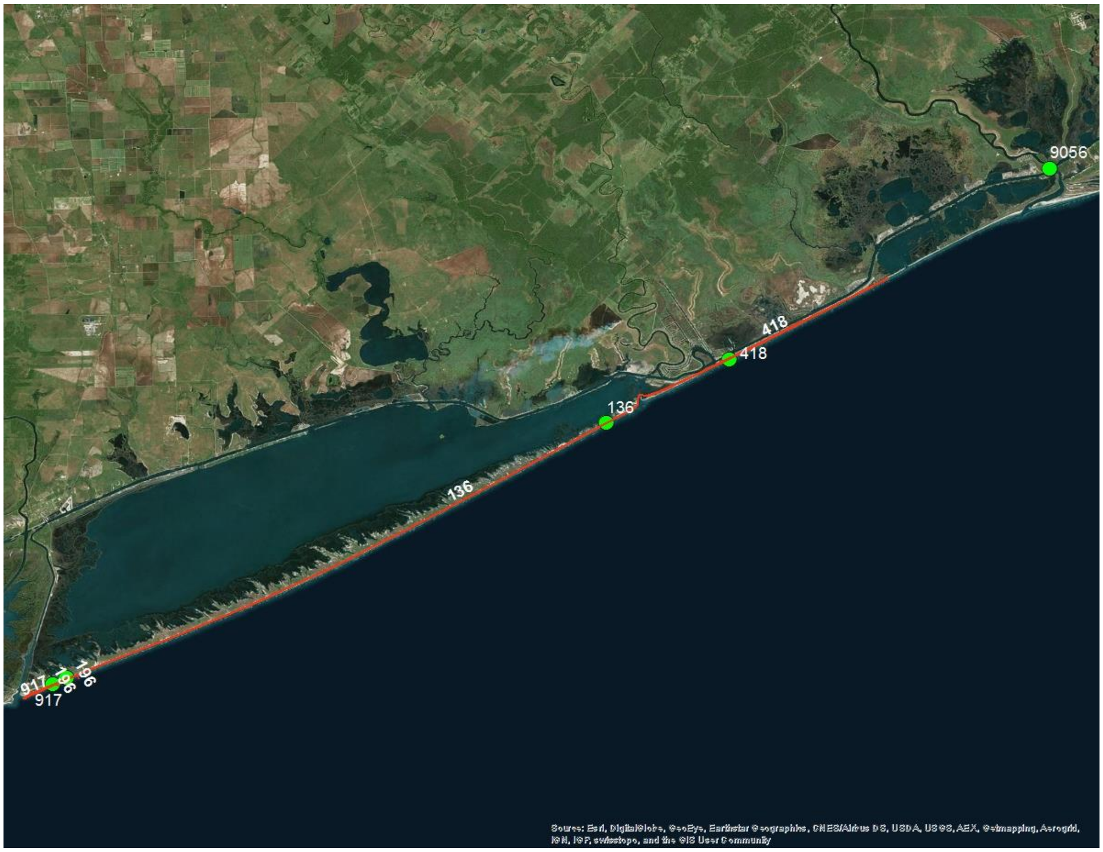


Figure 5. Gulf Beach projects in Region 2[3]

Table 1. Descriptions of Follet's Island and Bolivar Peninsula Projects in Region 2

Project Number	Project Name	Project Description
136	Dune/Beach Restoration from Sargent Beach to the Colorado River	The project involves approximately 30.8 miles of beach nourishment and dune restoration along the Gulf shoreline from Sargent Beach to the Colorado River.
418	Sargent Beach Dune/Beach Restoration	The project involves approximately 8 miles of beach and dune restoration in Sargent Beach.
917	Matagorda Beach/Dune Restoration	The proposed project includes 3 miles of beach and dune restoration with dune planting from the mouth of the Colorado River to 3 Mile Cut.
196	Matagorda Peninsula Groin System	The proposed project will involve the construction of 3 new groins and an optional beach fill. The goals of the project are to increase the dry beach width by 200 feet over the project area and to have no impact to shoreline change rates at 3 Mile Cut.
9056	Restoration of the San Bernard River Deltaic Process	The San Bernard River mouth has closed numerous times. Restoration of a functional river mouth would alleviate navigation issues at the Brazos River lock/gate, enhance sediment movement towards Sargent, and improve water quality conditions in the San Bernard River. The addition of a gate west of the San Bernard River would provide a means to maintain the river mouth. This would require a concerted effort at operating the locks/gates to ensure that flow conditions maintain the river mouth. A study is proposed to determine the best means and methods for the restoration.

IV. How does the project or grouping mitigate the vulnerability?

Projects 136, 196, 418 and 917

The first four projects (i.e., 136, 418, 917, and 196) address the lack of sediment supply on Region 2 beaches by adding additional sediment via nourishment activities or maintaining sediment in the system using groin fields. Given erosion rates at places like Sargent Beach, the projects may require substantial re-nourishment on an ongoing basis.

Project 9056

Project 9056 addresses the sediment sink issue (noted earlier) by using lock/gate operations to improve maintenance of the river mouth. This may also move some of the sediment currently trapped in the river mouth downdrift to starved beaches. Additional study is needed to verify that San Bernard River flows under these conditions are sufficient to allow the Brazos River sediment to bypass the river mouth.

V. Is the project or grouping effective at mitigating the vulnerability?

Nourishment is generally effective in providing additional beach width over an extended period, provided that re-nourishment is a component of the project. Knowledge of sand pathways helps ensure that nourishment activities are properly and efficiently targeted. Nourishment projects that address larger, continuous reaches are generally found to be more effective at mitigating vulnerabilities than smaller, localized efforts.

Dune construction can restore and/or establish valuable habitat and, with the exception of large flood events, will provide some degree of protection from waves and storm surge. Dunes also provide a significant natural source of sediment under the case of overwash.

VI. Does the project address the physics driving the vulnerability, or does it mitigate the effects?

Beach nourishment does not address the underlying cause of erosion in this area, which is a direct result of coastal development and near-shore activities that have modified the sand source of the Brazos River. However, given the sediment starved beaches, nourishment is a good mitigation option.

VII. What are the recommendations for a resilient coastline?

Beach nourishment activities are effective in mitigating vulnerabilities in developed areas, provided that re-nourishment takes place via long-term maintenance. Further, any additional prospective development in these areas needs to be evaluated to determine the nature of their impacts on both local and regional sediment conditions. A continuous dune line provides a valuable habitat and sand resource as well as some protection against wave and storm surge events. Dune lines are most resilient when installed without breaks and when vehicular access is limited.

As noted earlier, additional studies are also recommended to identify measures that can be effective in addressing the sediment sink problem in the San Bernard River.

B. Bay Shoreline Stabilization and Estuarine Wetland Restoration

I. What vulnerability was assessed and what are the risks?

Coastal erosion and land loss is a continuing trend in many Texas bay systems, driven by ship wakes from large vessels traveling to Texas ports in increasing numbers. Also contributing to coastal erosion and land loss are coastal storms that degrade vegetative buffer zones, reef structures, and barrier islands, as well as human activity that results in climate change impacts (e.g., sea level rise and land subsidence). Shoreline erosion along the coast has major, negative implications for the future in terms of flooding and related storm surge damages to coastal communities, and attendant negative implications for public safety, infrastructure, and habitat loss and degradation.

Erosion has contributed to marsh degradation throughout the coastal region of Texas. Degrading marshland is correlated with losses or reductions of habitat diversity as evidenced by losses of nursing and nesting grounds for birds, and the losses of marine and estuarine habitat for fish and organisms. Flood gates and other structures installed in bay systems can significantly alter sediment transport mechanisms which, in turn, deplete sediment deposit processes in marshes. If mitigation efforts are not pursued, marsh and habitat loss issues will be exacerbated by sea level rise and continued coastal development.

II. What are the physics of the system that drive this vulnerability?

Physical mechanisms that drive shoreline erosion within Region 2 bay systems are typically related to one or more of the following:

- Ship wake from vessels;
- Localized wake due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;

- Relative sea level rise; and/or
- A change in sediment supply due to upstream modifications (e.g., dams).

Vessel Induced Ship Wakes

Shipping channels in Region 2 are classified as either deep draft or shallow draft.

The major deep draft channel in Region 2 is the Matagorda Ship Channel (Figure 6). The entrance channel is north of Pass Cavallo at the southern end of the Matagorda Peninsula. The channel crosses through Matagorda Bay. Additional deep draft channels connect the main ship channel to Port Lavaca, Harbor of Refuge, Point Comfort and Red Bluff. The main Ship Channel is dredged to a depth of 36 feet.

The major shallow water draft channel through Region 2 is the GIWW. Shoreline erosion due to barge navigation through the GIWW is of concern, and addressed separately than bay shoreline vulnerabilities. The GIWW crosses Matagorda Bay from southwest to northeast. A shallow draft tributary to the GIWW extends to Palacios in the northeast part of Matagorda Bay. The GIWW was re-aligned in 2007.

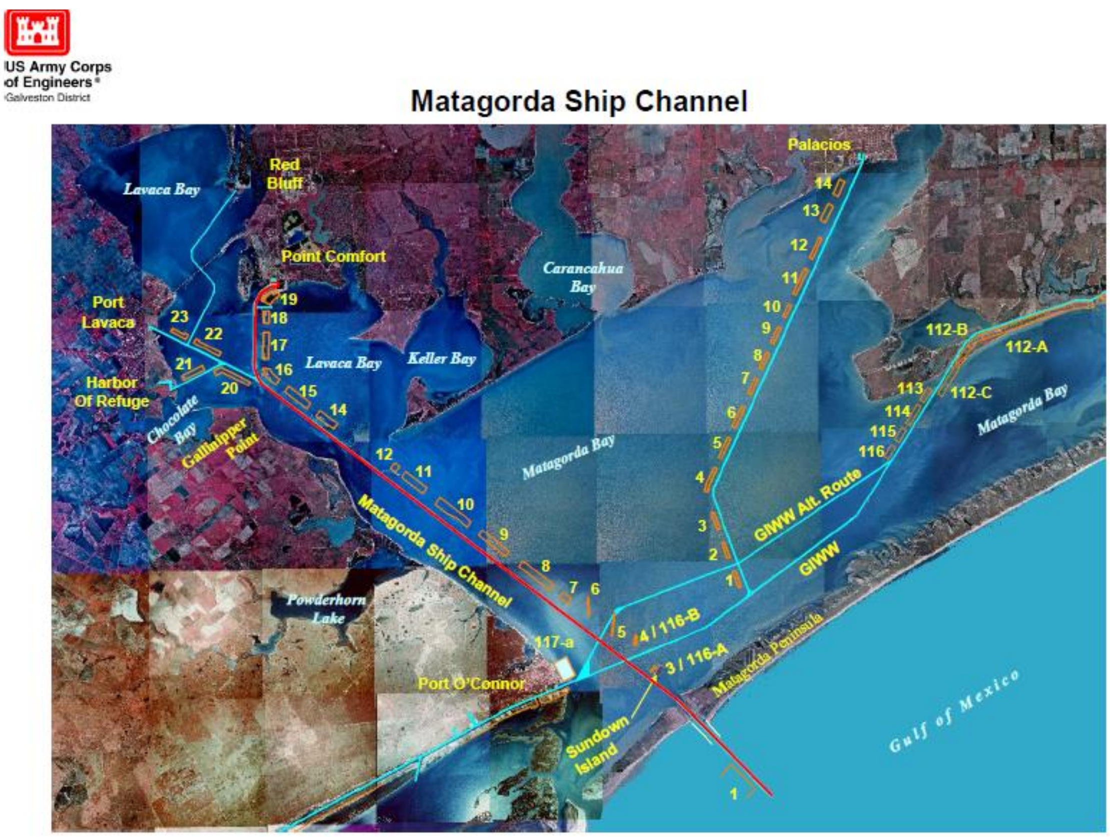


Figure 6. Matagorda Ship Channel[4]

Localized Wakes due to Recreational Boating or Jet Skis

Localized shoreline erosion can occur in places where recreational boating and/or jet skiing is common. These activities cause wave effects that, over time, can have significant adverse impacts with regard to shoreline erosion.

Structural Intervention Disrupting Sediment Transport

Structures such as groins or jetties can disrupt sediment transport and result in areas with limited sediment supply and pockets of erosion. This is typically seen along Gulf-facing beaches where littoral transport is evident, but can also be present in bayside shorelines as well. Structural intervention alternatives are best determined on a case-by-case basis.

Large Fetch and Natural Shoreline Migration

Shorelines are not static; they have cycles of sediment migration responding to factors such as storm events, changes in sediment supply, and natural variability in wave conditions. Some shorelines are in a state of natural erosion for some of the time, but with a balancing natural state of accretion during other times. However, the accretion cycle can be disrupted by an interruption of sediment supply or the influence of relative sea level rise, resulting in erosion problems over time.

Relative Sea Level Rise

Relative sea level rise is a function of two interacting factors: land subsidence and weather change-induced increases in sea level.

Land subsidence along the Texas coast is a widespread problem that is typically associated with the withdrawal of groundwater and oil and gas. A state wide study of subsidence rates for the USGS and TWDB found that rates in Region 2 (called Subregion 3 in the study) are generally less than 0.5 feet over the period of record from 1942-1975. Subsidence in Region 2 was mainly caused by groundwater withdrawals prior to 1973.[5]

The combination of land subsidence and climate change-induced sea level rise translates into relative sea level rise. The resultant impact is a retreating shoreline. Given the flat topography of the Texas coast, even a modest increase in relative sea level rise (e.g., 0.5 feet) can cause significant land loss. In addition to these direct effects, the increased depth of water adjacent to the shoreline results in more severe wave action which, in turn, can result in more erosion.

Change in Sediment Supply

Rivers flowing into the coastal bays of Texas are a major source of sediment supply that helps balance natural erosion by feeding delta systems that supply shorelines around the bays through sediment transport mechanisms. Upriver infrastructure (e.g., dams) interrupts this natural supply mechanism and can lead to sediment starved deltas. This results in the direct loss of marsh habitat within the deltas, and adversely impacts surrounding marshes.

Sediment supply can also be affected from the Gulf-facing side of barrier islands. Dune migration and wind weathering on the dunes supply sediment to the bay-facing beaches of barrier islands. As Gulf-facing beaches become increasingly sediment-starved, the impact is also experienced by the bay-facing beaches of the same islands.

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Table 2 shows proposed projects within Region 2 that address issues of Bay Shoreline Stabilization and Estuarine Wetland Restoration. Figure 7 provides an aerial view of those projects. Note that the project descriptions provided in this report are draft versions used during the initial assessment of projects.

Table 2. Projects related to Bay Shoreline Erosion Vulnerability

Project Number	Project Name	Project Description
52	Restoration of Chester's Island	The project aims to slow the erosion on the island and add 30 acres of land. Potential solutions include sand filled 300-foot long geotubes or other breakwater structures, invasive species control, and other shoreline stabilization techniques. There is a need to study the hydrology of the area to reduce erosion and currents/tides in the area.
138	Bay Shoreline from Magnolia Beach to Port O'Connor	The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.
1188	Port Alto Living Shoreline	The proposed project includes living shoreline to provide protection to the shoreline at Port Alto from erosion due to the beach in Redfish Lake.
9028	Schicke Point Living Shoreline and Marsh Protection	The project proposes shoreline protection to prevent further recedence of intertidal marsh from Schicke Point on the Matagorda Bay shoreline to the east. Potential protection method includes construction of a living shoreline combined with sediment addition.
914	Palacios Marsh Restoration	The project involves beneficial use of dredged material for approximately 400 acres of marsh restoration at Sartwelle Lake.
430	Redfish Lake on Carancahua Bay Shoreline Stabilization	The proposed project includes 3 miles of breakwaters. The restoration of the protective barrier, oyster reefs, marsh, and sea grasses would preserve special aquatic sites such as wetlands and vegetated shallows.

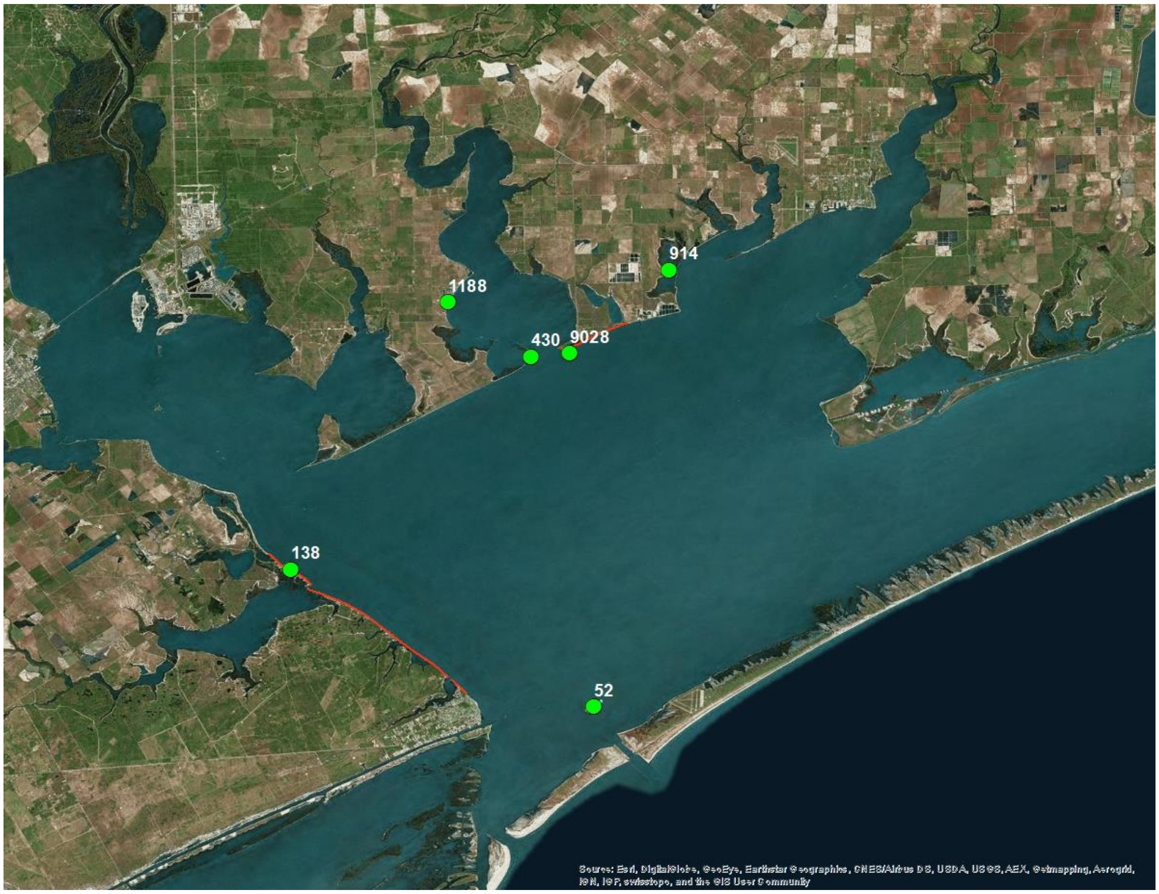


Figure 7. Bay Shoreline Erosion Projects for Region 3[3]

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

Project 52

This project slows erosion on the island and adds 30 acres of land. Potential solutions include sand filled 300 foot geotubes or other breakwater structures, invasive species control, and other shoreline stabilization techniques. There is likely a need to study the hydrology of the area (including currents/tides) in the interest of reducing erosion.

Chester's Island (also known as Sundown Island) was created through the beneficial use of dredged material in the interest of providing nesting habitat for Brown Pelicans and other birds. The island historically received dredge material every 12-16 months to help maintain its land mass. After the GIWW was re-aligned in 2007, it moved further north (away from Chester Island), resulting in the loss of a consistent source of maintenance dredging material to re-nourish the island. Further, maintenance dredging conducted by USACE decreased in frequency, exacerbating the problem and there is no natural source of sediment to the island to offset the sudden loss of beneficial use material. Also contributing to the problem is the island's exposure to a number of erosive forces, including:

- Ship wake from vessels travelling along the adjacent Matagorda Ship Channel;
- The long fetch on the northwest side of the island; and
- Currents and waves due to the island's proximity to both the entrance channel and ship channel.

A number of shoreline stabilization structures have been installed on Chester's Island including geotextile tubes and an articulated concrete mat revetment. The geotubes on the southern end of the island were considered successful, while the concrete mat revetment failed, causing additional erosion. Shoreline stabilization is recommended for future restoration efforts of this island.

Project 138

The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.

Project 138 is located on the west side of Matagorda Bay (Figure 8), along a stretch of shoreline exposed to erosion from sources that include:

- Ship wake from the Matagorda Ship Channel; and
- Wind and waves from the long fetch in Matagorda Bay.

Longshore transport along the beach has been observed going from north to south as well as from south to north. Recession can be severe. North of this site, a set of jetties and revetments were constructed along with a nourishment campaign in 2003 (Figure 9). Since that time, the site has not required additional re-nourishment.

Given the success of the project north of the site, it would be expected that a similar project, when properly designed, could help mitigate shoreline erosion in this area.

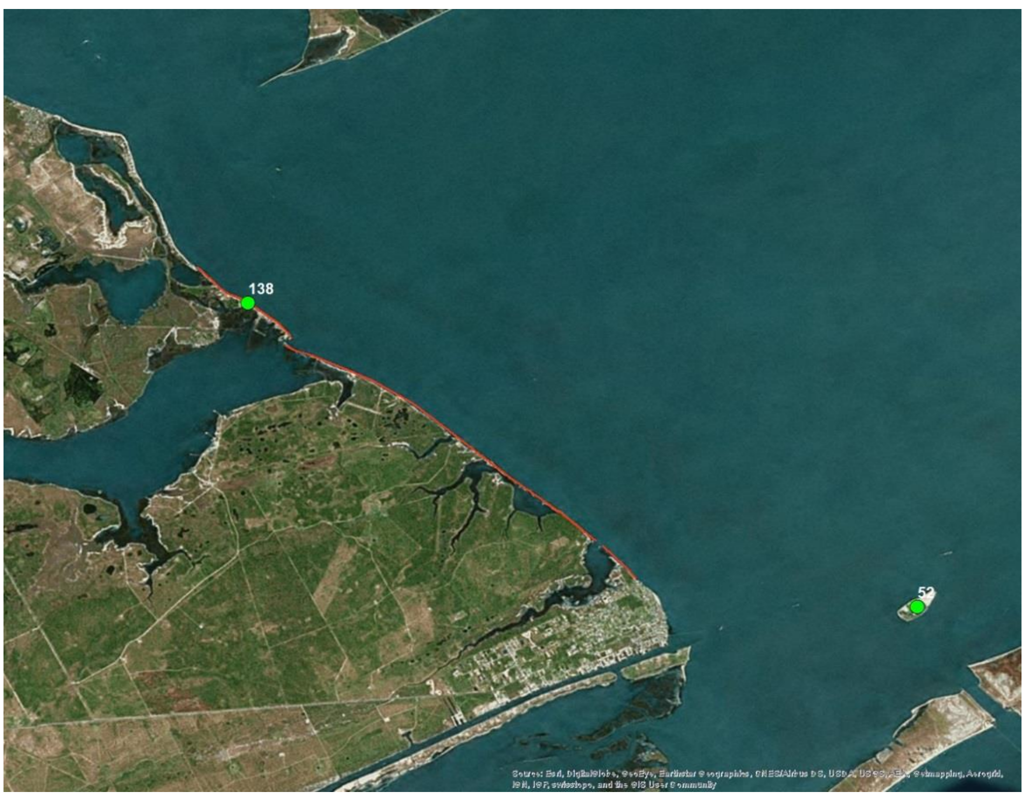


Figure 8. Location of Project 138[3]

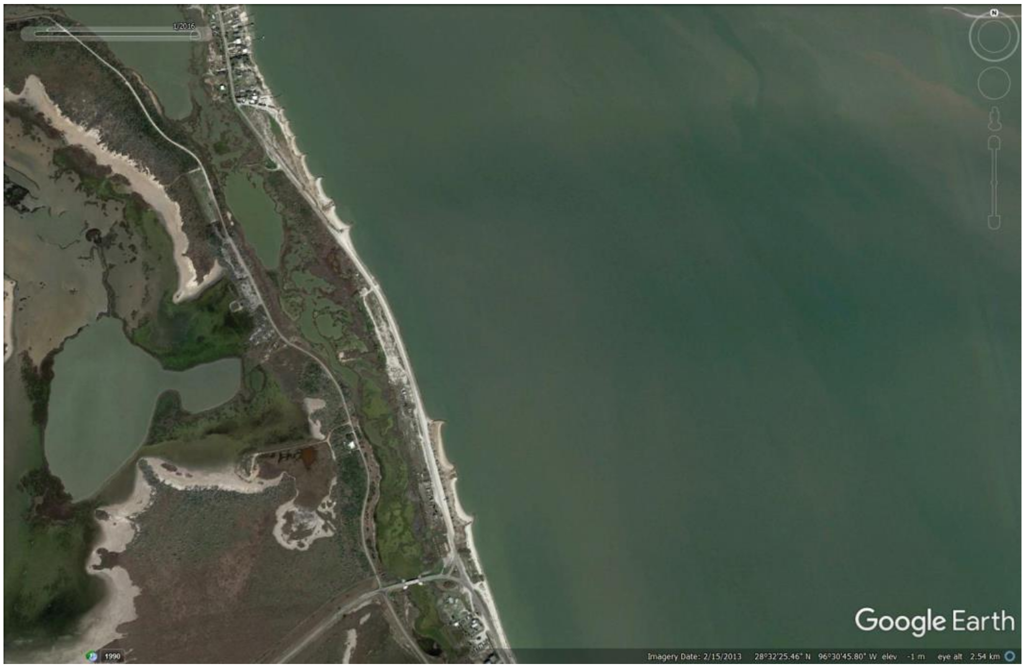


Figure 9. Structure Field North of Project 138[3]

Project 1188

The proposed project entails the installation of a living shoreline to protect the shoreline at Port Alto from erosion due to the beach in Redfish Lake (Figure 10). A number of residential structures are located along the shoreline in Port Alto; installation of a living shoreline will provide additional stability and prevent or reduce the likelihood of future land loss. Shoreline vulnerability at this location is the result of wind-driven and vessel-induced waves within Redfish Lake, as well as land loss due to relative sea level rise.

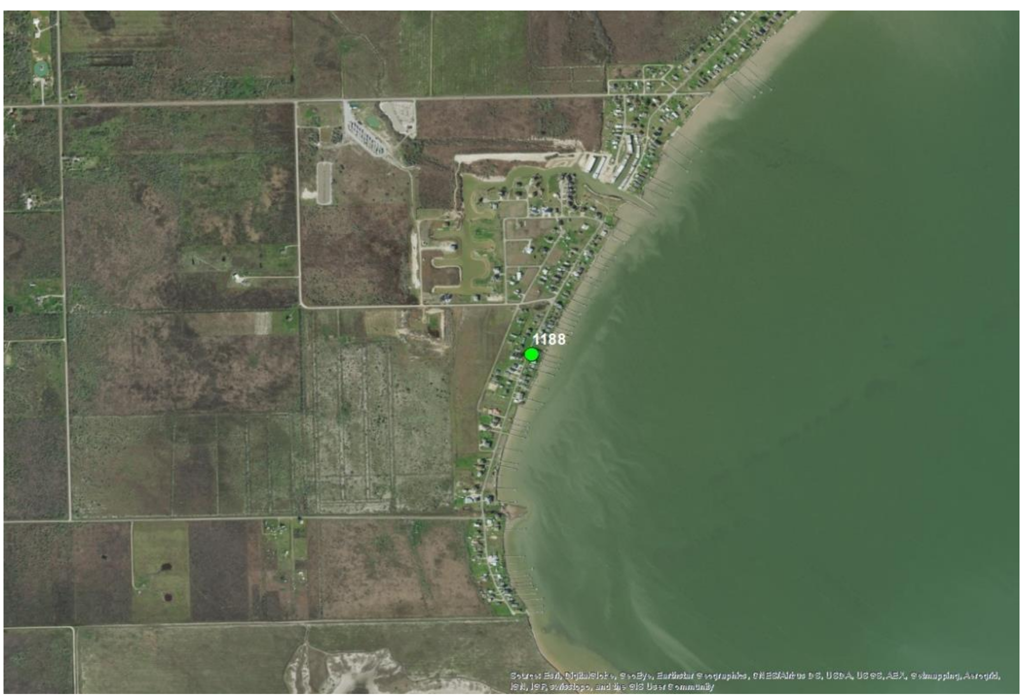


Figure 10. Location of Project 1188[3]

Project 9028

The project proposes the construction of a living shoreline, combined with sediment placement, to prevent further recedence of intertidal marsh from Schicke Point on the Matagorda Bay shoreline to the east (Figure 11). Notable recession of Schicke Point is evident on the eastern entrance to Redfish Lake. Figure 12 shows the recession from 1990 to 2016. The point is exposed to large fetches in Matagorda Bay. Installation of a living shoreline, combined with placement of sediment, is proposed as a means to prevent further recession.

Figure 11. Project 9028 Location[3]

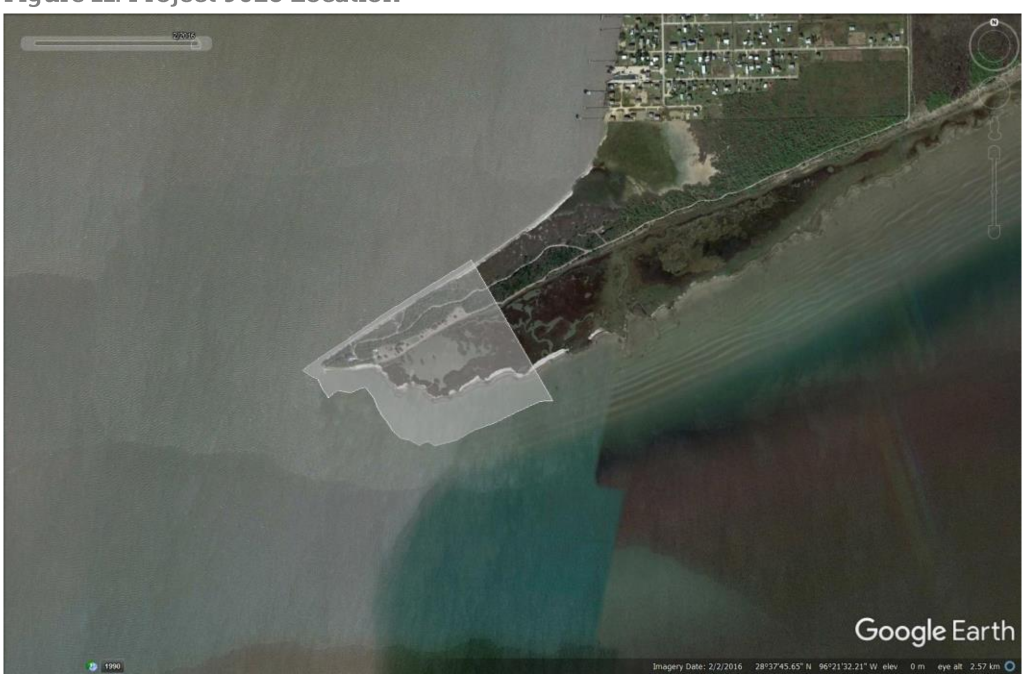


Figure 12. Recession of Schicke Point Shoreline from 1990 (white box) to 2016[6]

Project 914

The project involves the beneficial use of dredged material to restore approximately 400 acres of marsh at Sartwelle Lake (Figure 13). Much of the land loss in the vicinity of Sartwelle Lake occurred prior to 1979 as the result of inundation of estuarine marsh habitats, likely caused by high rates of subsidence at the time. The rebuilding of such habitats by beneficially using dredged material should mitigate this marsh loss, given that no other major physical vulnerabilities affect the area.

Figure 13. Location of Project 914[3]

Project 430

The proposed project entails the construction of three miles of breakwaters to restore natural protective barriers (Figure 14). Collectively, the breakwaters will facilitate restoration of oyster reefs, marsh, and sea grasses, thereby protecting and preserving aquatic sites such as wetlands and vegetated shallows. The point on the western side of the entrance to Redfish Lake has eroded significantly, primarily due to exposure to long fetches across Matagorda Bay. The proposed project restores the historical protective barrier as well as native habitats. The area was historically linked with a small channel to Redfish Lake, but the land linkage has eroded significantly (Figure 15).

Figure 14 Location of Project 430[3]

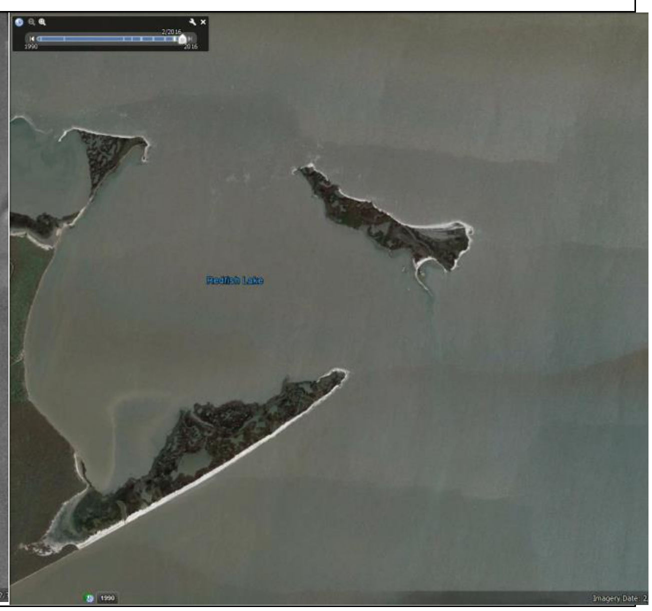
1990	2016
	

Figure 15. Historical Imagery Showing the Area Around Project 430 from 1990 (left) and 2016 (right)[7]

V. Is the project or grouping effective at mitigating the vulnerability?

The projects are effective at mitigating the vulnerability using a variety of techniques, including rebuilding shorelines using beneficial use of dredged materials and implementing structural shoreline stabilization (e.g., breakwaters). Living shoreline approaches are frequently recommended, which would mitigate estuarine wetland losses noted for the region. In some instances, key areas of breaching or habitat loss are indicated and planned for. Where structural methods are proposed, they should be designed to consider future conditions as well as potential impacts to the surrounding environments.

VI. Does the project address the physics driving the vulnerability, or does it mitigate the effects?

These projects effectively mitigate or plan for the effects of the vulnerability across the board. In some instances, the projects are able to directly address the physics driving the vulnerability (e.g., large fetch), however, many of the physical issues driving the vulnerability are expected to be persistent or even increasing (e.g., vessel wakes). Some of the physics driving the vulnerability may be able to be addressed when multiple Resiliency Strategies are implemented or when system-wide impacts are addressed (e.g., freshwater and sediment inflows). Future projects should consider projections of change along the coast, such as in the case of relative sea level rise and shifting weather patterns, to ensure that projects remain viable in the long term.

VII. What are the recommendations for a resilient coastline?

All the proposed Region 2 projects focusing on Bay Shoreline erosion issues would benefit from additional analysis of wave conditions within the Matagorda Bay system, and an enhanced understanding of their effects on shoreline erosion. Toward that end, the development and application of a regional model is recommended as a means to support the detailed design of such projects. For shorelines affected by vessel wake in the vicinity of the Matagorda Ship Channel, a wave model using sources (from vessels) is recommended as a means to further understand to transport conditions, associated implications for shoreline erosion, and means to address it.

C. Stabilizing the Texas Gulf Intracoastal Waterway

I. What vulnerability was assessed and what are the risks?

Man-made navigation channels are a large driver of ecosystem instability and degradation along the Texas coast. The GIWW is separated from adjacent bays, lakes, and other ecosystems by a series of small islands that shield inland ecosystems from vessel wakes, salt water intrusion and turbidity impacts. Over time, these islands have eroded due to channel use and maintenance. Inland marshes, wetlands, lakes, and their habitats are no longer protected from erosive vessel wakes, fetch and salt water intrusion resulting from (or exacerbated by) GIWW navigation activities. Neighboring seagrass beds are periodically inundated with sediment from maintenance dredging activities, and associated marsh and wetland degradation compromises wildlife habitat. An increased susceptibility of breaching for lakes and peninsulas that neighbor the GIWW is expected to lead to further degradation of existing ecosystems. Further, the GIWW has altered the natural hydrology of bays and wetlands near the channel. This change in hydrologic conditions is reflected in higher salinity level scenarios and reductions in freshwater inflows.

II. What are the physics of the system that drive this vulnerability?

As the GIWW traverses Region 2, a significant portion is fronted by barrier islands. Barge traffic through the GIWW is substantial, and wake from barges and other vessels result in erosion of the protective perimeter islands, leading to loss of habitat and increased exposure of interior shorelines to erosion. It can also lead to difficulties in navigation, as the magnitude and complexity of currents and waves tend to increase as protection from the islands decreases. The Victoria Barge Canal is also an offshoot of the GIWW that runs north-south through San Antonio Island, and experiences similar erosion problems.

III. What projects/groupings address this vulnerability?

Four proposed projects (i.e., 4, 51, 62, 9029) within Region 2 address erosion of the islands along the GIWW and the Victoria Barge Canal. The projects are listed and described in Table 3, and are shown in Figure 16.

Table 3. Description of GIWW Projects for Region 2

Project Number	Project Name	Project Description
4	Brazos River to Cedar Lake Creek Shoreline Protection	Shoreline erosion along GIWW creates shoaling and erosion of adjacent marshes. The length of the GIWW included in the project area is approximately 20 miles per shoreline. The project proposes breakwaters or a living shoreline along the GIWW and restoration of marshes adjacent to the GIWW.
51	Boggy Cut GIWW Protection	This project will protect the GIWW from erosion cause by wind, current, and ship wakes. Solutions may include breakwaters along the GIWW and restoration of marshes adjacent to the GIWW. The project may also include acquisition of private property adjacent to the GIWW. These efforts would improve wind and current hazards to navigation and mainland erosion.
62	Welder Flats Wildlife Management Area	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.
9029	Guadalupe Bay - Victoria Barge Canal Cuts	The land between Guadalupe Bay (GB) and Victoria Barge Canal (VBC) has eroded cuts resulting from barge traffic. These cuts allow water to flow down the VBC instead of going to GB, which robs GB of natural flows and increases sedimentaion in the VBC. Most of the eroded cuts are shallow, but one is deep. Geotubes have been used previously with some success; additional shoreline stabilization is recommended to preserve the original hydrology.

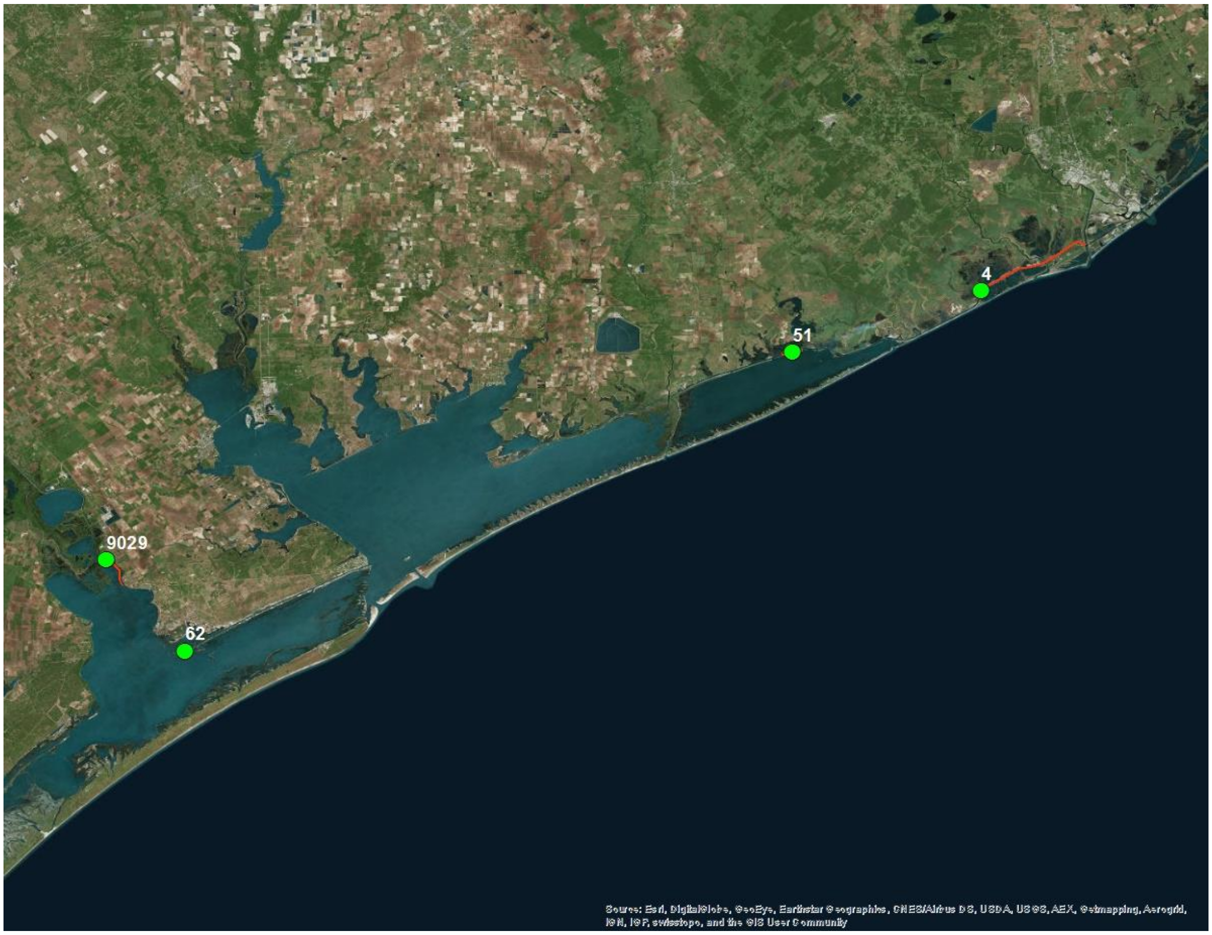


Figure 16. Locations of Channel Stabilization Projects in Region 2[3]

IV.HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

Project 4

Shoreline erosion along the GIWW results in frequent shoaling of the channel and erosion of adjacent marshes. This project entails the construction of breakwaters or a living shoreline along a 20 mile reach of the GIWW as well as restoration of marshes adjacent to the GIWW. The project reflects a need to design and implement shoreline stabilization measures to stop the ongoing erosion of adjacent marshes. Shorelines in this area have been modified significantly over the years; Figure 17 shows past and current conditions at the shoreline east of Cowtrap Lake.

Figure 17. Change in shoreline within Project 4 between 1995 (left) and 2014 (right)[8]

Project 51

This project protects the GIWW from erosion caused by wind, current, and ship wakes, while also protecting the mainland from erosion. Solutions include breakwaters along the GIWW and restoration of marshes adjacent to the GIWW. The project may also include acquisition of private property adjacent to the GIWW.

The land between the GIWW and East Matagorda Bay has been persistently erosive, primarily due to the effects of wakes from barges and other navigation traffic. This has essentially removed all barriers between East Matagorda Bay and the GIWW, causing navigation problems (i.e., increased exposure to wind, waves and currents) and loss of land adjacent to the GIWW due to exposure to both fetch and ship wake-induced erosion. The area near Boggy Cut is particularly affected by this vulnerability, as the historical islands in this location are essentially gone. Figure 18 and Figure 19 shows conditions at and in the vicinity of the proposed Boggy Cut project site.

The proposed project at Boggy Cut entails both structural and land-building measures providing separation between the GIWW and East Matagorda Bay. Due to the highly erosive nature of the area, land-building will need to include structural protection. Others areas along the GIWW are also close to losing their island protection. Figure 19 shows such an area just upstream of Boggy Cut.

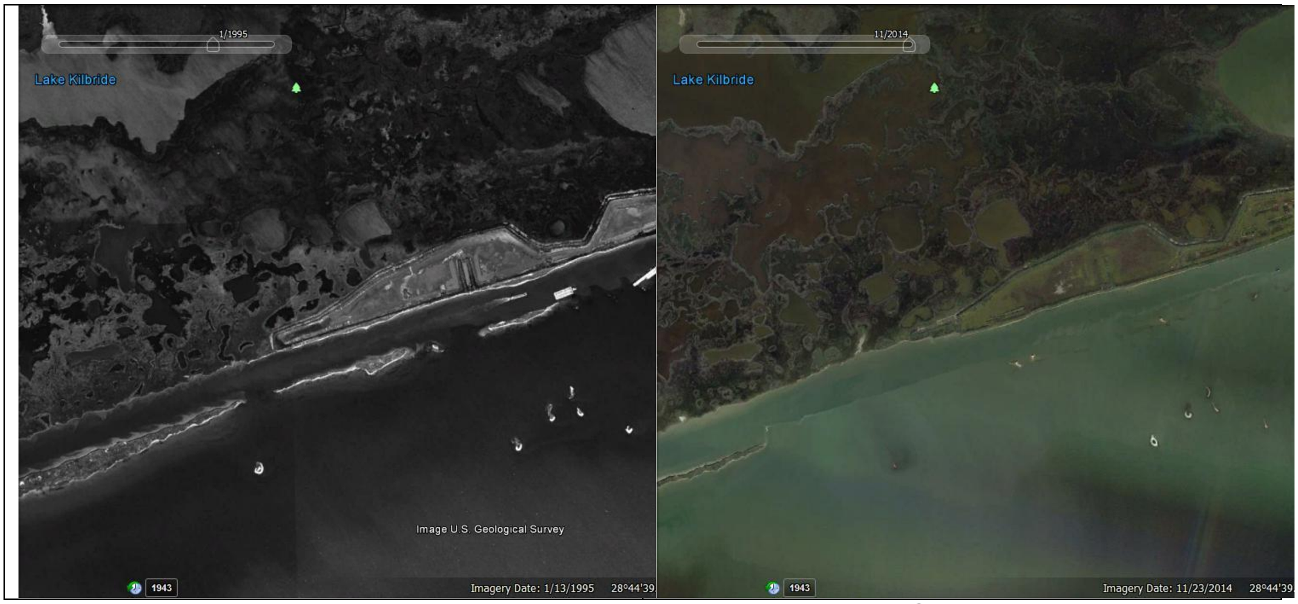


Figure 18. Land Loss Near Boggy Cut Between 1995 (left) and 2014 (right)[9]

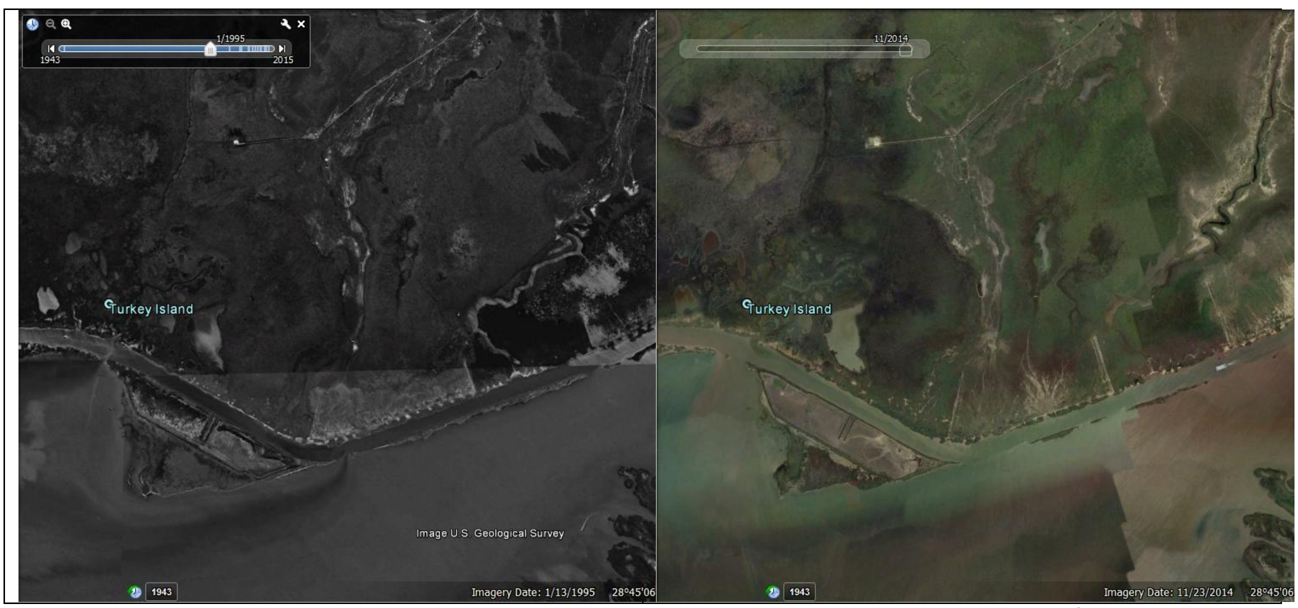


Figure 19. Land Loss in the Vicinity of Boggy Cut Between 1995 (left) and 2014 (right)[10]

Project 62

Rock breakwaters and/or a living shoreline are proposed to mitigate shoreline erosion caused by vessel traffic on the GIWW. This project protects the Welder Flats Wildlife Management Area and its 1,480 acres of submerged coastal wetlands that provide habitat for the endangered Whooping Crane, and numerous other species of waterfowl and wading birds. The Welder Flats Wildlife Management Area is located at the intersection of the Victoria Barge Canal and the GIWW (Figure 20). The primary vulnerability is wake-induced erosion from barge and other vessel traffic.

Stabilization of the shoreline will prevent additional habitat loss when appropriately designed for the wake conditions.

Figure 20. Location of Project 62[3]

Project 9029

This project entails the application of shoreline stabilization measures to preserve the natural hydrology of this area. The land between Guadalupe Bay and the Victoria Barge Canal has eroded cuts resulting from barge and other vessel traffic. These cuts allow water to flow down the Victoria Barge Canal instead of going to Guadalupe Bay, which robs Guadalupe Bay of natural flows and increases sedimentation in the Victoria Barge Canal. Most of the eroded cuts are shallow, although one is deep. Geotubes have been used previously with some success, and additional shoreline stabilization measures are needed.

The land between Guadalupe Bay and Victoria Barge Canal is persistently erosive, primarily due to barge and other vessel traffic. Given that such traffic is likely to increase in the future, this erosive force will persist. On the basis of historical imagery and in the absence of any mitigative action, the land between the two water bodies is likely to soon become ineffective as a barrier. Figure 21 shows the difference between conditions in 2006 and 2016.

The project responds to a need to identify and implement shoreline stabilization measures to restore and preserve the natural hydrodynamics of Guadalupe Bay and the Victoria Barge Canal. Given land loss to date, consideration should be given to a combination of measures for the entire length of the barrier chain (e.g., beneficial use of dredged material, structural approaches to shoreline stabilization).

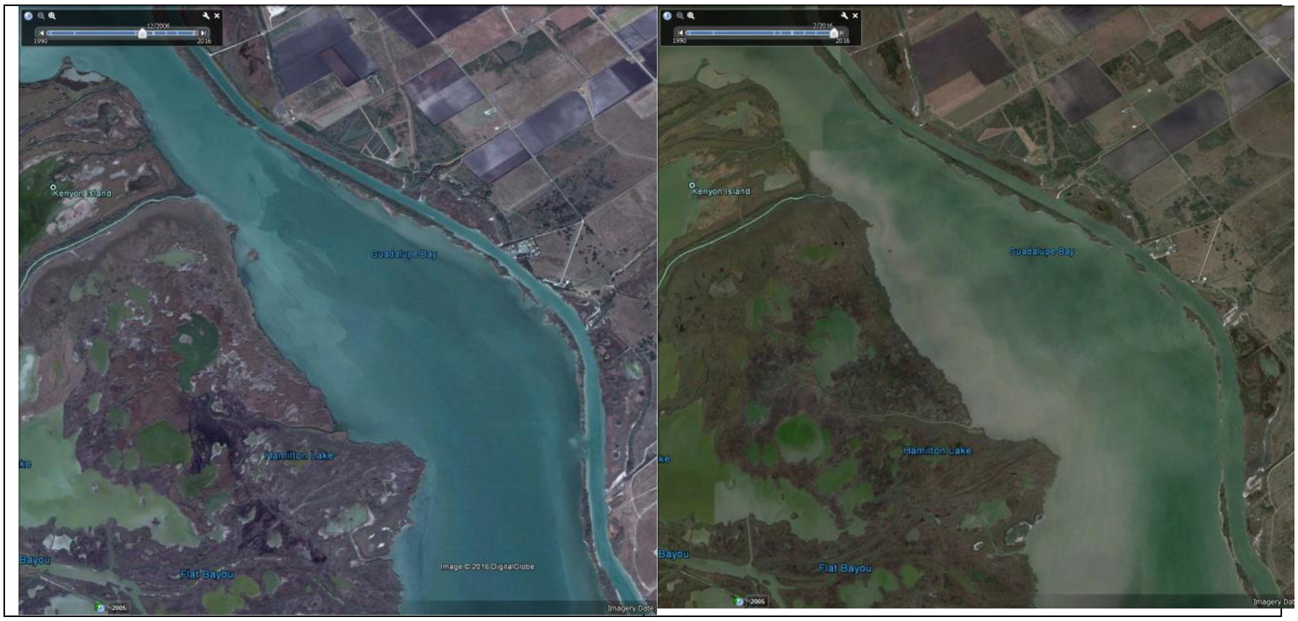


Figure 21. Land Loss Near the Victoria Barge Canal Between 2006 (left) and 2016 (right)[11]

V. Is the project or grouping effective at mitigating the vulnerability?

These projects are effective at mitigating the shoreline erosion vulnerability along various reaches of the GIWW within Region 2. However, this vulnerability is found along the entire length of the GIWW and, consequently, other sections of the GIWW with high erosion rates should be addressed via future projects.

VI. Does the project address the causation of the physics driving the Vulnerability, or does it mitigate the effects?

All the projects addressing shoreline erosion vulnerability in Region 2 are focused on mitigation. Addressing the cause of the problem would require a fundamental alteration to the purpose of the GIWW.

VII. What are the recommendations for a resilient coastline?

In addition to the detailed design and implementation of the proposed projects, a resilient coastline can be further promoted via the development of a prioritization tool addressing other reaches of the GIWW that are most vulnerable to shoreline erosion due to barge and other vessel traffic. For example, this could involve development and application of a wave propagation model that can represent barge or vessel wakes.

D. Freshwater Wetland and Coastal Uplands Conservation

I. What vulnerability was assessed and what are the risks?

The Texas coast has seen a pronounced decline in wetland numbers and acreage over the years due to their conversion to agricultural, industrial, residential and related uses. Wetland alteration or destruction (e.g., deepening, draining) significantly compromises a range of ecosystem services that naturally functioning wetlands provide. Among others, consequences include adverse impacts on salinity levels of surrounding environments, lost /degraded habitat, and compromised water quality.

II. What are the physics of the system that drive this vulnerability?

Much of the natural coastal habitat has been altered by human activity which, in turn, has led to habitat degradation throughout Region 2.

III. What projects/groupings address this vulnerability?

Table 4 shows 11 projects addressing freshwater wetland and coastal uplands conservation in Region 2. The majority of the projects focus on land acquisition and management.

Table 4. Projects Related to Freshwater Wetlands and Coastal Uplands Conservation In Region 2

Project Number	Project Name	Project Description
9048	Baer Ranch Addition to San Bernard NWR	The Baer Ranch proposed addition to San Bernard National Wildlife Refuge consists of approximately 10,000 acres and is adjacent to East Matagorda Bay. It has several miles of frontage on the bay and contains tidal bayous and marshes, transitional habitats, bottomland habitats, coastal prairies and pothole wetlands. East Matagorda Bay is one of the most intact Texas bay systems remaining, and there is at present an opportunity to preserve much of the associated shoreline and watershed to ensure the health of the bay for fish, wildlife and future generations.
9049	Lake Austin Shoreline Addition to Big Boggy NWR	This is a proposed addition to Big Boggy National Wildlife Refuge of 757 acres of prime wetlands and salty prairie, which encompasses approximately 1/4 of the shoreline of Lake Austin. The addition will provide important habitat for a diverse bird population including large numbers of waterfowl, wading birds and shorebirds. The conservation of this land will improve resilience by: preventing further development in a floodplain subject to Gulf storms, allowing the natural movement and restoration of habitats after storms, and providing protection to the inland fields and wildlife habitat adjacent to the lake. The addition will allow the U.S. Fish and Wildlife Service to expand public use programs on the refuge, including waterfowl hunting, fishing, canoe and kayak access and environmental education.
9050	Sargent Ranch Addition to San Bernard NWR	Sargent Ranch consists of approximately 8,000 acres of habitat surrounded by the San Bernard National Wildlife Refuge. The U.S. Fish and Wildlife Service would like to purchase the ranch. The ranch stretches from the Gulf inland and includes beaches, dunes, prairies, extensive salt and fresh water wetlands, and Columbia Bottomland forests dominated by large old live oaks. The acquisition of the ranch would connect large portions of the refuge and make it possible to protect important coastal dune and beach habitat for nesting sea turtles, piping plovers and a great diversity of waterfowl and water birds. The protection of the beach dunes would also improve the resiliency of this portion of the coast to storms and sea level rise and allow the natural migration of marshes and wetlands and other habitats over time.
56	Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition	This project will acquire 3,440 acres of property located next to the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge on the north shoreline of Powderhorn Lake. In addition, there will be an estimated 500 to 600 acres of freshwater wetland/moist soil unit habitat created in the abandoned farmland. Water quality will be improved by constructing substantial amounts of wetland units in the abandoned farmland. This will reduce nutrient loading from cattle grazing.
9030	Matagorda Peninsula and East Matagorda Bay State Scientific Area	The project proposes the acquisitions of the East Matagorda Peninsula Barrier Island (from bay shoreline to Gulf dunes) and the Matagorda Peninsula to establish a state scientific area. The adjacent bays are a refuge for sea turtles, critical fish habitat, and support oyster and sea grass habitats. The recent establishment of a Texas Parks and Wildlife Department Ecosystem Resources Program Habitat Team provides staff for monitoring and ecosystem studies.
249	Texas Mid-Coast Wetland Initiative	Construction of 200 acres of wetland/moist soil units, to eliminate invasive species from 300 acres of wetlands and to install a high volume deep water well to provide fresh water to 175 acres of existing freshwater wetland units on the Mad Island WMA
624	Falcon Point Ranch Conservation and Restoration Project	The project includes two primary elements: (1) place 585 acres of high-value coastal habitat under a perpetual conservation easement; and (2) implement a coastal prairie restoration plan that creates and restores wetlands, increases wolfberry production, and manages the site for conservation purposes to benefit habitat and other natural resources in the Gulf of Mexico. The site is part of the 6,000-acre Falcon Point Ranch located near the Aransas National Wildlife Refuge, Guadalupe Wildlife Management Area, and Welder Flats Wildlife Management Area. As part of the project, significant additional water sources and freshwater wetlands may be created on the project site to benefit whooping cranes and other wildlife. The site is also ideally situated for the recruitment of new salt marshes as sea level rises.

Project Number	Project Name	Project Description
849	Myrtle Foester Whitmire Unit Wetland Enhancement Project	This project would enhance up to 400 acres of moist soil wetlands for the benefit of shorebirds and waterfowl on the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge. Creation of managed moist soil units in abandoned rice fields will be accomplished by rebuilding levees and installing water control structures.
862	Habitat Enhancement for Mottled Ducks at Mad Island WMA	The proposed project would construct 5 moist-soil impoundments at MIWMA ranging in size from 10 to 40 acres to increase the amount of shallow freshwater marsh available to breeding mottled ducks. These impoundments will be located within tracts of suitable nesting habitat. Additionally, the project would develop a small water well system for 1 or 2 of the impoundments. The solar-powered well would provide supplemental water throughout the year and ensure that some freshwater wetland habitat is available for mottled ducks during times of drought. The proposed project also would provide benefits to wading birds and migratory shorebirds and waterfowl.
869	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	The objective of this project will be to enhance 1,875 acres of freshwater wetlands along the Texas coast. These wetlands will be designed to function as feeding, resting, and breeding habitat for mottled ducks.
871	Texas Mid-Coast Wetland Initiative	The project goals are to construct 200 acres of wetland/moist soil units on the San Bernard NWR and to construct 45 acres of wetland/moist soil units, to eliminate invasive species from 300 acres of wetlands and to install a high volume deep water well to provide fresh water to 175 acres of existing freshwater wetland units on the Mad Island WMA.

IV. How does the project or grouping mitigate the Vulnerability?

The majority of the projects addressing this vulnerability involve acquiring lands or conservation easements to protect wetland habitat. In some cases, infrastructure removal and restoration efforts are proposed as well.

V. Is the project or grouping effective at mitigating the Vulnerability?

Yes; while the effects may not be able to be totally reversed, restoration and protection of lands from human intervention mitigates of the vulnerability.

VI. Does the project address the causation of the physics driving the Vulnerability, or does it mitigate the effects?

Given that these proposed projects all involve the restoration and protection of land through acquisition and easements (and in some instances infrastructural removal), they do address causative factors associated with land loss and wetland degradation.

VII. What are the recommendations for a resilient coastline?

Restoration and protection of lands from human intervention and continued monitoring

E. Delta and Lagoon Restoration

I. What Vulnerability was assessed and what are the risks?

The ecological health of several watersheds within the Texas coastal zone has been compromised by development that has fundamentally altered the hydrology of rivers and deltaic systems. Reducing the natural flow of water toward river deltas, for example, can reduce deposition of minerals and nutrients essential for a healthy system. Similarly, the reduction of freshwater inflows can alter the salinity of deltaic habitats, causing degradation of fresh water marshes and wetlands. Upland development within watersheds can increase the velocities of flows reaching watersheds, exacerbating erosion and decreasing water quality (often due to elevated bacteria levels and low levels of dissolved oxygen). In some instances, channel and outfall closures have been prompted by sediment deposition from dredging activities and waves. Re-opening these systems to re-establish circulation may be required as part of restoration efforts.

II. What are the physics of the system that drive this vulnerability?

Hydrologic restoration activities in Region 2 focus primarily on restoring tidal exchange to wetland and marsh areas. Modifications to the hydrodynamic exchange can result from factors such as:

- Construction of structures such as levees;
- Marsh fill or dewatering;
- Sedimentation in areas restricting exchange between areas'
- Decrease in tidal prism; and/or
- Overall reduction in tidal energy.

III. What are projects/groupings address this Vulnerability?

Five proposed projects in Region 2 address delta and lagoon restoration. These projects are shown in Table 5 and Figure 22.

Project 68 addresses an area of Matagorda Island that was modified by a series of levees that have cut off natural tidal exchange in the area. By removing levees and opening culverts, this project will return the system to a natural tidal environment that restores marsh habitat. Project 638 addresses the Indianola-Magnolia marsh system. Recent studies indicate that build-up of shell and mud at the Magnolia Inlet channel has severely restricted tidal exchange. This project restores hydraulic connections to improve exchange and return the area to conditions that support natural marsh habitat. Project 423 focuses on hydrologic restoration, and Projects 9034 and 9035 are planning based.

Table 5. Description of Delta and Lagoon Restoration projects in Region 2

Project Number	Project Name	Project Description
68	San Antonio Bay - Matagorda Island Hydrologic Restoration	Existing levee systems on the island are creating muted tidal exchange with surrounding bay and marsh systems, restricted flow, altered circulation and impaired water quality. Removal of certain levees and opening culverts to provide multiple flow pathways would enhance tidal exchange, increase circulation, improve water quality and reverse the negative impact on species that inhabit the marsh, such as the Whooping Crane, American Alligator, Aplomado Falcon, Brown Pelican, Piping Plover and the Kemp's Ridley Sea Turtle.
638	Magnolia Beach and Marshes Habitat Protection and Restoration - Phase I	The objective of this project is to protect and restore about 1,800 to 2,200 acres of wetlands and marshes lost due to the lack of intertidal and water circulation, rapid bay shoreline erosion, and human impacts in the historical area known as the Indianola-Magnolia Marsh System
423	Matagorda Bay System Hydrologic Restoration	The proposed project includes hydrologic restoration of the Matagorda Bay System. This would result in the preservation of aquatic habitat and marshes in Matagorda, East Matagorda, Tres Palacios, Carancuhua and Lavaca Bays.
9034	Matagorda Bay Freshwater Inflows from the Colorado River	This project involves purchasing an ongoing right to have water delivered to the estuary from new storage facilities that are planned for imminent development. Although purchasing the right to get water from a new storage facility will result in a relatively high per-unit cost for the water, the availability of storage will allow for water to be captured during periods of very low inflows, thereby managing a limited quantity of water to maximize environmental benefits . The project will procure up to 15,000 acre-feet per year of freshwater inflows that can be delivered when most needed.
9035	Matagorda Bay Estuary System Freshwater Inflows from Tributary Streams	This project involves purchasing one or more existing water-use permits from willing sellers on other streams that flow directly into the Matagorda Bay estuary system. By limiting water withdrawals on one or more streams that reach the bay at a key location, this project will help moderate salinity levels during dry periods and provide a refuge from which organisms can emerge to help revitalize the overall bay when water conditions return. Reduced withdrawals will also improve bay productivity during more normal rainfall conditions. The project will procure up to 10,000 acre-feet per year of water that would otherwise be withdrawn, and will establish downstream delivery points to protect the flows all the way to the estuary.

Figure 22. Locations of specific hydrologic restoration projects within Region 2[3]

IV. How does the project or grouping mitigate the Vulnerability?

Project 68

In the 1940s,the Air Force maintained facilities on the island, and installed a system of levees and ditches that dewatered marsh areas by the mid-1950s. Island ownership was transferred to the U.S. Fish and Wildlife Service and the Texas Parks Wildlife Department beginning in the 1970s.

Levee installations and marsh dewatering adversely impacted the natural saltwater marsh habitats. To address this, Project 68 entails removal of some of the levees and construction of culverts to return the project site to saltwater marsh habitat. This will increase the exchange between bay and marsh environments and promote circulation between interior marsh cells. Project elements include breaching levees, installing a low water crossing, and installing culverts. These actions will be evaluated with regard to the physical reaction of the system (e.g., in terms of tidal prism, intrusion and flow rates), and the ecological response in terms of water quality and marsh response.

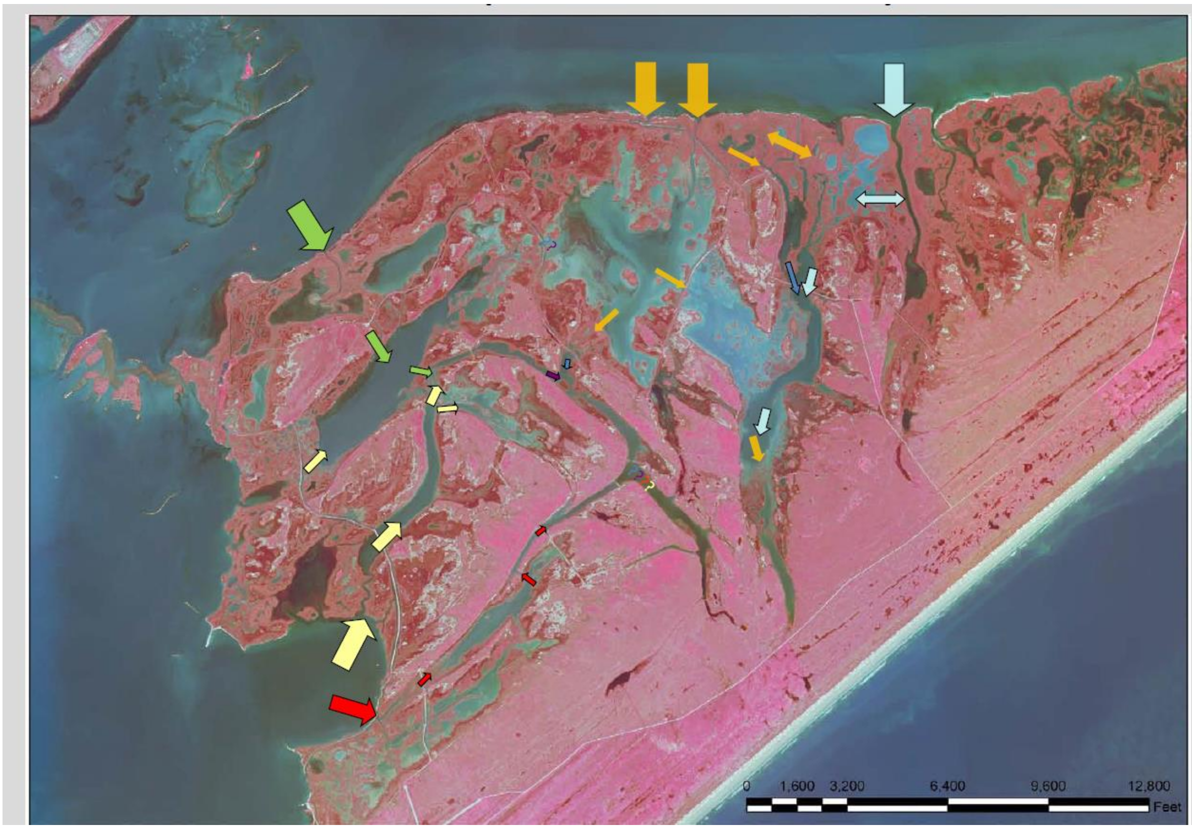


Figure 23. Conceptual Model of Flow Pathways, Matagorda Island[12]

Project 638

The planning stage of this project (Phase 1) has been completed; it documented a substantial loss of low marsh between 1958 and 2012. And, while there was an increase in marsh vegetation between the 1958 and 1979 (when salt flats were converted to low marsh through subsidence and inundation), this gain was reversed between 1979 and 1996, and loss trends continue to the present day. This loss is largely attributable to build-up of shell and mud debris in Magnolia Inlet. This build-up acts as a dam, limiting the exchange of water between the Bay and Old Town Lake to high tide conditions. Removing build up will improve the water exchange.

Projects 423, 9034 and 9035

Project 423 focuses on hydrologic restoration, likely requiring a system-wide study, and Projects 9034 and 9035 entail acquisitions of water rights in the interest of stabilizing freshwater inflows, which would require coordination with other entities. Proper study and coordination would ensure that results consider future projections of inflows, and may help provide long-term solutions for the Matagorda Bay system.

V. IS THE PROJECT OR GROUPING EFFECTIVE AT MITIGATING THE VULNERABILITY?

With careful planning and design, the proposed projects can effectively mitigate the vulnerability. Continued monitoring is appropriate, however, to both assess project performance and identify areas where new projects may be needed.

VI. DOES THE PROJECT ADDRESS THE CAUSATION OF THE PHYSICS DRIVING THE VULNERABILITY, OR DOES IT MITIGATE THE EFFECTS?

Addressing causation is problematic, given that long-standing development practices and structures are primary contributors to this vulnerability. However, projects that limit or prohibit harmful future development can address causation, and coordinating studies in these areas will allow for best mitigation actions to be proposed.

VII. WHAT ARE THE RECOMMENDATIONS FOR A RESILIENT COASTLINE?

The proposed projects addressing this vulnerability provide for hydrologic solutions to resolve freshwater and saltwater imbalances in selected areas. In several instances, studies are required to better understand the system and evaluate alternative measures to maximize effectiveness.

F. OYSTER REEF CREATION AND RESTORATION

I. WHAT VULNERABILITY WAS ASSESSED WHAT ARE THE RISKS?

Oyster reefs in Texas bays are subject to degradation due to natural and man-made processes that contribute to the loss of oyster habitat. During hurricanes and tropical storms, significant amounts of sediment can inundate, and thereby damage or destroy, existing oyster reefs. An estimated 8,000 acres of oyster reef were lost during Hurricane Ike, for instance, due to excess levels of sediment deposition. Oyster habitats are also susceptible to man-made developments and associated impacts. Salinity gradients and turbidity changes impact the viability of reefs, as oysters are highly sensitive to both. Galveston Bay, along with other coastal bays in Texas, have seen increases in salinity gradients and turbidity due in large part to the construction of navigation infrastructure and ongoing channel dredging. In addition, degradation of marsh and vegetated habitat upstream can increase velocities flowing into bay systems, resulting in adverse impacts on oyster reefs. Vessel wakes and unchecked commercial harvesting can also negatively impact oyster reef viability.

II. WHAT ARE THE PHYSICS OF THE SYSTEM THAT DRIVE THIS VULNERABILITY?

The vulnerability of oyster habitats is related to the following physical processes:

- Increased sedimentation directly on existing beds;
- Increased salinity (due to decreased freshwater entering bay environments); and/or
- Increased turbidity due to vessel traffic and dredging activities.

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Proposed projects related to oyster reef restoration are shown in Figure 24 and described in

Table 6.

Figure 24. Location of projects related to oyster reef restoration in Region 2[3]

Table 6. Description of Oyster Reef Creation and Restoration Projects in Region 2

Project Number	Project Name	Project Description
853	Texas Mid-Coast Oyster Restoration and Enhancement	This project would result in the restoration of 450 acres of oyster reef within the four major bay systems along the middle Texas coast: Matagorda/Lavaca Bay, San Antonio Bay, Aransas Bay and Copano Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
896	San Antonio Bay Oyster Reef Restoration and Enhancement	This project would restore and enhance approximately 1,500 acres in San Antonio Bay, providing adequate habitat for the oyster and protecting the interests of commercial and recreational fishermen as well as safeguarding the marine-based economy of the City of Seadrift.
922	Oliver Point and Chinquapin Oyster Reef Restoration	The project involves oyster reef restoration on legacy reefs in Matagorda Bay and along the GIWW.

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

All three of these proposed projects (i.e., 856, 896, 922)entail the restoration and enhancement of oyster reefs in Region 2.

V. Is the project or grouping effective at mitigating the vulnerability?

Oyster reef restoration efforts associated with Projects 853 and 896 are not specific as to location within Region 2, but will focus on areas where reefs previously existed. Site selection will need to take into account areas with extensive vessel ship traffic and navigational dredging, as such activity does not lend itself to a sustainable oyster reef restoration or creation. Project 922 restores legacy oyster reefs in Matagorda Bay and along the GIWW. The latter also need to be evaluated and carefully selected in light of areas of extensive vessel traffic and navigational dredging.

Extreme weather events, such as hurricanes, pose risks to all oyster reefs. Also, monitoring the salinity and health of oyster reefs is essential in ensuring their long term viability.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

The projects can only mitigate the physical effects of oyster reef degradation by building new beds. Beds should be located in areas where the likelihood of continued degradation due to normal conditions is minimized.

VII. What are the recommendations for a resilient coastline?

Reef placement should be considered carefully and ongoing monitoring is important.

G. Rookery Island Creation and Restoration

I. What vulnerability was assessed and what are the risks?

As with Texas bay shorelines, rookery islands have been subjected to increased erosion due to vessel wakes, wind, and waves. To date, a large number of such islands have experienced significant erosion damage or have degraded completely. Lacking suitable nesting habitat on these islands, shorebirds and migratory birds congregate in nearshore coastal communities and become more susceptible to inland predators. Over time, these bird populations decrease, sometimes to the point of endangerment or extinction.

II. What are the physics of the system that drive this vulnerability?

The physical vulnerability of rookery islands is largely a function of shoreline erosion. Physical mechanisms that drive such erosion within Region 2 are typically are related to one or more of the following:

- Ship wakes from vessels in the GIWW and other minor ship channels;
- Localized wakes due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise; and/or
- A change in the sediment supply due to upstream modifications (e.g., dams).

III. What projects/groupings address this vulnerability?

Two projects (i.e., 621, 9027) related to Rookery Island Creation and Restoration in Region 2 are proposed; they are described in Table 7 with an aerial view provided in Figure 25. Both focus on the restoration and enhancement of rookery islands, with erosion control and habitat improvements as key elements.

IV. What projects/groupings address this vulnerability?

The proposed projects addressing rookery islands are described in Table 7.

Table 7. Description of Rookery Island Creation and Restoration Projects in Region 2

Project Number	Project Name	Project Description
9027	San Antonio Bay Rookery Island Restoration	San Antonio Bay bird rookery islands have significantly declined due to erosion. An inventory of rookery islands within San Antonio Bay shows only two marginally functioning islands where there had been 10. The loss of suitable nesting habitat has led to a decline in herons, egrets, black skimmers and brown pelicans. An initial site assessment of San Antonio Bay identified five locations of previously functioning islands that are suitable for reconstruction. This project proposes restoration of a historical rookery island utilizing one or more of these locations. BUDM would be used from the adjacent channels, if possible.
621	Dressing Point Colonial Waterbird Rookery Island Restoration & Enhancement	The project will restore and enhance the Dressing Point Island. The total length of shoreline to be protected is approximately 2,400 linear feet. The project goal is to restore lost emergent vegetation and enhance existing habitat from continued degradation and habitat loss. End results would include preservation of the island and the valuable nesting habitat it offers to colonial waterbirds. Oyster reef restoration is proposed to be one of the shoreline protection methods.

V. How does the project or grouping mitigate the Vulnerability?

Project 621

Project 621 restores and enhances existing rookery island habitat through shoreline stabilization measures. Dressing Point is subject to relative sea level rise and fetch-driven wave conditions; factors that will be taken into account at the design stage.

Project 9027

Project 9027 involves the restoration of an historical rookery island (via placement of dredged material) that has been severely degraded due to erosion, with the loss of attendant nesting habitat.

The restoration of rookery islands mitigates the vulnerability over the long term, provided that the restored islands are protected (either naturally or structurally) from future erosion.

Figure 25. Location of Project 621[3]

VI. Is the project or grouping effective at mitigating the vulnerability?

These projects will be effective in mitigating the vulnerability by restoring rookery habitat. The design of rookery island restoration (and creation) efforts must take into account factors that may compromise their sustainability (e.g., relative sea level rise, fetch-driven wave conditions).

VII. Does the project address the causation of the physics driving the Vulnerability, or does it mitigate the effects?

These projects mitigate the physical effects of erosion on rookery islands. However, relative sea level rise and fetch-driven wave action are large-scale considerations that cannot be prevented.

VIII. What are the recommendations for a resilient coastline?

The vulnerabilities presented in this section must be kept in mind to ensure that project designs accommodate the array of issues (e.g., relative sea level rise, extreme weather events, vessel wakes) that will continue to contribute to erosion.

[1] University of Texas at Austin, Bureau of Economic Geology. 2014. Shoreline Change Rates 1950's-2012. Data available at: http://www.arcgis.com/home/item.html?id=7bd9c5bf9823451bb783ce22f18cecc9 (accessed Jan 30, 2017) and

described in Paine, J. G., Caudle, T. and J. Andrews. 2014. Shoreline Movement along the Texas Gulf Coast, 1930's to 2012, Final Report to the Texas General Land Office. Bureau of Economic Geology, The University of Texas at Austin.

[2] "Brazoria County, TX." 28°51'07.1"N 95°26'17.9"W. Google Earth (accessed Nov. 18, 2016)

[3] Aerial photographs taken from the project geospatial database, described in the Report.

[4] U.S. Army Corps of Engineers, Galveston District. 2016. Available at: http://www.swg.usace.army.mil/ (accessed Nov. 18, 2016)

[5] Ratzlaff, Karl. Land-Surface Subsidence in the Texas Coastal Region. 1980. U.S. Department of the Interior, Geological Survey. Available at: https://pubs.usgs.gov/of/1980/0969/report.pdf (accessed Dec 8, 2016)

[6] "Schicke Point, Calhoun County, TX." 28°37'43.7"N 96°21'52.4"W. Google Earth (accessed Nov. 18, 2016)

[7] "Redfish Lake, Calhoun County, TX." 28°37'30.6"N 96°23'20.1"W. Google Earth (accessed Nov. 18, 2016)

[8] "Cowtrap Lake, Brazoria County, TX." 28°51'52.3"N 95°28'30.7"W. Google Earth (accessed Nov. 18, 2016)

[9] "Pelton Lake, Matagorda County, TX." 28°44'39.2"N 95°48'06.0"W. Google Earth (accessed Nov. 18, 2016)

[10] "Turkey Island, Matagorda County, TX." 28°44'56.4"N 95°45'00.2"W. Google Earth (accessed Nov. 18, 2016)

[11] "Guadalupe Bay, TX." 28°26'35.7"N 96°46'00.2"W. Google Earth (accessed Nov. 18, 2016)

[12] Coastal Bend Bays & Estuaries Program. 2010. Matagorda Island Marsh Restoration: An Adaptive Management Approach. Available at: https://www.estuaries.org/pdf/2010conference/monday15/harbor/session1/cravey.pdf (accessed Nov. 18, 2016)

Region 3 Results

Region 3 Contents

A. Restoration of Beaches and Dunes

I. What vulnerability was assessed and what are the risks?

The erosion of beaches adversely impacts the resilience of the ecological systems of the Gulf. Eroded beach and dune structures and systems, many of which have been removed or altered due to navigation or tourism industry developments, cannot effectively serve as storm surge defenses. Degraded beach and dune systems permit saltwater intrusion into inland coastal habitats, degrading and further reducing the vegetative buffers that would otherwise function as wave dissipaters during extreme weather events.

As described in the Plan, Texas contends with a general lack of beach-quality sand sources (i.e., in terms of grain size and minerology). However, as placement areas are reaching capacity, USACE and private entities may be willing to sell sand from their maintenance dredged materials to the State.

Within Region 3, shoreline erosion problems on Gulf-facing beaches are generally not as severe as erosion problems elsewhere along the coast. An examination of historical erosion rates indicates that, for most of the Region 3 coastline, erosion rates are less than 5 feet per year. Localized areas, just north of the Packery Channel on North Padre Island, have long-term erosion rates of up to 8 feet per year, and data from 2000-2012 indicate that the rate of erosion is increasing (Figure 1).

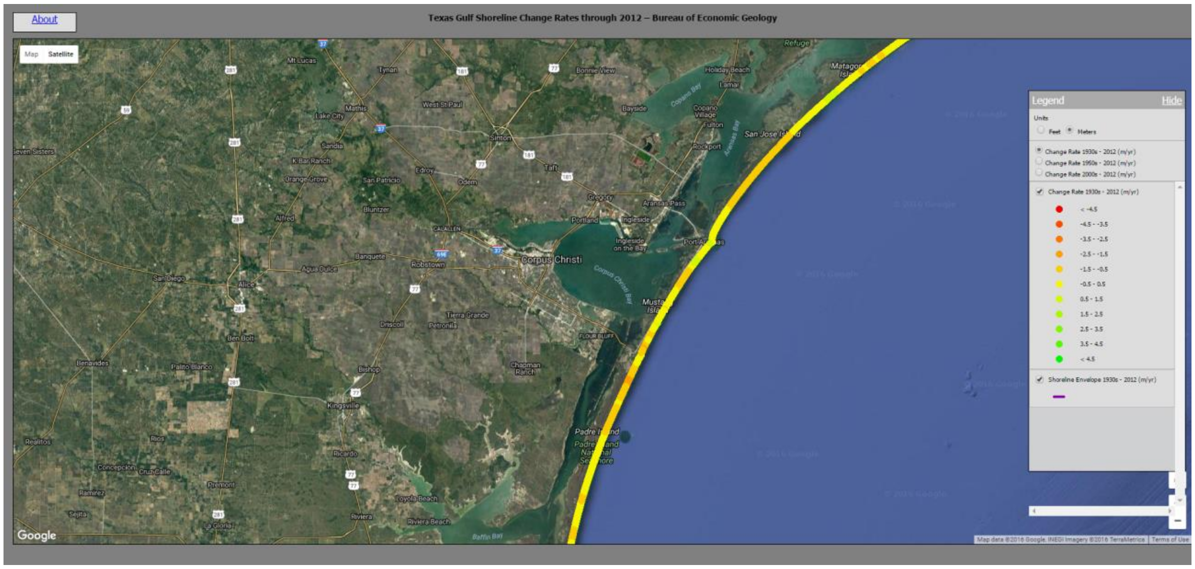


Figure 1. Shoreline change rates from 1930 to 2012[1]

II. WHAT ARE THE PHYSICS OF THE SYSTEM THAT DRIVE THIS VULNERABILITY?

A number of physical conditions affect the erosion of Gulf-facing beaches. Natural cycles of erosion and accretion typically take place due to prevailing forcing conditions (i.e., storms, waves, fluctuations in sediment supply). For a variety of reason (i.e., changes in sediment supply, changes to the natural littoral system due to man-made infrastructure, the effects of subsidence and sea level rise), much of the Texas coast has been in a persistent state of erosion for many decades.

Within Region 3, littoral transport is primarily directed toward the north. Wave conditions in the area show primary waves coming from the southeast. Figure 2 shows Wave Information Studies (WIS) modeled wave conditions along the Region 3 coast that were examined with regard to wind generated waves (seas) and longer period waves (swells). Figure 3 and Figure 4 show these conditions for the four stations relevant for Region 3. All stations indicate that primary waves come out of the southeast. Wind-generated seas come from a slightly more southerly direction, and swells come from a slightly more easterly direction. These wave conditions tend to induce a net northward-directed longshore current and littoral transport.

Figure 2. Location of WIS stations relevant to Region 3[2]

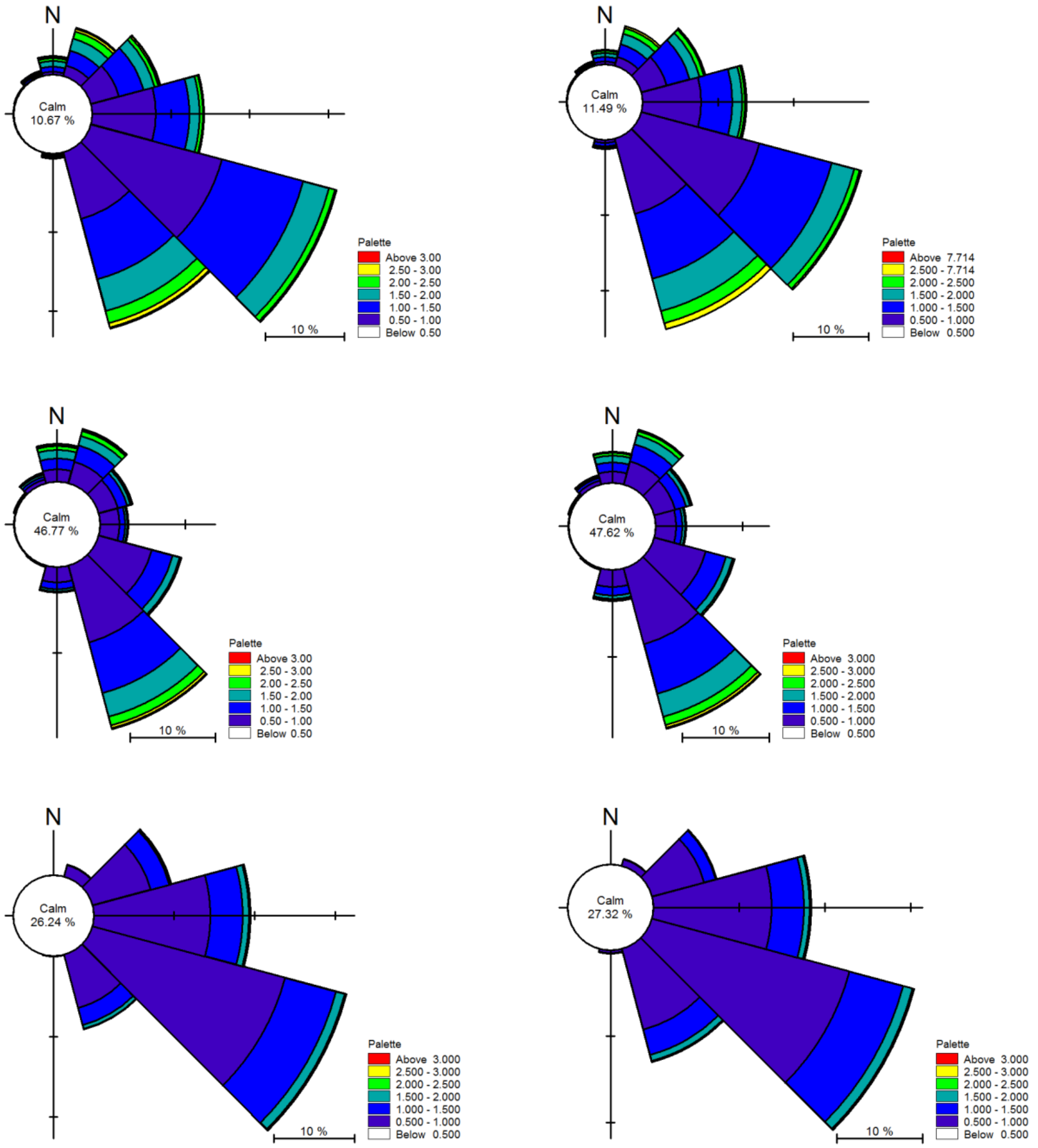


Figure 3. Wave conditions for WIS stations 73031 (left) and 73038 (right); Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom)[2]

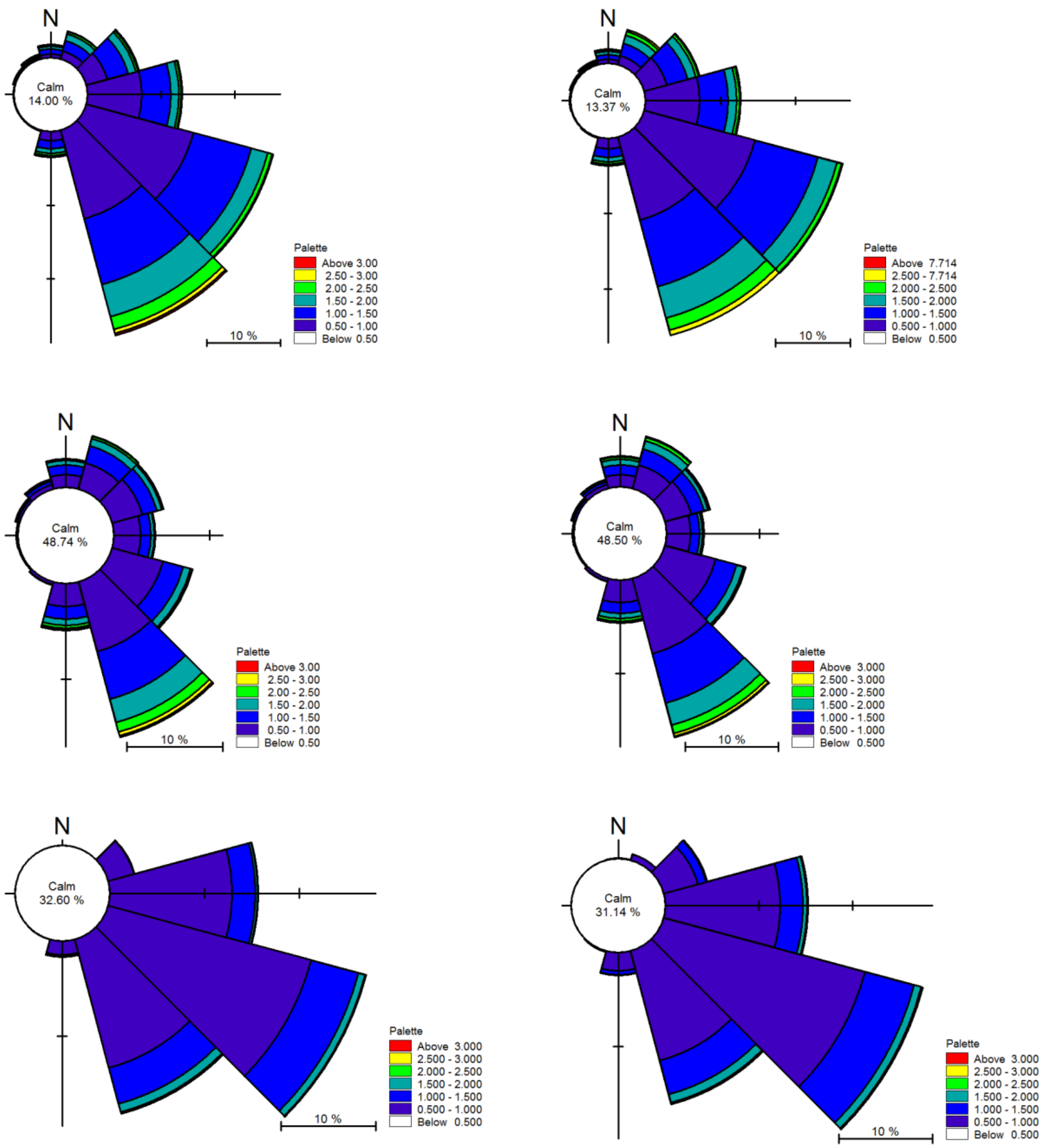


Figure 4. Wave conditions for WIS stations 73043 (left) and 73049 (right); Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom) [2]

Region 3 features two major natural and man-made breaks in an otherwise continuous barrier island. Packery Channel separates North Padre Island and Mustang Island. The entrance to the Corpus Christi Ship Channel is on the northern end of Mustang Island near Port Aransas.

III. What projects/groupings address this vulnerability?

Project 439 in Region 3 addresses the beach and dune erosion vulnerability. It is a beach and dune nourishment project located due east of the Packery Channel (Figure 5). This area has high erosion rates, primarily due to interruption of longshore sediment attributable to the stabilized and deepened Packery Channel.

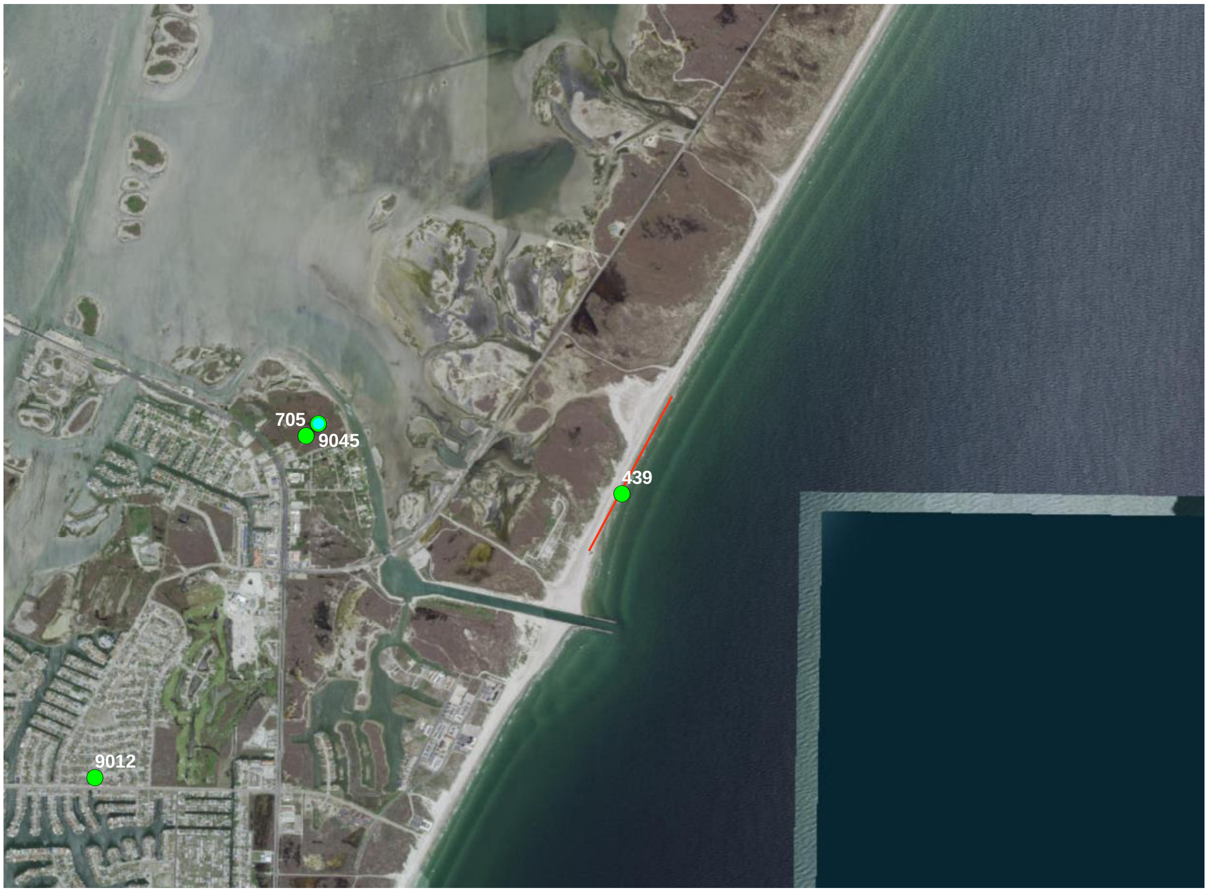


Figure 5. Location and Extents of Project 439[3]

IV. How does the project or grouping mitigate the Vulnerability?

Project 439 adds beach width and dune features to the coastal barrier island and, consequently, will slow the rate of erosion along the shore of the island.

V. Is the project or grouping effective at mitigating the Vulnerability?

The project is effective at mitigating the vulnerability, recognizing that ongoing maintenance will be required. Structural stabilization solutions that are modified to decrease impacts on longshore transport need to be considered on a case-by-case basis. However, beach nourishment is an effective mitigation alternative when maintenance requirements are met and when infrastructure adjustments are not desired or warranted.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

Although beach nourishment is an effective mitigation measure (particularly when structural measures are not an option), it does not address the underlying cause of erosion along the Texas coastline. Issues such as wind and wave impacts, vessel wakes, land subsidence and sea level rise are larger factors of causation.

VII. What are the recommendations for a resilient coastline?

Beach nourishment has demonstrated effectiveness in mitigating the beach and dune erosion vulnerability, provided that it is part of an ongoing program. Continued monitoring of all coastal areas is advised, particularly where the width and crest of the barrier island make it prone to breaching, an occurrence that can have adverse consequences on water quality and ecosystem balance along the entire coast.

B. Bay Shoreline Stabilization and Estuarine Wetland Restoration

I. What vulnerability was assessed and what are the risks?

Coastal erosion and land loss is a continuing trend in many Texas bay systems, driven by ship wakes from large vessels traveling to Texas ports in increasing numbers. Also contributing to coastal erosion and land loss are coastal storms that degrade vegetative buffer zones, reef structures, and barrier islands, as well as human activity that results in climate change impacts (e.g., sea level rise and land subsidence). Shoreline erosion along the coast has major, negative implications for the future in terms of flooding and related storm surge damages to coastal communities, and attendant negative implications for public safety, infrastructure, and habitat loss and degradation.

Erosion has contributed to marsh degradation throughout the coastal region of Texas. Degrading marshland is correlated with losses or reductions of habitat diversity, as evidenced by losses of nursing and nesting grounds for birds, and the losses of marine and estuarine habitat for fish and organisms. Flood gates and other structures installed in bay systems can significantly alter sediment transport mechanisms which, in turn, deplete sediment deposit processes in marshes. If mitigation efforts are not pursued, marsh and habitat loss issues will be exacerbated by sea level rise and continued coastal development.

A shapefile compiled by the Harte Research Institute (Figure 6) shows bay shoreline erosion throughout Region 3, with areas of critical erosion indicated in red. Shoreline erosion is most pronounced along the bay sides of the barrier islands with rates typically exceeding 5 feet per year. Much of Copano Bay also exhibits significant shoreline erosion, typically exceeding 1 foot per year.

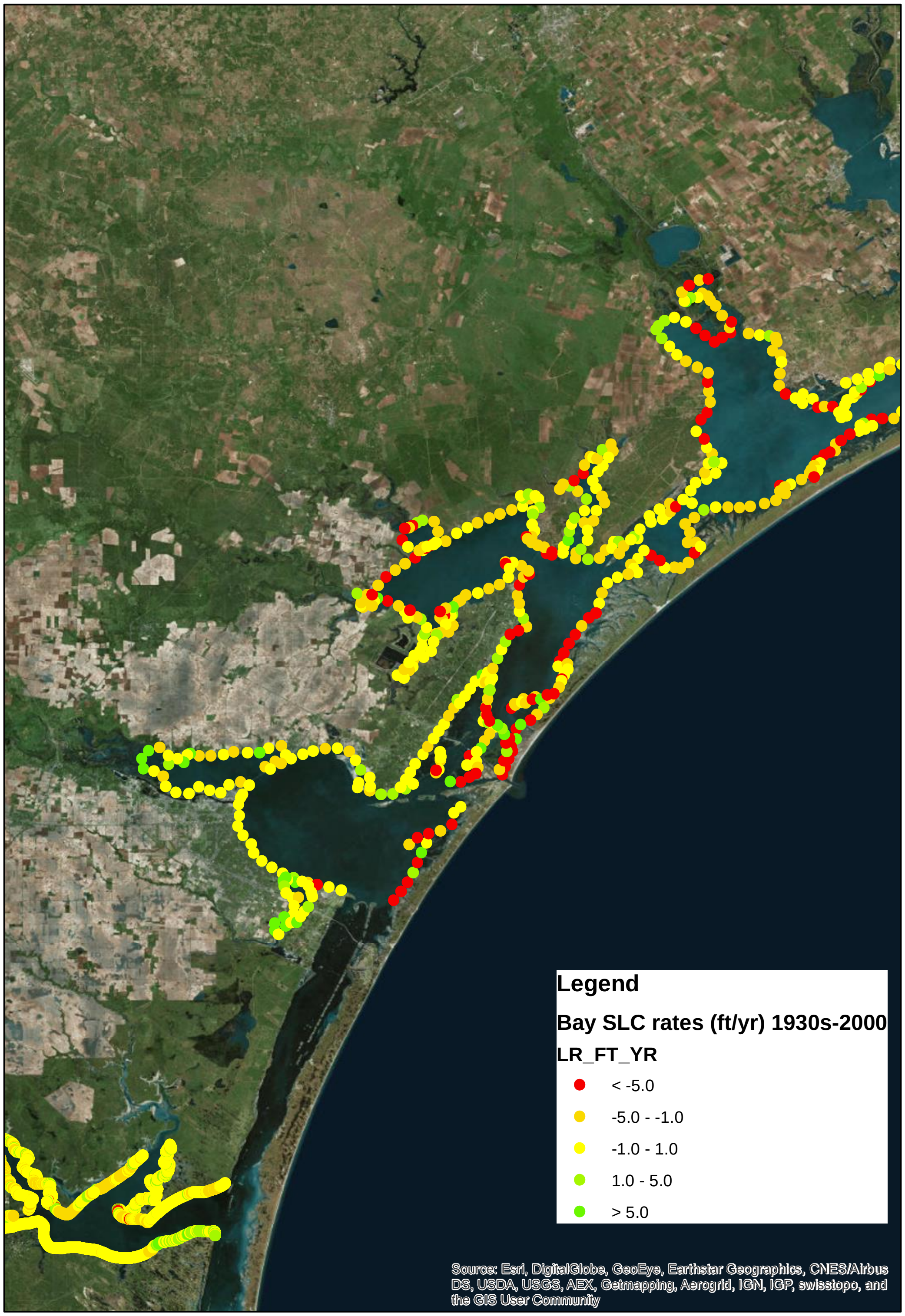


Figure 6. Bay Shoreline Change (SLC) in feet per year (ft/yr) 1930s-2000. Negative values indicate loss, while positive values indicate shoreline gain.[3],[4]

II. WHAT ARE THE PHYSICS OF THE SYSTEM THAT DRIVE THIS VULNERABILITY?

Physical mechanisms driving shoreline erosion within Region 3 are generally related to one or more of the following:

- Ship wake from vessels;
- Localized wake due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise;
- Broader scale sediment starved barrier island system; and/or
- A change in sediment supply due to upstream modifications (e.g., dams).

Extreme weather events can destabilize shorelines in bay systems due to elevate water levels and wave action. However, once wetlands are compromised (i.e., fully inundated or flooded), wave action has less impact on sediment mobility than in un-inundated wetlands.

Vessel Induced Ship Wake

The shipping channels in Region 3 are classified into two sections: deep draft navigation and shallow draft navigation.

The major deep draft channel is the Corpus Christi Ship Channel (Figure 7). The entrance channel is located between Mustang and Matagorda Islands at Port Aransas. The channel then cuts along the south side of Harbor Island and extends along Ingleside before crossing Corpus Christi Bay. The main Ship Channel is dredged to a 45 foot depth, although there are plans to deepen the channel to 50 feet and widen sections to 530 feet. An offshoot deep draft channel (La Quinta Channel) extends to the north of the main channel at Ingleside, and is also authorized to 45 feet. An extension of this channel was completed in 2014.

The major shallow water draft channel through Region 3 is the GIWW (Figure 7). This channel extends through the estuary from south to north, and intersects the main Corpus Christi Ship Channel near Pelican Island. Aransas Channel links Aransas Pass to the channel entrance and cuts through Harbor Island and Redfish Bay (Figure 8). This channel has a depth of 14 feet. In addition, Lydia Ann Channel (largely a recreational channel linking the entrance channel to the GIWW) is a feature of this area (Figure 8). A long, shallow water draft channel extends from the GIWW to Victoria in San Antonio Bay (Figure 10). The Rincon Channel, tributary to (and extending north of) the Corpus Christi Ship Channel, is also classified as shallow draft as it has a 12 foot depth (Figure 9). South of the main entrance channel on Mustang Island, Packery Channel links the GIWW to the Gulf of Mexico. The inlet has remained open since 2005, but shoaling within the channel has caused periodic navigational hazards.

Localized Wake Due to Recreational Boating or Jet Skis

Localized shoreline erosion can occur in places where recreational boating or jet skiing is common. These activities can cause wave effects that over time can have significant impact on shorelines.

Structural Intervention Disrupting Sediment Transport

Structures such as groins or jetties can disrupt sediment transport and lead to areas with limited sediment supply and pockets of erosion. This is often attributed to ocean facing beaches where littoral transport is evident, but can also be present in bayside shorelines as well. This is best assessed project by project.

Large Fetch and Natural Shoreline Migration

Shorelines are not static; they have cycles of migration responding to factors such as storms, changes in sediment supply, and natural variability in wave conditions. Some shorelines are in a natural state of flux between periods of erosion and accretion. However, disruption of the accretion process (due to factors such as interruptions in sediment supply and/or se level rise) can place a system into a more continuous state of erosion.

Relative Sea Level Rise

Relative sea level rise is a function of two interacting factors; land subsidence and climate change-induced increases in sea level. Land subsidence is a problem along the entirety of the Texas coast. Factors of causation include the withdrawal of groundwater and oil and gas.

Combined with land subsidence, elevated sea levels due to global climate change result in an increase to the mean sea level relative to its historic level. Given the topography of the Texas coast, even 0.5 feet of additional relative se level rise will cause significant land loss. In addition to direct effects, increased water depth adjacent to the shoreline allows for increased erosion from wave impacts.

Change in Sediment Supply

One of the major sources to sediment supply in the inland coastal bays of Texas is the supply from rivers flowing into the system. These sources can supply much of the sediment that can balance natural erosion of the system, and help to feed delta systems that supply shorelines around the bays through regional transport mechanisms. Upriver projects such as dams, interrupt this natural supply mechanism and can lead to sediment starved deltas. This causes direct loss of marsh habitat within the deltas and has an impact on surrounding marshes as well that may depend on regional transport mechanisms to continue to supply sediment.

Sediment supply can also be affected from the Gulf-facing side of barrier islands. Dune migration and wind weathering on the dunes supply sediment to the bay-facing beaches of barrier islands. As Gulf-facing beaches become increasingly sediment-starved, the impact is also experienced by the bay-facing beaches of the same islands.

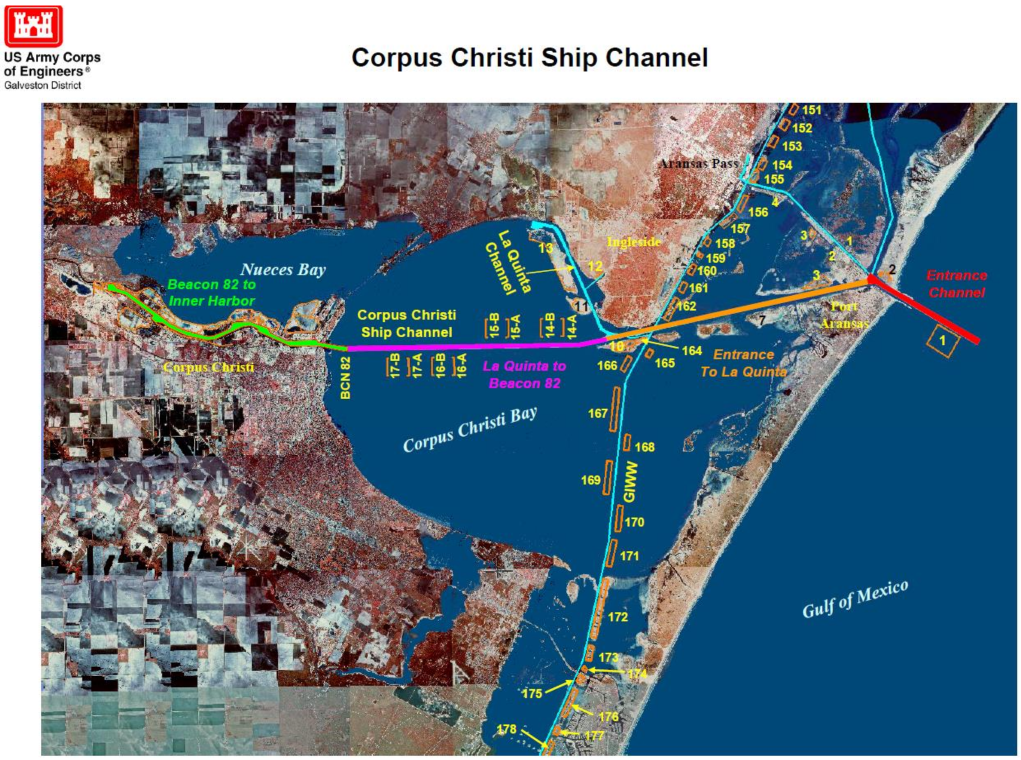


Figure 7. Corpus Christi Ship Channel[5]

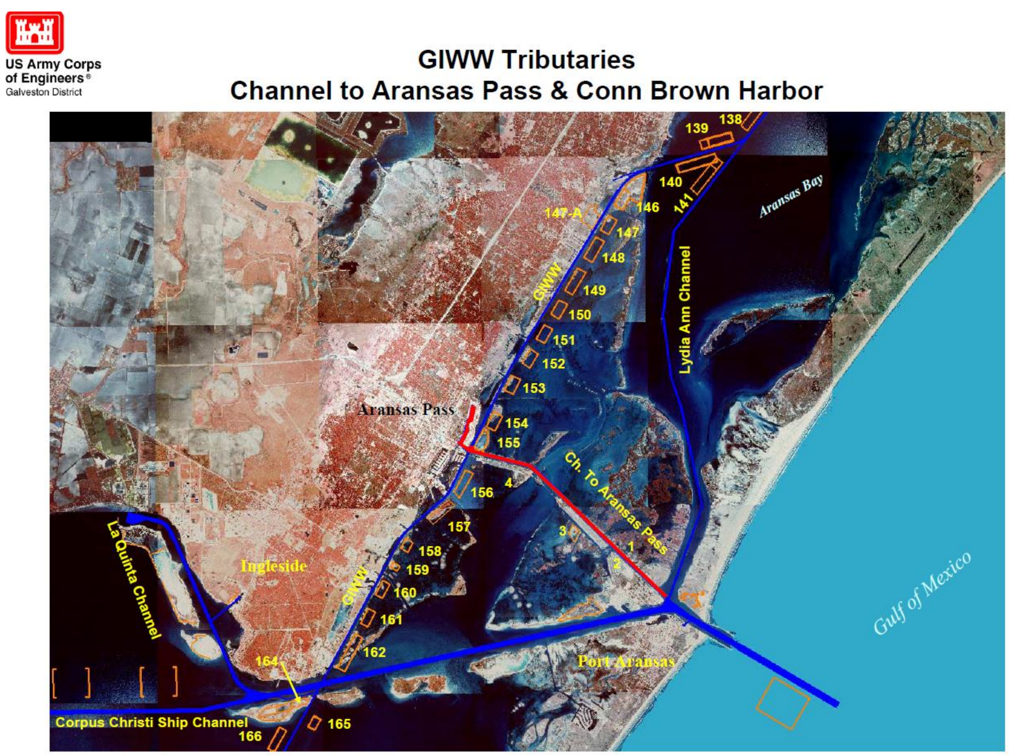


Figure 8. Shallow Water Connections from Entrance Channel to Aransas Pass and the GIWW[5]

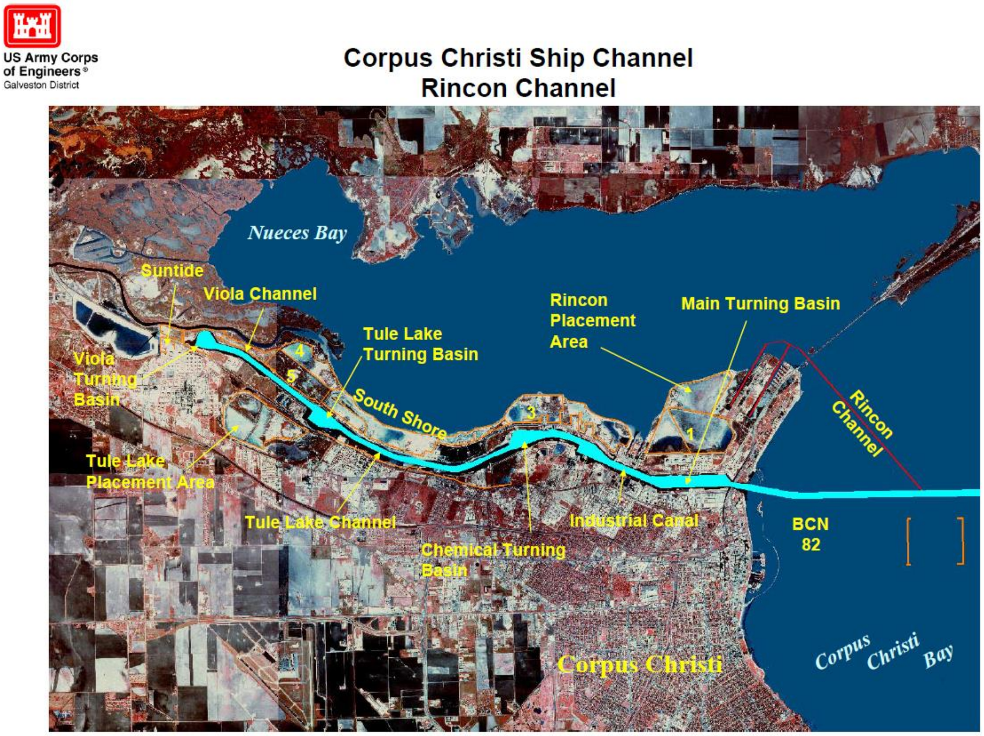


Figure 9. Rincon Channel[5]

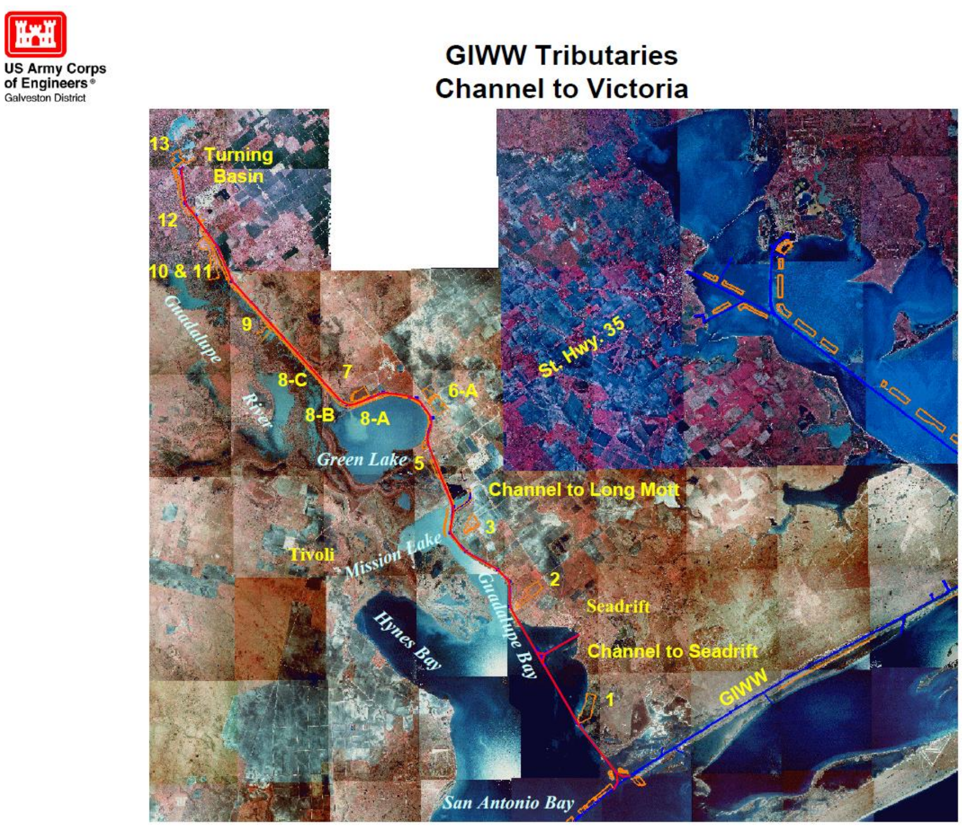


Figure 10. Victoria Seadrift Channel[5]

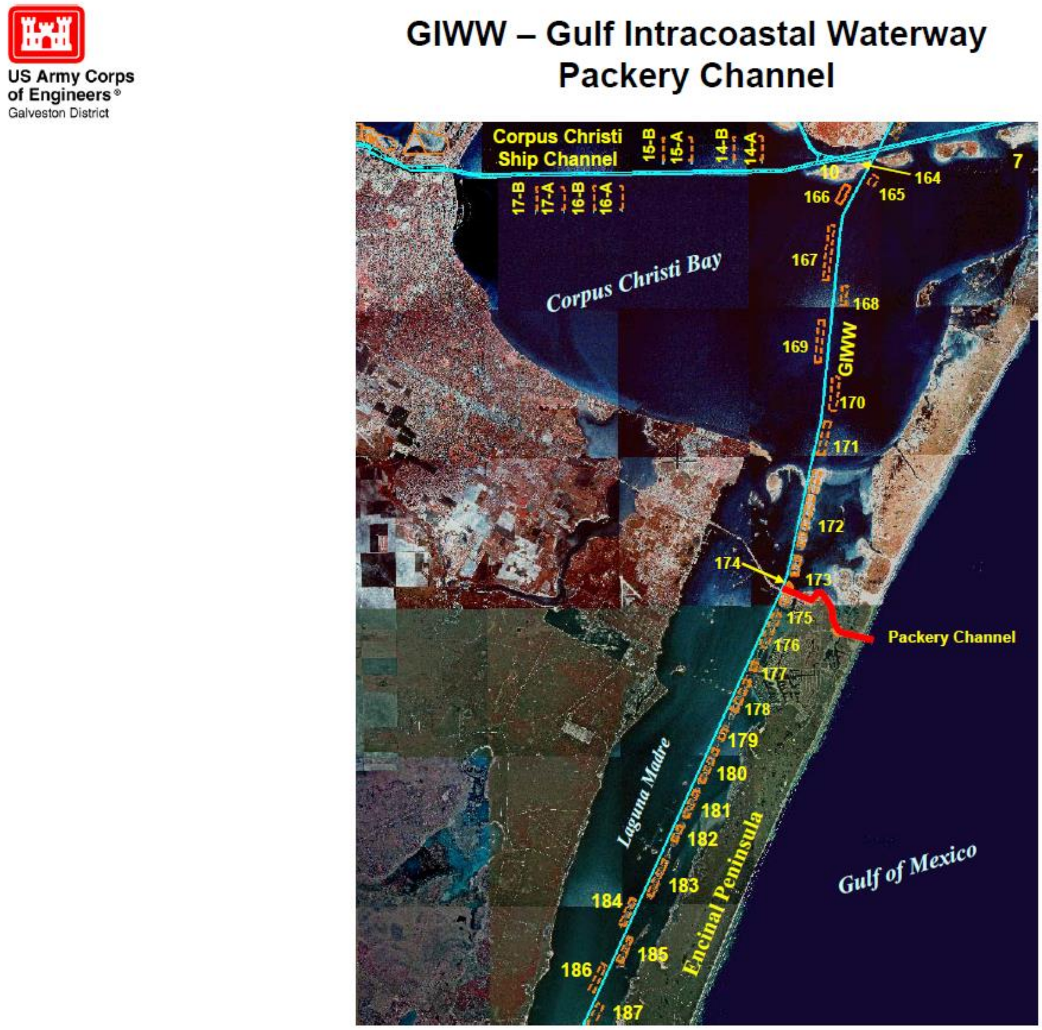


Figure 11. Packery Channel[5]

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Table 1 shows the 14 projects identified within Region 3 that address the Bay Shoreline Stabilization and Estuarine Wetland Restoration vulnerability. Note that the project descriptions are draft versions, typically provided in the original project literature. Figure 12 shows the location of projects within Region 3. Projects are grouped in the discussion that follows, based on similarity in project type, vulnerability addressed, or location.

Table 1 Projects Related to Bay Shoreline Stabilization and Estuarine Wetland Restoration in Region 3

Project Number	Project Name	Project Description
696	Shamrock Island Restoration Phase II	This project involves 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 breakwaters will protect 2,045 linear feet of prime beach nesting habitat, 11.5 acres of saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat from erosion. Improvements to the 150-acre rookery island will enhance the habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, and the American Oystercatcher.
718	East Copano Bay Shoreline Stabilization and Habitat Protection	The project focuses on stabilization with oyster bed creation to prevent further erosion of a shallow, vegetated sand bar from Copano Bay Bridge to Newcomb's Point (approximately 6,000 feet).
142	Mustang Island Bay Shoreline Protection and Marsh Restoration	The project includes shoreline protection for approximately 8.25 miles of eroding shoreline and up to 215 acres of marsh land restoration.
70	Goose Island State Park Habitat Restoration and Protection	The project involves shoreline and habitat protection of the critical intertidal estuarine marsh habitat that makes up 25 acres of Goose Island State Park.
678	Indian Point Shoreline Protection Phase II	Phase I of this project included the construction of approximately 1,040 linear feet of limestone revetment and offshore breakwaters. Phase II of the 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.
437	Fulton Beach Road Protection	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.
448	Copano Bay Shoreline Stabilization	The proposed project involves breakwater stabilization of shorelines in Copano Bay along the Western shoreline, along with vegetative plantings to establish a more stable shoreline habitat.
9004	Lamar Beach Road Protection	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 along with marsh planting to establish a living shoreline system. Lamar Beach Road was recently damaged in 2015/2016 with high winds and above-average tides. The current shoreline hardening is non-engineered rubble and concrete riprap, which is deteriorating and threatens the road infrastructure and access for public and private users. This road provides water access for St. Charles Bay and popular kayak launching for the public. The living shoreline solution would also address extensive marsh / estuarine habitat loss along this shoreline.
9005	Bayshore Pocket Beach Stabilization	The project proposes development of alternative stabilization methods for backshore bluffs at bayside pocket beaches. These small community beaches typically serve as local water access / launch sites, and erosion is compromising the beach environment by introducing incompatible sediment onto the beaches. A study may be required to determine the best methods for stabilizing pocket beaches.
9006	Dagger Island Shoreline Protection	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 reefs, emergent marsh, mangrove marsh, mangroves, tidal flats, benthic life and associated uplands important for the health of the entire bay ecosystem. In addition, this project will create low and high marsh habitats and enhance seagrass beds.
9008	Flour Bluff / Laguna Shores Road Living Shoreline	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.
9032	Aransas NWR San Antonio Bay Shoreline Protection	The Ingleside Barrier Island strandplain upland is eroding and large live oaks are falling into San Antonio Bay. A wave-break of some type could prevent or slow down loss of this important habitat.
9045	Packery Channel Nature Park Habitat Restoration - Phase II	Portions of the original project narrative have been completed under a CIAP grant. The remaining work to be completed that still needs funding is an additional 2 acres of habitat restoration, additional elevated boardwalk for public access, and a living shoreline stabilization along the parks boundary on Packery Channel, which has been extremely erosive since the channel was opened. The habitat in this area is critical to neotropical migratory birds for food and cover as well as resident bird populations, and a key element of the project is to have funding to collect data on how the bird populations are responding to the restored habitat. A portion of the habitat restoration work also involves continued control and removal of invasive grasses and trees, such as Brazilian Pepper Trees.
9001	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	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.

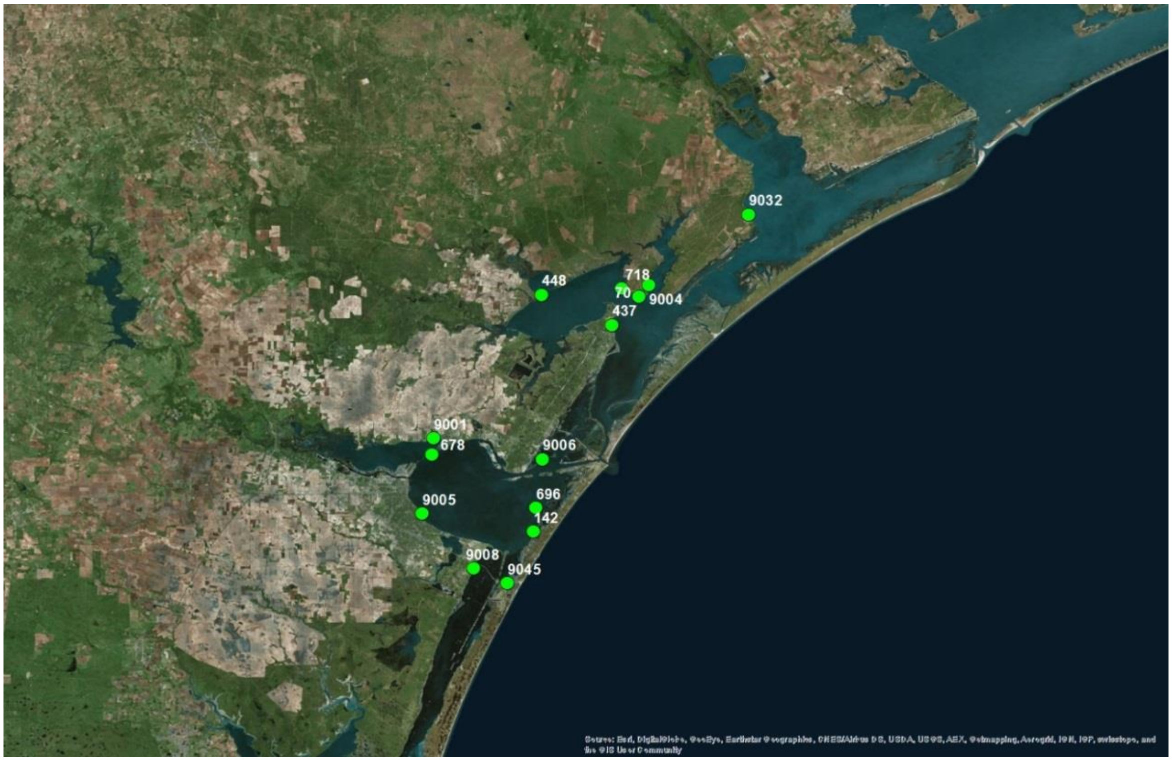


Figure 12. Bay Shoreline Stabilization and Estuarine Wetland Restoration Projects for Region 3[3]

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

Project 718

The project stabilizes a shoreline by creating an oyster bed creation to prevent further erosion of a shallow, vegetated sand bar from Copano Bay Bridge to Newcomb Point (approximately 6,000 feet). Figure 13 shows the extents of Project 718 that involves stabilization of a shallow sand bar along the shoreline near Copano Bay Bridge. Figure 14 shows historical imagery of the shoreline conditions in this area. Shoreline changes are likely a product of increasing relative sea level rise that has adversely affected the natural equilibrium of the shoreline and the stability of the sand bar. Oyster bed creation will stabilize sandbar sediment and may provide moderate benefits to slow the rate of shoreline retreat. The area should undergo continuous monitoring and adaptive management. If depths increase, for example, oyster beds alone may not be sufficient to address this vulnerability.

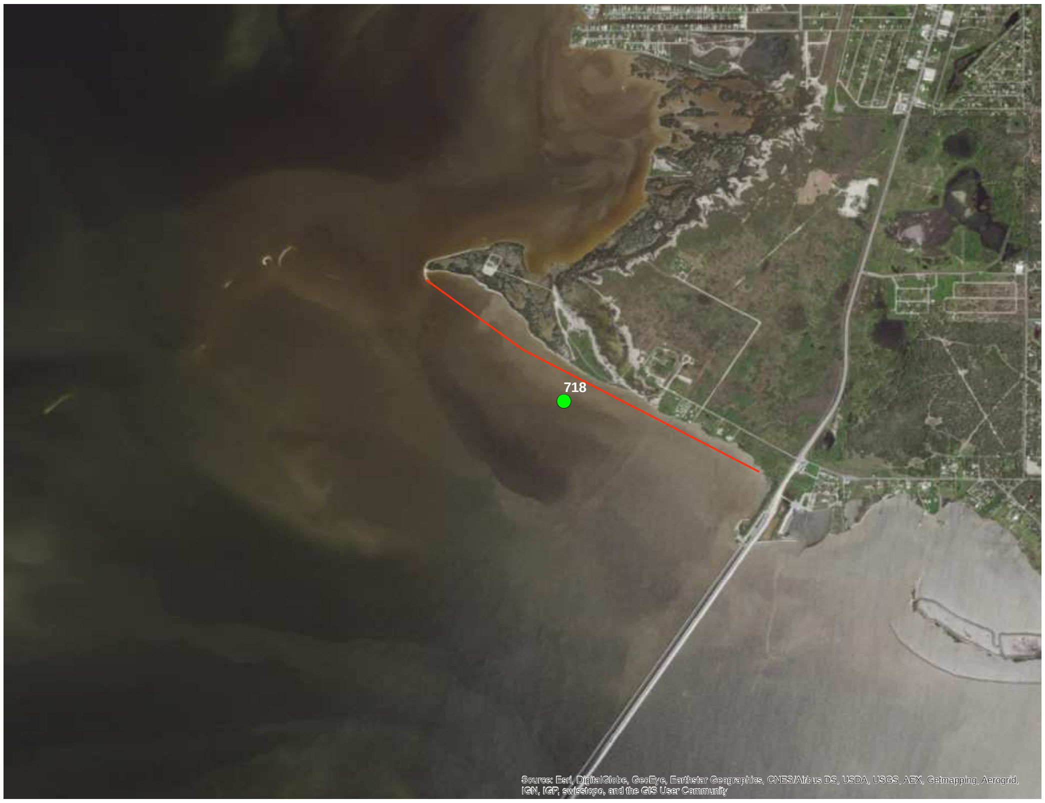


Figure 13. Location of Project 718, East Copano Bay Shoreline Stabilization and Habitat Protection[3]

1995	2016

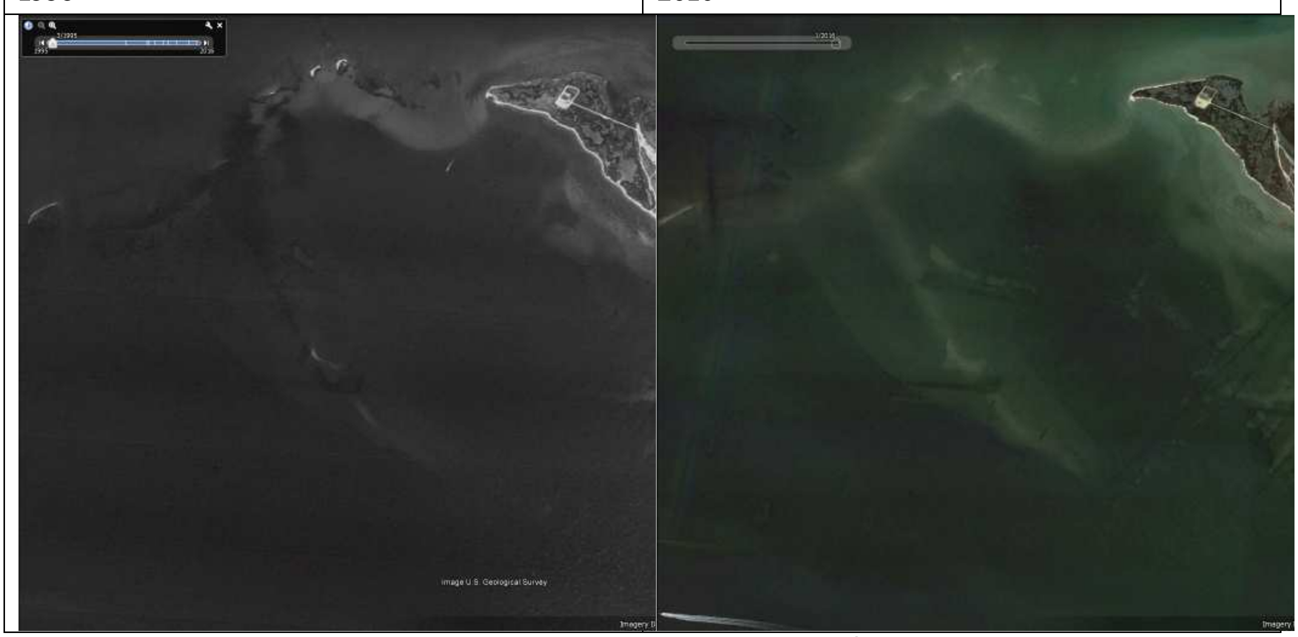


Figure 14. Area in the vicinity of Project 718 between 1995 and 2016[6]

Projects 142 and 696

These complementary projects both focus on shoreline protection and marsh restoration near Shamrock Island. Project 142 will protect approximately 8.25 miles of eroding shoreline and restore up to 215 acres of marsh land using a living shoreline stabilization construction. Project 696 entails the installation of 900 feet of breakwaters, filling of a breach into an interior wetlands and lagoon, and installing a feeder mound to help restore the breach fill. These actions will protect 2,045 linear feet of prime beach nesting habitat, 11.5 acres of saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat. Improvements to the 150-acre rookery island will also enhance the habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, as well as the American Oystercatcher.

The shoreline in the vicinity of Shamrock Island, on the Bay Shoreline of Mustang Island, has eroded significantly. Figure 16 shows historical imagery from 1956 and 2016, demonstrating that Shamrock Island used to be connected to the main part of Mustang Island. Since the connection failed, Shamrock Island has become a more suitable rookery habitat, but continued erosion (and assocaited land loss) continues to be problematic. Since the 1950s, over 17 acres have been lost. Primary causes of erosion in this area include:

- The impacts of the Corpus Christi Ship Channel and vessel wake;
- The long fetch exposure of this shoreline; and
- Impacts of Hurricane Celia in 1970, wherein Shamrock Island broke from the main part of Mustang Island (shown in Figure 17).

Shoreline protection provided by Project 142 will address the long term effects of fetch exposure andvessel wake-induced erosion, provided that project design fully takes into consideration wave impacts. Project 696, involving the installation of breakwaters, provides a longer term structural solution to the erosion issue, while aslo addressing the breach area and enhancing habitat. Thus, the two projects should be designed in collaboration to ensure that this synergy is optimized.

Figure 15. Location and Extents of Project 142[3]

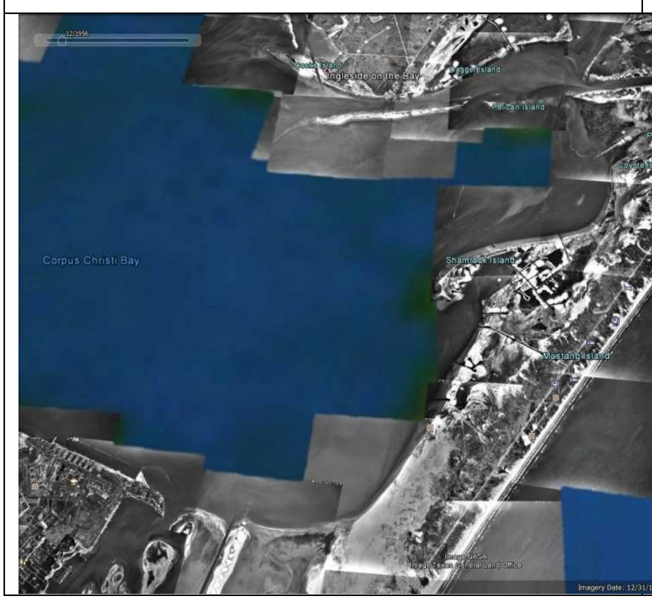
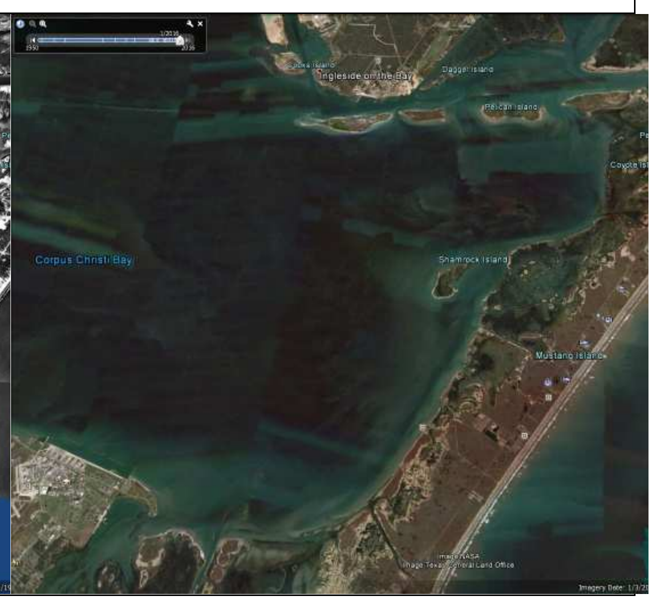
1956	2016
	

Figure 16. Historical Imagery Around Shamrock Island Between 1956 and 2016[7]

1961	1979

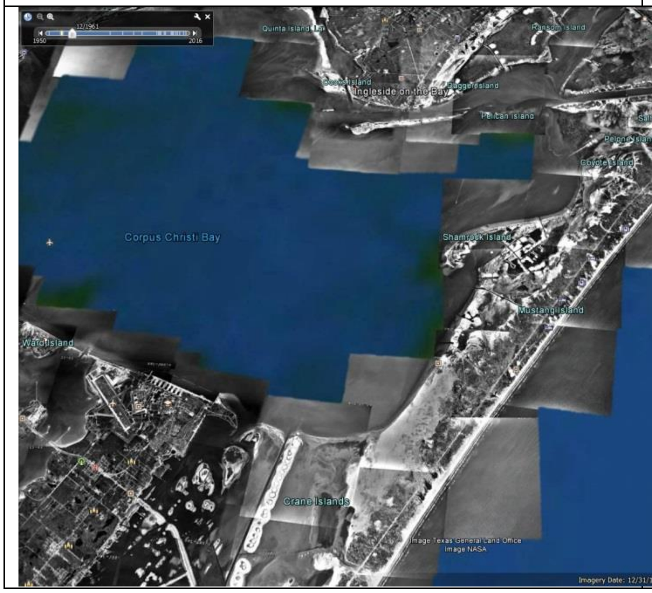


Figure 17. Historical Imagery Around Shamrock Island Between 1961 and 1979 Showing the Effect of Hurricane Celia[7]

Project 70

The project involves shoreline and habitat protection of the critical intertidal estuarine marsh habitat that makes up 25 acres of Goose Island State Park. The project has been ongoing since 2005, when a segmented rock breakwater was built offshore of Goose Island. Since that time, containment levees were constructed landward of the island that can be used for the placement of dredged material to rebuild marsh habitats (Figure 18). This project continues the rebuilding of said habitat and protects the remaining legacy parts of Goose Island

Figure 18. Project 70, Goose Island State Park Habitat Restoration and Protection Project, in 2016[8]

Project 678

Phase I of the Indian Point Shoreline Protection Project included the construction of approximately 1,040 linear feet of limestone revetment and offshore breakwaters. During conceptual design of Phase I of this is project, severe shoreline erosion problems were found in two locations on the east side of Indian Point (Figure 19). Subsequent study found that up to 85 feet of progressive shoreline retreat occurred between 2005 and 2011.[9] The proximity of roadway infrastructure to the eroding shoreline, coupled with the potential for breaching of existing wetland lagoons, indicated that protective measures were in order, and Phase I was subsequently constructed.

Phase II of the 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. The proposed breakwaters are south of the seagrass limit and, therefore, should have no direct impact on existing seagrass. Further, the breakwaters will be segmented, allowing water exchange in the gaps while minimizing wave transmission.

Figure 19. Difference in shoreline erosion between 2005 and 2011[9]

Phase I was constructed with rock shoreline protection around Indian Point, with the segmented breakwaters extended to the east (Figure 20). Phase II is be a continuation of the breakwaters constructed as part of that initial phase.

2011	2014

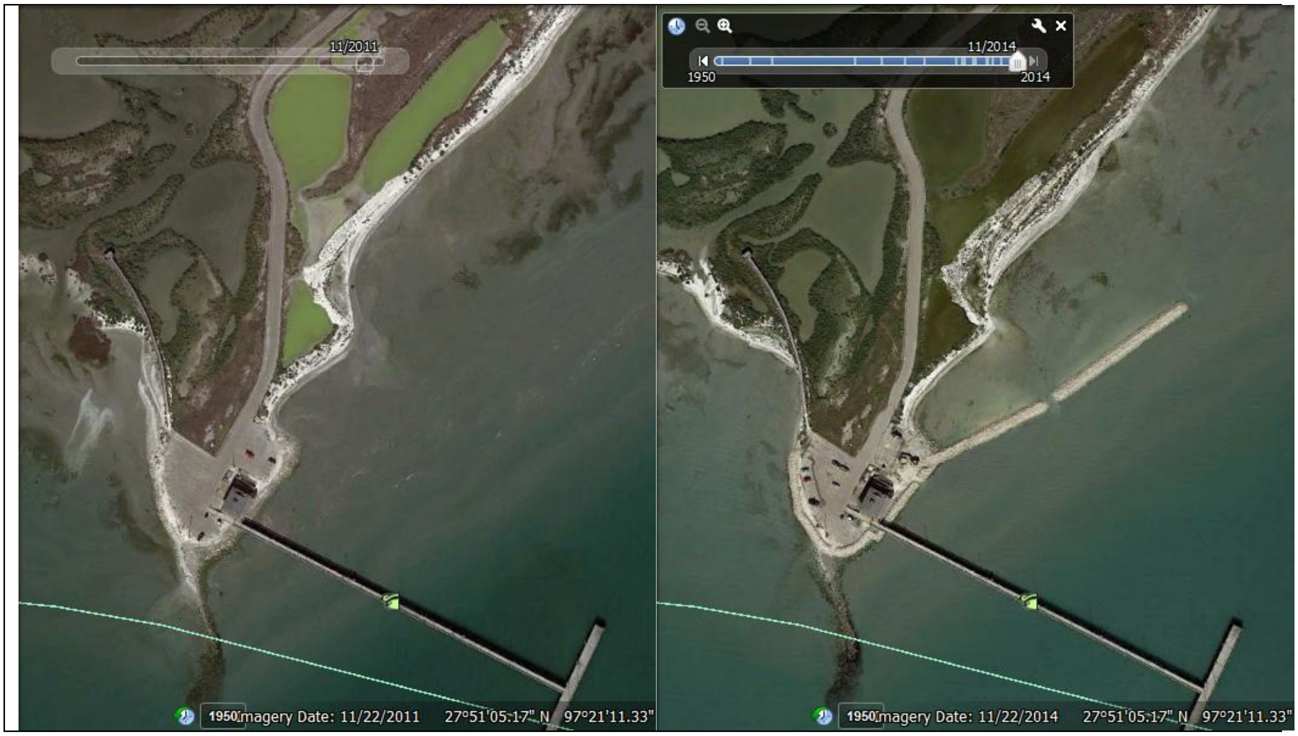


Figure 20. Construction of Phase 1 of Project 678, 2011 to 2014[10]

Projects 437, 9004 and 9008

Three of the projects addressing this vulnerability focus on the construction of living shorelines to address erosion issues, restore marshes, and enhance fish and wildlife habitat.

Project 437 (Fulton Beach Road Protection) entails the construction of three to four miles of breakwaters along Fulton Beach in Aransas County. The project also involves re-grading and filling along the shoreline, as well as marsh planting, to establish a living shoreline.

Project 9004 (Lamar Beach Road Protection) will construct approximately one 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, as well as marsh planting, to establish a living shoreline. Lamar Beach Road was damaged in 2015/2016 due to high winds and above-average tides. The shoreline, comprised of non-engineered rubble and concrete riprap, is deteriorating, compromising road infrastructure. Further, public and private access is limited due to the deterioration (this road provides water access for St. Charles Bay and popular kayak launching for the public). The living shoreline solution offered by Project 9004 will also address extensive estuarine wetland habitat loss within the project location.

Project 9008 (Flour Bluff/Laguna Shores Road Living Shoreline) entails the creation of approximately 1.5 miles of living shoreline serving as a buffer between Laguna Shores Road and the eroding shoreline of Laguna Madre, along the eastern shoreline of Flour Bluff. The project will address erosion problems, improve water quality, and protect existing transportation infrastructure.

As noted, these three projects are similar in that they enhance shoreline protection along bay beaches adjacent to roadway infrastructure. Fulton Beach Road and Lamar Beach Road both have existing - though deteriorating - shoreline protection in the form of rubble and concrete riprap. While beach erosion in these locations is not extremely severe at this point in time, even a continuation of minor erosion rates will further destabilize existing protection and threaten roadway infrastructure. In designing and installing these living shorelines, it will be important to make them sufficiently resilient, to the extent possible, to accommodate extreme weather events.

Project 9032

The Ingleside Barrier Island strandplain upland is eroding and large live oaks are falling into San Antonio Bay (Figure 21). The Bureau of Economic Geology estimates shoreline erosion rates at the point of this area shows erosion rates in excess of 7 feet per year. Erosion over the last decade has been substantial, and lost trees can also be seen in recent aerial photography (Figure 22). Live Oak habitat is now flush with the shoreline; any additional erosion will result in the loss of more trees. A wave-break of some type will prevent or slow down loss of this important habitat.

Erosion in this area San Antonio Bay is likely due to the naturally long fetch and associated wave impacts on the shoreline, coupled with relative sea level rise. A breakwater offshore of the area will slow the naturally progressive erosion, provided that is designed to with these erosional factors in mind.

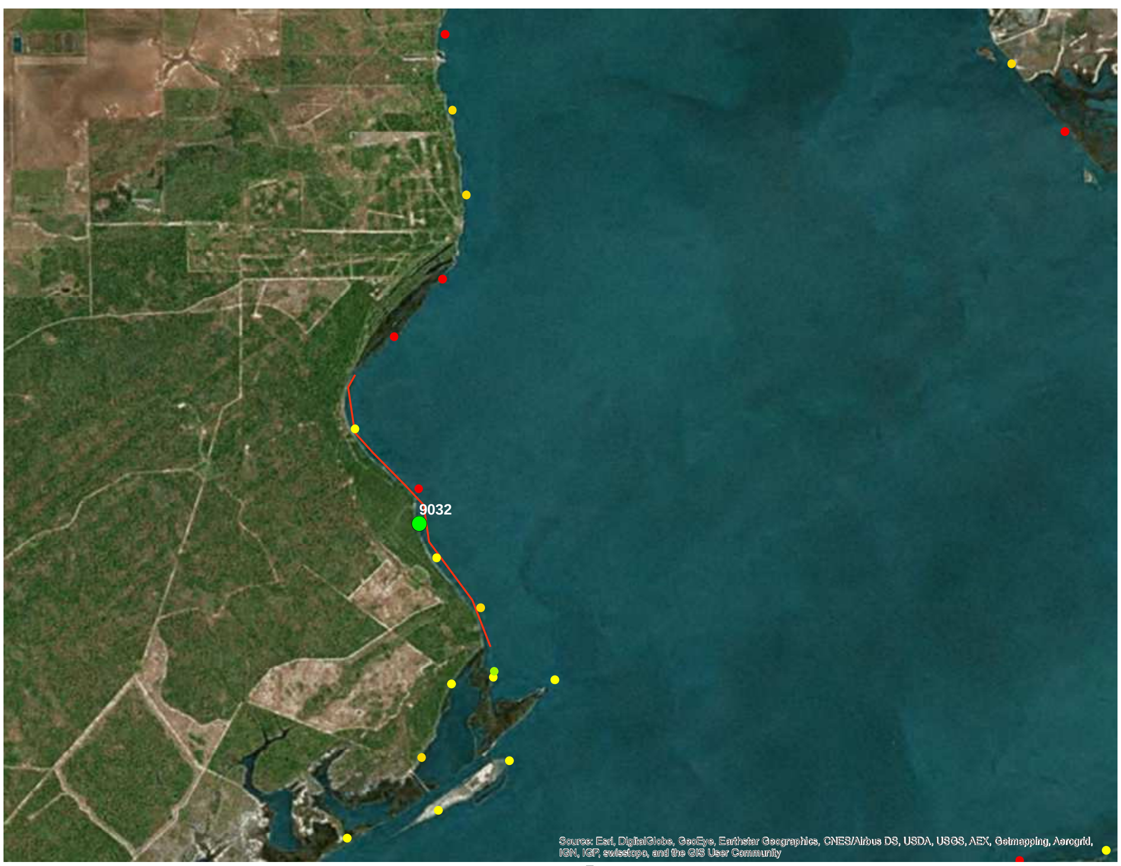


Figure 21. Location and Extents of Project 9032[3]

Figure 22. 2016 Imagery with 2005 Shoreline Indicated in White. Line of Live Oaks Fallen into San Antonio Bay Clearly Visible.[11]

Project 448

This proposed project involves breakwater stabilization of shorelines in Copano Bay along the Western shoreline, along with vegetative plantings to establish a more stable shoreline habitat (Figure 23). On the western shoreline of Copano Bay, the entrance to Mission Bay is flanked by two marsh peninsulas that are eroding significantly (Figure 24). This is due to a combination of relative sea level rise and waves generated from the fetch of Copano Bay. The project will stabilize the shoreline with breakwaters to protect the shoreline from wave energy. Vegetative plantings will also enhance the stability of the shoreline and marsh habitat. The project will not mitigate against the effects of relative sea level rise, which may continue to cause land loss of the marsh areas on the Mission Bay side.

Figure 23. Location and Extents of Project 448[3]

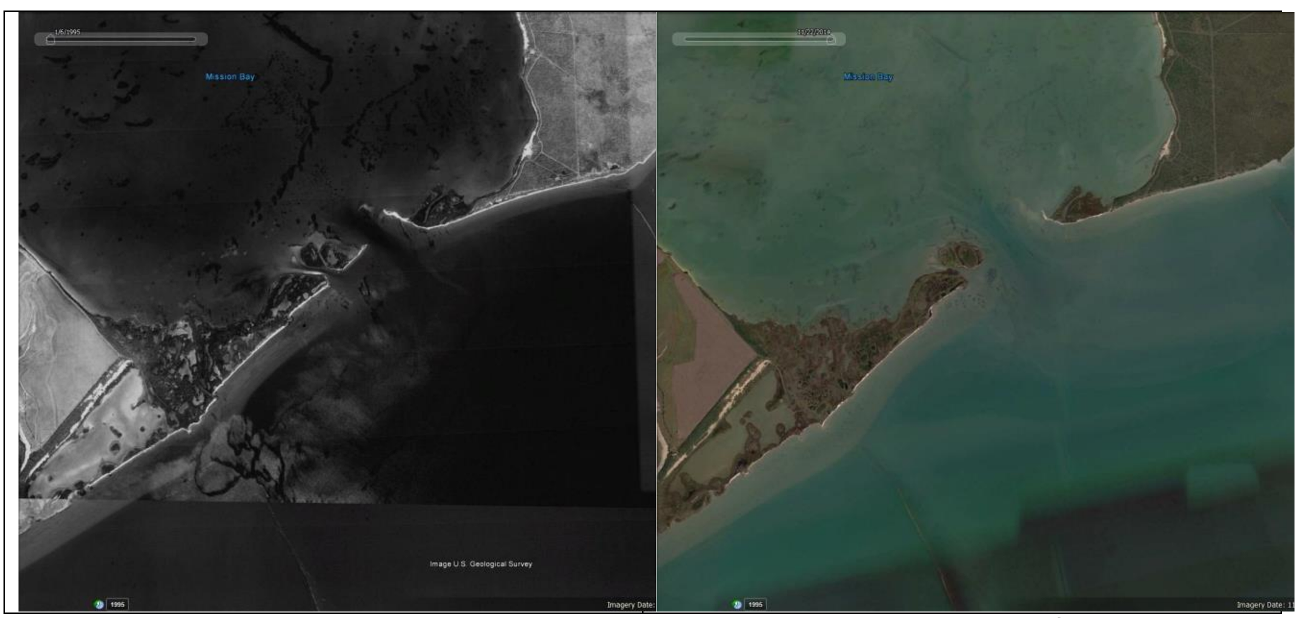


Figure 24. Historical Imagery from Copano Bay Between 1995 (left) and 2014 (right)[12]

Project 9006

This project will eliminate or drastically reduce the rate of erosion and island migration by protecting the shoreline of Dagger Island, located due west of Ingleside, on the southern edge of Redfish Bay just north of Corpus Christi Bay, using living shorelines. 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 will protect shallow aquatic habitat, submerged aquatic vegetation, intertidal habitat, oyster reefs, emergent marsh, mangrove marsh, mangroves, tidal flats, benthic life and associated uplands important for the health of the bay ecosystem. In addition, this project will create low and high marsh habitats and enhance seagrass beds.

Dagger Island erosion is a product of natural conditions as well as the impact of vessel wakes in the Corpus Christi Ship Channel. With the proposed deepening and widening of this channel, it is expected that the frequency and intensity of vessel wakes will increase, thereby exacerbating the erosion problem. Figure 25 shows the first phase of the proposed project, focused on an area with a particularly high shoreline erosion rate (Figure 26). Located just west of Dagger Island are fringe islands may that are also vulnerable to erosion and breaching, and resultant adverse impacts on the seagrass environments behind them. These areas should be monitored on a continuing basis, and be considered as candidates for future shoreline stabilization projects.

Figure 25. Location and Extents of Project 9006, with Bay Shoreline Change Data (see Figure 6)[3]

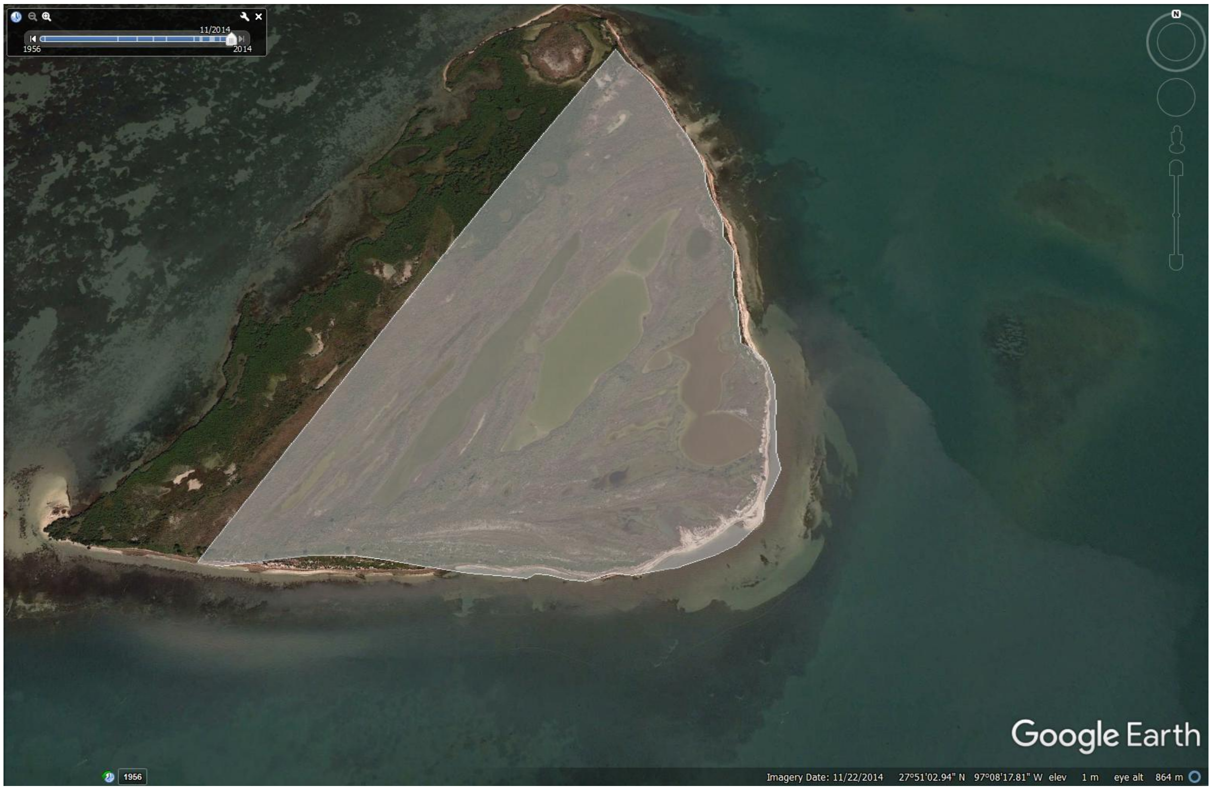


Figure 26. Shoreline Erosion of Project 9006 from 2003 (white polygon) to 2016[13]

Project 9045

This proposed project is a continuation (i.e., Packery Channel Nature Park Habitat Restoration – Phase II) of an earlier effort initiated under a CIAP grant. This second and final phase provides for an additional two acres of habitat restoration, the extension of an elevated boardwalk for public access, and a living shoreline to stabilize the erosion-prone park boundary on Packery Channel. Erosion along the park's shoreline has increased due to heavy vessel traffic since the channel opened. The habitat in this area is critical to neotropical migratory birds for food and cover, and also supports resident bird populations. The project also has a study dimension, as it will collect data to evaluate how the bird populations are responding to restored habitat. Another component of the project involves continued control and removal of invasive grasses and trees, such as Brazilian Pepper Trees.

Project 9001

This proposed project entails the construction of a living shoreline in southwest Portland that would serve as a buffer to mitigate water quality problems in Nueces Bay as well as mitigate the impacts of storm surge on the city's coastal infrastructure. This project site is adjacent to farmland that drains into Nueces Bay (Figure 27). Construction of the living shoreline will improve water quality by mitigating the adverse impacts of nutrient-rich run-off. In addition, the area has experienced significant localized erosion, particularly in those areas where shoreline development has interrupted natural littoral transport (Figure 28). A living shoreline will stabilize the shoreline.

Figure 27 Location and Extents of Project 9001[3]

1950	2014

Figure 28. Historical Imagery Between 1950 and 2014 Showing Erosion to the West of Portland[14]

V. Is the project or grouping effective at mitigating the vulnerability?

The projects are effective at mitigating the vulnerability using a variety of techniques, including rebuilding shorelines using beneficial use of dredged materials and implementing structural shoreline stabilization (e.g., breakwaters). Living shoreline approaches are frequently recommended, which would mitigate estuarine wetland losses noted for the region. In some instances, key areas of breaching or habitat loss are indicated and planned for. Where structural methods are proposed, they should be designed to consider future conditions as well as potential impacts to the surrounding environments.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

These projects effectively mitigate or plan for the effects of the vulnerability across the board. In some instances, the projects are able to directly address the physics driving the vulnerability (e.g., large fetch), however, many of the physical issues driving the vulnerability are expected to be persistent or even increasing (e.g., vessel wakes). Some of the physics driving the vulnerability may be able to be addressed when multiple Resiliency Strategies are implemented or when system-wide impacts are addressed (e.g., freshwater and sediment inflows). Future projects should consider projections of change along the coast, such as in the case of relative sea level rise and shifting weather patterns, to ensure that projects remain viable in the long term.

VII. What are the recommendations for a resilient coastline?

For bay shoreline erosion conditions, a regional assessment of wave conditions within the bay would assist in providing more information on critical areas, and would inform the efficacy of solutions with respect to the expected wave climate. Such a regional model would also lend itself toward being effective in examining the effects of relative sea level rise on waves and shoreline erosion in the bay environments.

C. Freshwater Wetland and Coastal Uplands Conservation

I. What vulnerability was assessed and what are the risks?

The Texas Coast has seen a pronounced decline in wetland numbers and acreage over the years due to their conversion to agricultural, industrial, residential and related uses. Wetland alteration or destruction (e.g., deepening, draining) significantly compromises a range of ecosystem services that naturally functioning wetlands provide. Among others, consequences include adverse impacts on salinity regimes of surrounding environments, lost /degraded habitat, and compromised water quality.

II. What are the physics of the system that drive this vulnerability?

Much of the natural habitat along the Texas coast has been altered by human activity, typically leading to habitat degradation and other adverse ecological consequences.

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Table 2 shows the eight proposed projects addressing the Freshwater Wetland and Coastal Uplands vulnerability in Region 3. Most feature land acquisition (i.e., Projects 937, 91, 9003, 9007, 809, 86) as the primary measure, while two focus on wetland creation and restoration (i.e., 76, 936).

Table 2. Projects Related to Freshwater Wetlands and Coastal Uplands Conservation In Region 3

Project Number	Project Name	Project Description
937	Mustang Island Coastal Prairie and Wetland Restoration	This project will restore approximately 12.8 acres of coastal prairie and estuarine wetland habitat within Mustang Island State Park.
91	Coastal Bend Conservation Easements	The project aims to establish an endowment to purchase approximately 150,000 acres of conservation easements and to fund habitat restoration and maintenance in the Coastal Bend area. Additionally, the funds would provide for restoration and maintenance on South Texas coastal prairies and marshes.
936	Mustang Island State Park Freshwater Wetland Habitat Enhancement - Phase II	Enhance approximately 230 acres of coastal prairie and fresh water estuarine wetland habitat suitable for use by mottled ducks and other wildlife at the park. Restoration efforts will include road removal for to return portions of the park to their original hydrologic conditions.
9003	Coastal Prairie Estuarine Wetland and Mima Mound Complex Habitat Protection at Shell Point Ranch	The project proposes the acquistion of approximately 400 acres of coastal habitats that support coastal prairie, freshwater, and estuary wetlands and the southernmost extents of Mima mounds at Shell Point Ranch in Texas. This mosaic of habitats supports Mottled Duck and whooping cranes, in addition to other wildlife.
9007	Live Oak Woodland Pothole Wetland Habitat Protection, Live Oak Peninsula	The project proposes the acquisition of 400 to 600 acres of imperiled live oak / red bay woodlands with pothole wetlands that support the rare plant communities and state-listed species (e.g. Scarlet Snake). The proposed acquisition area is on the southern tip of the Live Oak Peninsula, at the former Ingleside naval station.
809	Barrier Island Habitat Conservation - Coastal Bend	The project aims to purchase land, purchase development rights, and donate conservation easements to protect essential habitat on Mustang and North Padre Islands.
76	Oso Bay Marsh Habitat Creation	This project consists of constructing wetlands through contouring, planting, and directing water inflow. Additionally, project will control and remove invasive species. Restoring the degraded wetlands and removing invasive species will enhance the wetland habitat, providing better functionality for water draining through the wetland before entering Oso Bay.
86	Mustang Island State Park Acquisition	The project involves the acquisition of parts of Mustang Island and the protection of tidal marsh, emergent estuarine wetlands, and coastal prairie dune and beachfront habitats. This includes the Mustang Island State Park Conservation Initiative, which will create a contiguous 5,100+ acre conservation area along the barrier island that will enhance the net biological value of the island.

IV. HOW DOES THE PROJECT OR GROUPING MITIGATE THE VULNERABILITY?

Most of the projects addressing this vulnerability involve acquiring lands or conservation easements to protect important wetland habitats. In some cases, infrastructure removal and restoration efforts are planned.

V. IS THE PROJECT OR GROUPING EFFECTIVE AT MITIGATING THE VULNERABILITY?

Land acquisition projects, including the purchase of conservation easements and development rights, are highly effective at mitigating the vulnerability on a site-specific basis. They do so by permanently preventing or controlling development activity with the potential to exacerbate wetland and habitat loss, among others. Larger scale events (e.g., extreme weather, relative sea level rise, land subsidence) still threaten such land, but adverse impacts are lessened when land acquisition removed the property from potentially harmful development.

VI. Does the project address the causation of the physics driving the vulnerability, or does it serve to mitigate the effects?

Proposed projects addressing this Region 3 vulnerability are primarily focused on mitigating the effects of wetland loss experienced over a number of years. Addressing the causation of the vulnerability will also require actions that 1) prohibit future development in wetlands; and 2) eliminate or minimize the adverse impacts of relative sea level rise, extreme weather events and other climate change-related factors that contribute to wetland loss/degradation.

VII. What are the recommendations for a resilient coastline?

Restoration and protection of lands from human intervention and continued monitoring.

D. Delta and Lagoon Restoration

I. What vulnerability was assessed and what are the risks?

The ecological health of several watersheds within the Texas coastal zone has been compromised by development that has fundamentally altered the hydrology of rivers and deltaic systems. Reducing the natural flow of water toward river deltas, for example, can reduce deposition of minerals and nutrients essential for a healthy system. Similarly, the reduction of freshwater inflows can alter the salinity of deltaic habitats, causing degradation of fresh water marshes and wetlands. Upland development within watersheds can increase the velocities of flows reaching watersheds, exacerbating erosion and decreasing water quality (often due to elevated bacteria levels and low levels of dissolved oxygen). In some instances, channel and outfall closures have been prompted by sediment deposition from dredging activities and bore waves. Re-opening these systems to re-establish circulation may be required as part of restoration efforts.

Within Region 3, 11 proposed projects are directed at Delta and Lagoon Restoration; six are focused on the Nueces River Delta system (i.e., Projects 9013, 443, 9002, 680, 75, 841); four are focused on the Guadalupe River Delta system (i.e., Projects 9031, 9033, 433, 605); and one (i.e., Project 9059) is focused on the Little Bay system. All three systems have been significantly modified, both upstream with regard to development along the watershed, and by alterations to the delta system directly.

II. What are the physics of the system that drive this vulnerability?

Depending on the hydrodynamics of the system under investigation, this vulnerability is associated with one or more of the following:

- Reductions in freshwater inflows to a deltaic system that directly affect the salt balance within the system. A reduction in flow tends to increase the salinity of delta habitats. In addition, reduction in the discharge rate tends to reduce the sediment load the river carries into the delta. This results in a reduction in marsh growth or marsh loss.
- Man-made or natural excursion of saltwater channels that increases the saltwater volume reaching inland, also affecting the salt balance within the system.

- Obstructions that interfere with natural flow regimes within the system and/ or direct flow and sediment loads to locations within the estuary that do not feed historical marsh habitats.

Channelization or diversion of the natural delta system can also direct freshwater and sediment loads to different locations within the estuary where they may not directly feed delta marsh habitats that rely upon them. All of these physical effects can have significant impacts on water quality and habitat suitability.

The physics of Region 3 related to Delta and Lagoon Restoration are grouped by delta system:

Nueces River Delta System

The average annual freshwater inflow to the upper Nueces Delta has decreased by 99 percent when compared to pre-dam conditions.[15,16] In addition, changes along the Nueces River isolated it from the delta, with the exception of the overflow channel that was opened in 2001. Most of the remaining freshwater flow is diverted from the river into Nueces Bay. This has led to occasional hypersaline environments reaching into the upper Nueces Delta. To address this issue, a number of projects have been implemented within the Nueces system:

- The Nueces Delta Mitigation Project excavated an area to restore a salt marsh habitat in the lower delta.
- The Rincon Bayou Demonstration Project, the Rincom Overflow Channel opening, and the Rincon Pipeline Diversion were each designed to increase freshwater inflows. Currently, a complex system of pumps and diversions are used to divert freshwater through Rincon Bayou to feed the Upper Nueces Delta.
- The Allison Wastewater Treatment Plant Diversion involved piping nutrient rich water to the middle delta.

The six proposed projects, as presented in Table 3, will complement these projects in the interest of returning the Nueces Delta system to a healthier ecological state.

Guadalupe River Delta System

The Guadalupe Delta is a dominant feature within San Antonio Bay. The delta was formed by the deposition of sediments at the point where the Guadalupe and San Antonio Rivers enter the Bay. In recent years, expansion of the delta has resulted in the filling in of Mission Lake. Traylor's Cut was excavated in 1935, diverting freshwater and sediment under normal-high flows into that lake. As a consequence, large parts of the existing delta are not receiving their historical sediment load, resulting in increased shoreline erosion.

The impacts of sea level rise and land subsidence are also adversely impacting the delta. Elevated water levels, combined with normal wind-generated wave activity within the bay, are also eroding the shorelines in the delta.

Little Bay System

This system has been altered extensively since the 1950s, resulting in a reduced exchange of water between Little Bay and Aransas Bay (Figure 29). It has also led to an increase in impervious surfaces and increased influence of stormwater runoff.

Figure 29. Comparison of Little Bay between 1952 and 2005[17]

Following large, rainfall-induced flood events, the salinity of Little Bay is reduced for extended periods.[17] This is an indication that the exchange between Aransas Bay and Little Bay is insufficient to maintain natural ecological function. Another contributing factor to water quality in Little Bay is that of high levels of chlorophyll and a decrease in water quality.[18]

III. What projects/groupings address this vulnerability?

Nueces River Delta System

In Region 3, there are six proposed projects that address the Delta and Lagoon vulnerability in the Nueces Delta. Figure 30 shows the proposed projects, and provides descriptions.

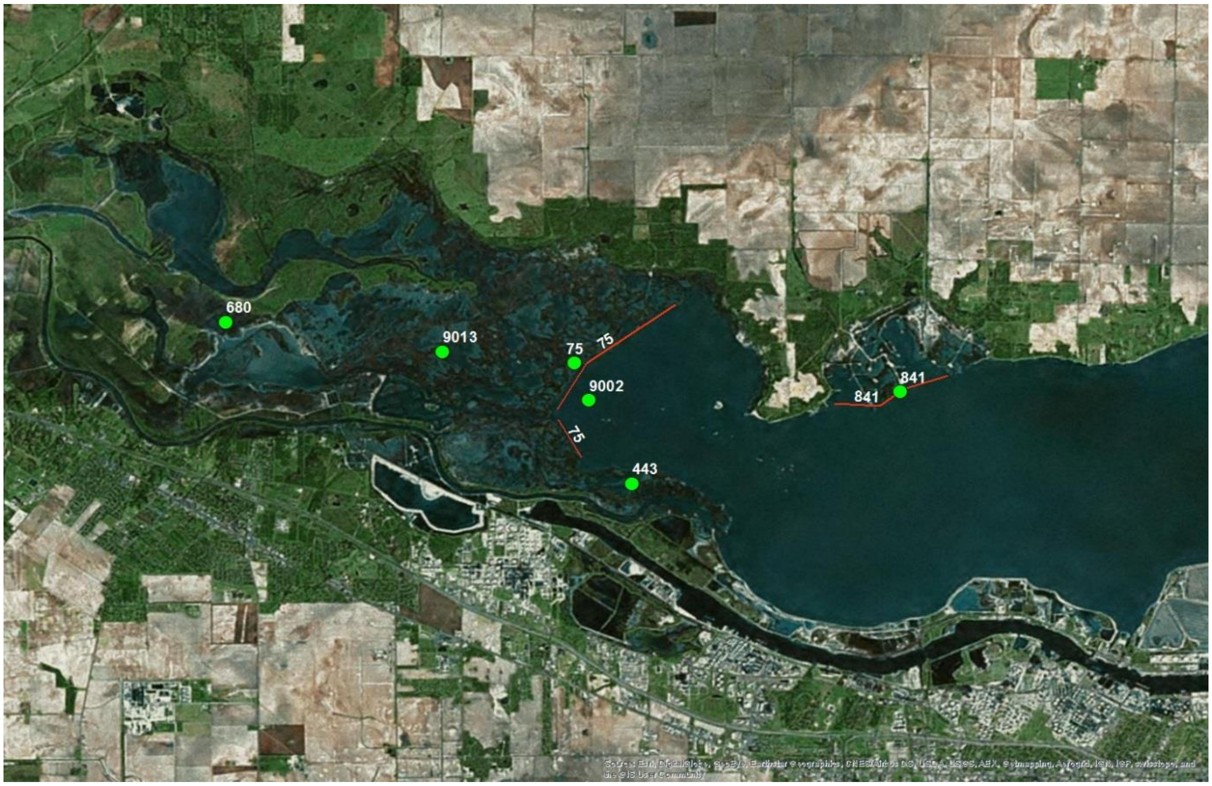


Figure 30. Projects Related to Delta and Lagoon Restoration in the Nueces River Delta[3]

Table 3. Projects Related to Delta and Lagoon Restoration in the Nueces River Delta

Project Number	Project Name	Project Description
9013	Nueces Bay Productivity Enhancement through Wastewater Delivery	In this river basin there is very limited potential for transactions to purchase water upstream to provide increased freshwater inflows to the estuary. Accordingly, this project proposes to pipe treated wastewater for delivery to the bay at an advantageous location. A demonstration project that ended in 2003 has already illustrated the ecological benefits of this approach. This project would provide infrastructure to deliver between 5 to 8 MGD (5 to 9 thousand acre-ft./yr.) of freshwater and beneficial nutrients from treated wastewater from a somewhat distant treatment plant to a key portion of the Nueces Delta each year.
443	Nueces County Hydrologic Restoration Study	The project involves hydrologic restoration in Nueces, Corpus Christi, Aransas, and Copano Bays to restore special aquatic sites such as wetlands, mudflats, and vegetated shallows recognized as nationally significant by the Clean Water Act.
9002	Lower Nueces River Freshwater Inflows	The proposed study would determine the impacts of limited or regulated freshwater inflow on the water quality of the Lower Nueces River below the saltwater barrier and Nueces Bay. There is a need of long-term monitoring of these systems across the Texas coast to capture these effects on the water quality and habitat and to understand all types of freshwater inflows for improved water and system-wide nutrient budgets.
680	Nueces Delta Marsh Plan and Restoration Project â€“ Phase II	This project will continue management and restoration of approximately 4,700 acres of vital habitat within the Nueces River Delta and conserve diverse estuarine marsh and prairie habitat. Numerous aquatic species and endangered or threatened avian species utilize the areas within the delta as breeding and nursery grounds. This project will develop and implement a comprehensive management plan for the area to allow for protection and restoration of the terrestrial and estuarine habitats.
75	Nueces River Delta Shoreline Stabilization	The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy causing emergent intertidal wetland losses.
841	Nueces Bay Living Shoreline	The project will focus on the north shoreline of Nueces Bay, where erosion rates are particularly high (average rates of 3 ft/yr and up to 5 ft/yr). The project proposes the use of a wave break to reduce wave energy along with vegetative plantings to establish a more stable shoreline habitat.

Guadalupe River Delta System

Four proposed projects address the Delta and Lagoon Restoration vulnerability in the Guadalupe River Delta. Figure 31 shows the location of these projects, and Table 4 provides descriptions. (Note: Two of the projects depicted in Figure 31 are addressed elsewhere. Project 9029 is more relevant to the GIWW vulnerability, and is addressed in the Region 2 discussion. Project 777 addresses the Rookery Island Creation and Restoration vulnerability, and is also addressed in Region 2 discussion. They are identified in Figure 31 given their proximity to the Guadalupe River delta region.)

Figure 31 Projects related to the hydrologic restoration in the Guadalupe River Delta[3]

Table 4. Projects Related to Delta and Lagoon Restoration in the Guadalupe River Delta

Project Number	Project Name	Project Description
9031	Traylor Cut (Mission Lake - Guadalupe River)	In the 1930s, the Guadalupe River was partially rerouted into Mission Lake through Traylor's Cut.Today, the Guadalupe Delta is eroding and sinking, at least in some measure due to lack of sediment despostion. Closing Traylor's Cut and reestablishing flows in the lower river could increase over banking onto the delta. A study is proposed to determine possible effects of closing the cut.
9033	San Antonio Bay Freshwater Inflows	This project involves the delivery of water to the San Antonio Bay estuary by purchasing existing water-use permits from willing sellers or paying owners of water-use permits to enter into long-term commitments to not withdraw that water upstream. Downstream delivery points will be established to ensure the water reaches the estuary and, where feasible, storage facilities will be used to help deliver the purchased water to the estuary at times when it provides the greatest ecological benefit. The project will provide up to 40,000 acre-feet per year of reliable inflows to the San Antonio Bay system as compared to future conditions without the project.
433	CA7 - Guadalupe River Delta and Breakwaters (1.3 mi), Calhoun County	Land loss due to diverted river flows and sediment. Divert river flows through original channel. No description given in draft 905(b) report.
605	Guadalupe Delta Estuary Restoration	The 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.

Little Bay System

A single, multi-phased project is proposed for Little Bay (see Project 9059, Table 5).

Table 5. Project Related to Delta and Lagoon Restoration in the Little Bay System

Project Number	Project Name	Project Description
9059	Little Bay Restoration Initiative	The initiative will restore Little Bay, a shallow, enclosed bay with approximately 420 acres of surface area, to a natural, vegetated state, making it better able to sustain and enrich an ecosystem that provides habitat for submerged seagrasses as well as local water fowl, migratory birds, fish, crustaceans, and other aquatic fauna. Scientists have identified polluted stormwater runoff, inadequate water circulation and diminished water exchange with Aransas Bay as principal causes of the declining water quality and loss of wildlife habitat. Four tasks will address these issues: dredge Little Bay to a depth of nine feet to restore historical conditions; beneficially use dredge material to restore two rookery islands and create a marsh platform along the western shoreline; plant four acres of new vegetative marsh habitat and create nesting habitat for black skimmers; and widen, realign, and extend Blevins Channel, one of the two outlets connecting Little Bay with Aransas Bay.

IV. How does the Project or Grouping Mitigate the Vulnerability?

Nueces River Delta System

Project 443, 9002 and 9013

Proposed projects focusing on the Delta and Lagoon Restoration vulnerability are directed at ecosystem improvements by restoring freshwater flows, achieving desired salinity levels, improving nutrient balance, and restoring/maintaining healthy marshes and habitats. Monitoring will be an important component of this effort, both to gauge the effectiveness of projects and to identify additional project needs. This should be continually monitored to ensure that the right balance is achieved. The addition of high nutrient wastewater to the system should also be monitored to ensure that the nutrient balance remains appropriate for the region. The projects related to this goal should remain adaptable as continual marsh health monitoring is conducted.

Projects 75, 680 and 841
These projects all relate to living shoreline approaches to stabilize the delta shoreline and restore habitats in the vicinity of the delta. Wave breaks and plantings are expected to help stabilize the delta in this area. Project 75 is a breakwater placed on the bay side of the delta to reduce the erosion of emergent marshes due to wave action from the Bay. This project should be considered carefully. While it will dissipate wave energy from the Bay, it may also have influence on the circulation and exchange between the Delta and the Bay. While estuarine marshes are dependent on the freshwater inflows, they are also dependent on the exchange with saltwater bodies. There is also a possibility that as marsh health and vegetation returns through projects 680 and 841, the impact of waves on the delta erosion may be less pronounced.

Guadalupe River Delta
Projects 433, 605 and 9031
Project 9031 proposes to examine the prospective benefits of closing Traylor's Cut and re-diverting flows back to the lower Delta to increase freshwater flow and sediment loads. This is similar to proposed Projects 433 and 605, although the former also includes a breakwater on the southern boundary of the delta, and the latter includes a living shoreline. These additional structural measures will slow land loss and complement associated efforts to restore natural flows.

Project 9033
Project 9033 proposes to increase freshwater flows into the Guadalupe Delta and San Antonio Bay to restore the natural estuarine balance between fresh and saltwater. The increased flows will also carry more sediment to the area. The effectiveness of this project will be enhanced when combined with other projects entailing the diversion of freshwater through the lower delta.

Little Bay
Project 9059
Compromised water quality within Little Bay is a consequence of inadequate flow exchange with Aransas Bay, coupled with the adverse impacts of stormwater runoff. Achieving a resilient coast requires that these factors be addressed. The increase of depth in Little Bay is important to restore historical conditions, but the exchange with Aransas Bay is important to achieve in order to increase the flushing of Little Bay especially with the increased prism of the deeper Bay. Project 9059 (Little Bay Restoration Initiative) offers a multi-faceted approach to achieve resiliency.

V. Is the Project or Grouping Effective at Mitigating the Vulnerability?

Individually and collectively, the 11 projects presented here are effective in mitigating the Delta and Lagoon Restoration vulnerability in various locations within the Nueces River Delta, Guadalupe River Delta, and Little Bay systems. Ongoing monitoring will be an important undertaking to assess progress with implemented projects, identify any adaptive management needs, and determine whether additional projects in these locations will further benefit vulnerability mitigation efforts.

VI. DOES THE PROJECT ADDRESS THE CAUSATION OF THE PHYSICS DRIVING THE VULNERABILITY, OR DOES IT SERVE TO MITIGATE THE EFFECTS?

Nueces River Delta System

The addition of freshwater flow will address the cause of the hypersaline environment currently experienced in the Delta. Emergent marsh loss is a consequence of wave-induced erosion, and will be addressed through the proposed construction of a breakwater. In so doing, breakwater design must address/avoid any unwanted impacts that might compromise delta restoration efforts.

Guadalupe River Delta System

The diversion of freshwater and sediment loads into the lower delta should decrease the rate of land loss, and also restore a desired balance of salt and freshwater. Project design will need to include a careful analysis of diversion outcomes, complemented by post-project monitoring to ensure that projects are performing properly. Erosion due to relative sea level rise and waves from San Antonio Bay can also be reduced by some sort of living shoreline or breakwater on the southern end of the delta, but this should be evaluated with respect to impacts on circulation between the delta and the bay.

Little Bay System

The multi-faceted project proposed for restoration of Little Bay will provide for modifications to Blevins Channel in the interest of increases the exchange of water between Little Bay and Aransas Bay. If the project is of a sufficient scale to increase the exchange of water doing, the project may address causation of the physics driving the vulnerability.

VII. WHAT ARE THE RECOMMENDATIONS FOR A RESILIENT COASTLINE?

Nueces River Delta System

In designing and implementing the six recommended projects for the Nueces River Delta, continual monitoring is recommended for parameters that include water quality, salinity, temperature, and marsh health. The update and application of models used in support of past projects should continue as a means to optimize project locations and volumes (i.e., freshwater inflow). Additionally, the breakwater proposed in Project 75 should be incorporated into one of these existing models to determine its impact on exchange and circulation within the Delta system.

Guadalupe River Delta

The design and implementation of the four recommended projects for the Guadalupe River Delta will all contribute to enhanced coastal resilience. The closure of Traylor's Cut and diversion of flow into the lower Delta will require additional study to ensure that sediment deposition and salinity concentration goals can be achieved. Structural measures will also need to be designed to maximize effectiveness in controlling wave-induced erosion and their ability to avoid or minimize any adverse impacts on circulation between the delta and the bay.

Little Bay System

The Little Bay Restoration Initiative project features four elements (i.e., dredging, rookery island restoration, marsh habitat enhancements, widening/realigning Blevins Channel) that will collectively contribute to a more resilient coastline. Given the scope and multi-faceted aspects of this project, design efforts should be preceded by careful study of water exchange between Little Bay and Aransas Bay, as well as consideration of other factors may affect project success (e.g., vessel wakes, sea level rise).

E. Oyster Reef Creation and Restoration

I. What vulnerability was assessed and what are the risks?

Oyster reefs in Texas bays are subject to degradation due to natural and anthropogenic processes that contribute to the loss of oyster habitat. During hurricanes and tropical storms, significant amounts of sediment can inundate, and thereby damage or destroy, oyster reefs. An estimated 8,000 acres of oyster reef were lost during Hurricane Ike, for instance, due to excess levels of sediment deposition. Oyster habitats are also susceptible to manmade developments and associated impacts. Salinity gradients and turbidity changes impact the viability of reefs, as oysters are highly sensitive to both. Galveston Bay, along with other coastal reaches in Texas, has seen increases in salinity gradients and turbidity due in large part to the construction of navigation infrastructure and ongoing channel dredging. In addition, degradation of marsh and vegetated habitat upstream can increase velocities flowing into bay systems, resulting in adverse impacts on oyster reefs. Vessel wakes and unchecked commercial harvesting can also negatively impact oyster reef viability.

II. What are the physics of the system that drive this vulnerability?

The vulnerability of oyster habitats is related to the following physical processes:

- Increased sedimentation directly on existing beds;
- Increased salinity due to decreased freshwater inflows into bay environments; and/or
- Increased turbidity due to vessel traffic and dredging activities.

III. What projects/groupings address this vulnerability?

Three proposed projects within Region 3 address the Oyster Reef Creation and Restoration vulnerability. Project locations are shown in Figure 32, and described in Table 6. All three projects (i.e., 779, 436, 829) focus on oyster reef restoration or construction. Figure 32 Projects related to oyster beds in Region 3

Table 6. Projects related to Oyster Reef Creation and Restoration in Region 3

Project Number	Project Name	Project Description
779	Copano Bay Oyster Reef Restoration	The primary goals for the project are to design and construct a segmented reef structure that enhances the recruitment and productivity of native oysters, provides a biologically rich and diverse collection of reef-dependent estuarine organisms, and builds resiliency into the Copano Bay estuarine ecosystem. The project also includes a monitoring program to assess project performance over 3 to 5 years post-construction.
436	A1 - Copano Bay Oyster Reef Restoration, Aransas County	Oyster reef (150 ac). 1) Magnuson-Stevens Fishery Conservation Ac recognizes oyster reef as one category of essential fish habitat; 2) NOAAâ€™s National Shellfish Initiative - NOAA's Office of Habitat Conservation is working all along the East, West and G
829	Oyster Reef Restoration in Nueces and Corpus Christi Bays	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.

IV. How does the project or grouping mitigate the vulnerability?

The proposed projects mitigate the Oyster Reef Creation and Restoration vulnerability by adding new oyster habitat to Region 3, through restoring compromised oyster reefs and constructing new ones.

V. Is the project or grouping effective at mitigating the vulnerability?

Projects 436 and 779

The first two projects (i.e., 779, 436) involve the creation of oyster reefs in Copano Bay, a promising location given the absence of (potentially damaging) ship/barge traffic and dredging activity in the area. Extreme weather events, such as hurricanes, still pose a risk to the integrity of the oyster beds.

Project 829

Oyster reef restoration, as provided in Project 829, is not location-specific at this time. However, following a careful evaluation of prospective sites where there is evidence of a previous reef, potential locations for oyster reef restoration can be identified. If legacy beds were located in proximity to areas heavily ship trafficked or proximal to navigation channels in need of maintenance dredging in Corpus Christi bay, it may not be an appropriate site to try to rehabilitate, as the newly constructed reefs may not be viable. As with the other two proposed projects, these sites can be expected to effectively mitigate the vulnerability, when properly located.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

These projects focus on mitigating oyster reef degradation by restoring damaged oyster beds and creating new ones. Larger scale concerns that have an adverse effect on oyster beds (e.g., relative sea level rise, wave action, extreme weather events, water quality degradation) are factors that drive the vulnerability and must be addressed if factors of causation are to be eliminated. The projects can mitigate the physical effects of oyster reef degradation by building new beds. Beds should be located in areas where the likelihood of continued degradation due to normal conditions is minimized.

VII. What are the recommendations for a resilient coastline?

The proposed oyster reef projects for Region 3 will provide an effective foundation for continued efforts, and their careful design and maintenance should be complemented by the identification of additional projects. The selection and design of those projects will be critically important, given that oyster reefs are vulnerable to many factors, as noted above. Ongoing monitoring is important.

F. Rookery Island Creation and Restoration

I. What vulnerability was assessed and what are the risks?

As with Texas bay shorelines, rookery islands have been subjected to increased erosion due to vessel wakes, wind, and waves. To date, a large number of such islands have experienced significant erosion damage or have degraded completely. Lacking suitable nesting habitat on these island, shorebirds and migratory birds congregate in nearshore coastal communities and become more susceptible to inland predators. Over time, these bird populations decrease, sometimes to the point of endangerment or extinction.

II. What are the physics of the system that drive this vulnerability?

The physical vulnerability of rookery islands is largely a function of shoreline erosion. Physical mechanisms that drive such erosion within Region 3 are typically are related to one or more of the following:

- Ship wake from vessels in the GIWW and other minor ship channels;
- Localized wake due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise; and/or
- A change in the sediment supply due to upstream modifications (e.g., dams).

III. What projects/groupings address this Vulnerability?

Four projects related to rookery islands in Region 3 are proposed (i.e., 72, 844, 806, 9014); they are presented in Figure 33 and described in Table 7. All focus on the restoration of rookery islands, with erosion control and habitat improvements as key elements.

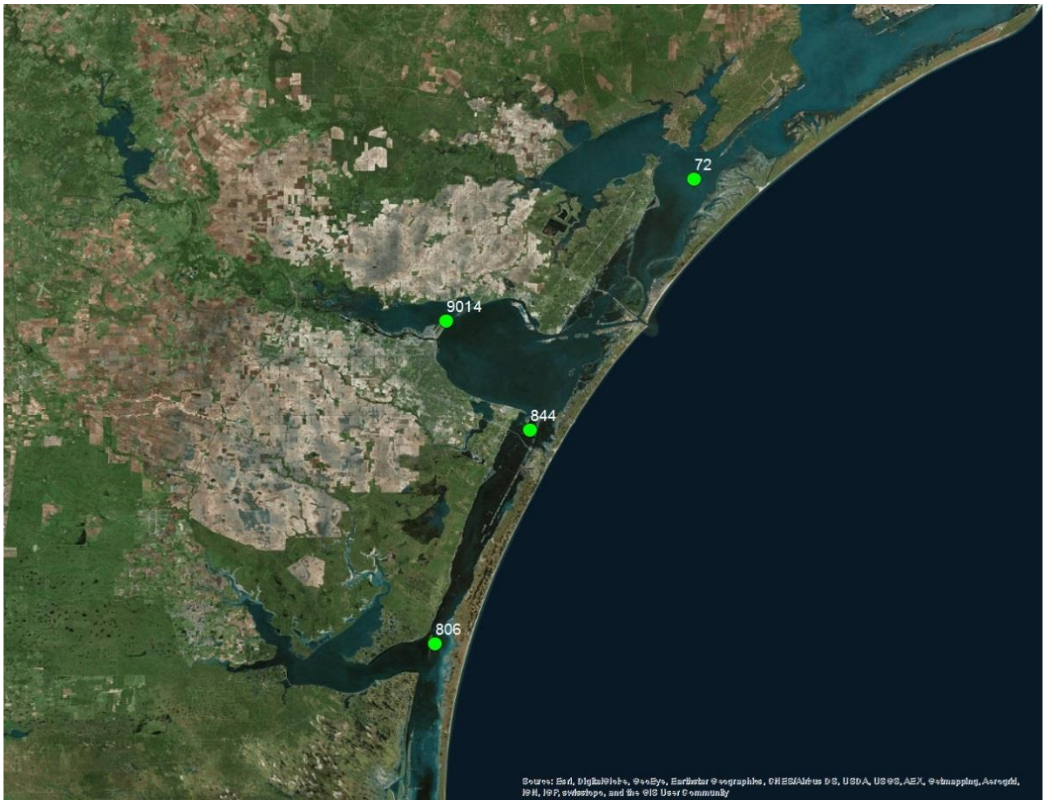


Figure 33. Rookery habitat projects for Region 3[3]

Table 7. Description of Rookery Island Creation and Restoration Projects for Region 3

Project Number	Project Name	Project Description
72	Long Reef Shoreline Stabilization and Habitat Protection	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.
844	Rookery Island Creation in Coastal Bend	The project involves the creation of 3 rookery islands, each approximately 4 acres in size, lined with erosion control material such as limestone rock. The islands will be placed in San Antonio Bay, Nueces Bay, and the Upper Laguna Madre. These rookery islands would allow for consistent nesting grounds for a declining waterbird population. Specific locations are to be determined.
806	Restoration of Rookery Islands in Upper Laguna Madre	The objectives of this project will be to determine the appropriate size and location for the creation of a new rookery island and to obtain preliminary feasibility analysis, engineering, and cost estimates.
9014	Causeway Island Rookery Habitat Protection	This project will address actions needed to protect important rookery island habitat at Causeway Island. The island supports approximately 3,070 pairs of breeding colonial waterbirds per year and harbors numerous threatened and priority avian species. The erosion of the islandâ€™s shoreline is causing the on-going loss of critical rookery island habitat; the primary benefit from this project is the protection of the rookery island from wind and wave erosion.

IV. How does the project or grouping mitigate the Vulnerability?

Projects 72, 844 and 9014

Project 72 addresses this vulnerability by restoring a rookery island through breakwater construction and sediment placement, while Project 844 has a similar goal but focuses on the creation of new rookery islands. Provided that both projects are designed to protect the islands (either naturally or structurally) from various erosive forces, they will be effective in mitigating the vulnerability. Project 9014 seeks to address and resolve ongoing erosion problems associated with rookery islands near Causeway Island through similar shoreline stabilization measures. Protection from wind and wave-induced erosion is a priority concern in mitigating the vulnerability.

Project 806

Project 806 is a study to determine the optimal size and location of prospective new rookery islands and, accordingly, must take into account designs that effectively counter erosive forces in those locations.

V. Is the project or grouping effective at mitigating the vulnerability?

Erosion is the primary factor associated with the degradation of rookery islands, whether it is due to vessel wakes, wind, wave action and/or sea level rise. The proposed projects will be effective in mitigating the vulnerability, provided that they are designed and maintained (e.g., periodic placement of dredged material) to eliminate or minimize erosion problems.

Project 844 is positioned in a location that will be subject to wake from barge traffic on the GIWW. Appropriate shoreline protection should be engineered.

Project 72 is located in open water and will be subject to significant waves and wind erosion. Appropriate shoreline protection should be engineered.

VI. Does the project address the causation of the physics driving the vulnerability, or does it serve to mitigate the effects?

These projects focus on mitigating the effects of erosion on rookery islands; larger scale concerns (e.g., relative sea level rise, wave action, extreme weather events) driving the vulnerability are beyond their scope.

VII. What are the recommendations for a resilient coastline?

The restoration and/or creation of rookery islands have multiple benefits that contribute to a more resilient coastline. In addition to providing habitat for nesting birds, such islands also provide shore-side protection from the erosive forces of vessel wakes, wind, and waves. Proposed rookery island projects for Region 3 will provide an effective foundation for continued efforts, and their careful design and maintenance should be complemented by the identification of additional rookery island projects with coastal resiliency benefits.

[1] University of Texas at Austin, Bureau of Economic Geology. 2014. Shoreline Change Rates 1950's-2012. Data available at: http://www.arcgis.com/home/item.html?id=7bd9c5bf9823451bb783ce22f18cecc9 (accessed Jan 30, 2017) and described in Paine, J. G., Caudle, T. and J. Andrews. 2014. Shoreline Movement along the Texas Gulf Coast, 1930's to 2012, Final Report to the Texas General Land Office. Bureau of Economic Geology, The University of Texas at Austin.

[2] U.S. Army Corps of Engineers. 2016. Wave Hindcast Model Domains for U.S. Coasts (Datasets). Wave Information Studies. Available at: http://wis.usace.army.mil/ (accessed Dec. 8, 2016)

[3] Aerial photographs taken from the project geospatial database, described in the Report.

[4] Texas Water Development Board. 2005. Coastal Erosion Rates (Ft. per Yr.), Texas, 1931-2000, Geospatial data compiled for the Texas Hazard Mitigation Package from Bureau of Economic Geology, The University of Texas at Austin, 2000-2003. Texas Coastal Hazards Atlas, Vol. 1-3. http://www.beg.utexas.edu/coastal/hazardsIndex.htm (accessed Feb 22, 2017)

[5] U.S. Army Corps of Engineers, Galveston District. 2016. Available at: http://www.swg.usace.army.mil/ (accessed Nov. 18, 2016)

[6] "Newcomb Point, Aransas County, TX." 28°09'02.4"N 97°01'35.9"W. Google Earth (accessed Nov. 18, 2016)

[7] "Shamrock Cove, Corpus Christi, TX." 27°45'27.2"N 97°09'40.5"W. Google Earth (accessed Nov. 18, 2016)

[8] "Goose Island, Aransas County, TX." 28°07'42.9"N 96°59'31.0"W. Google Earth (accessed Nov. 18, 2016)

[9] Coastal Bend Bays & Estuaries Program. 2012. Indian Point Shoreline Protection Feasibility Study. Available at: http://www.cbbep.org/publications/IndianPointShorelineFeasibility.pdf (accessed Dec. 8, 2016)

[10] "Indian Point Pier, TX." 27°51'04.4"N 97°21'16.8"W. Google Earth (accessed Nov. 18, 2016)

[11] "Live Oak Point, Calhoun County, TX." 28°15'04.6"N 96°47'14.1"W. Google Earth (accessed Nov. 18, 2016)

[12] "Mission Bay, TX." 28°08'24.7"N 97°09'03.8"W. Google Earth (accessed Nov. 18, 2016)

[13] "Dagger Island, Aransas Pass, TX." 27°50'10.8"N 97°10'16.6"W. Google Earth (accessed Nov. 18, 2016)

[14] "Hunt Road, Portland, TX." 27°53'00.3"N 97°21'02.3"W. Google Earth (accessed Nov. 18, 2016)

[15] Ryan, A. J. and B. R. Hodges. 2011. Modeling Hydrodynamic Fluxes in the Nueces River Delta. The University of Texas at Austin and Coastal Bend Bays and Estuaries Program.

[16] Irlbeck, M.J. and G. H. Ward, 2000. Analysis of the Historic Flow Regime of the Nueces River into the upper Nueces Delta and of the Potential Restoration Value of the Rincon Bayou Demonstration Project, in US Bureau of Reclamation, Rincon Bayou Demonstration Project: Concluding Report .

[17] Dunton, K. and C. Wilson. 2010. An Assessment of Little Bay Sediment and Water Quality in Relation to Indices of Seagrass Condition. University of Texas Marine Science Institute. Available at: http://missionaransas.org/sites/default/files/manerr/files/little_bay_final_report_dunton.pdf (accessed Dec. 8, 2016)

[18] Mission-Aransas National Estuarine Research Reserve. 2015. An Assessment of Little Bay Water Quality and Seagrass Monitoring Program. The University of Texas at Austin Marine Science Institute. Available at: https://repositories.lib.utexas.edu/bitstream/handle/2152/30470/little_bay_water_final_report_final.pdf?sequence=2&isAllowed=y (accessed Dec. 8, 2016)

REGION 4 RESULTS

Region 4 Contents

A. Restoration of Beaches and Dunes

I. What vulnerability was assessed and what are the risks?

The erosion of beaches adversely impacts the resilience of the ecological systems of the Gulf. Eroded beach and dune structures and systems, many of which have been removed or altered due to navigation or tourism industry developments, cannot effectively serve as storm surge defenses. Degraded beach and dune systems permit saltwater intrusion into inland coastal habitats, degrading and further reducing the vegetative buffers that would otherwise function as wave dissipaters during extreme weather events. In addition, the loss of sediment on beaches has negative impacts on the tourism industry, particularly on South Padre Island.

As described in the Plan, Texas contends with a general lack of beach-quality sand sources (i.e., in terms of grain size and minerology). However, as placement areas are reaching capacity, USACE and private entities may be willing to sell sand from their maintenance dredged materials to the State, which has been with success in Region 4.

Within Region 4, shoreline erosion on Gulf-facing beaches is evident from historical shoreline erosion trends, as noted in Figure 1. Areas on Brazos Island near the Texas border have high erosion rates, as does most of South Padre Island and areas just north of the Mansfield Channel on North Padre Island.

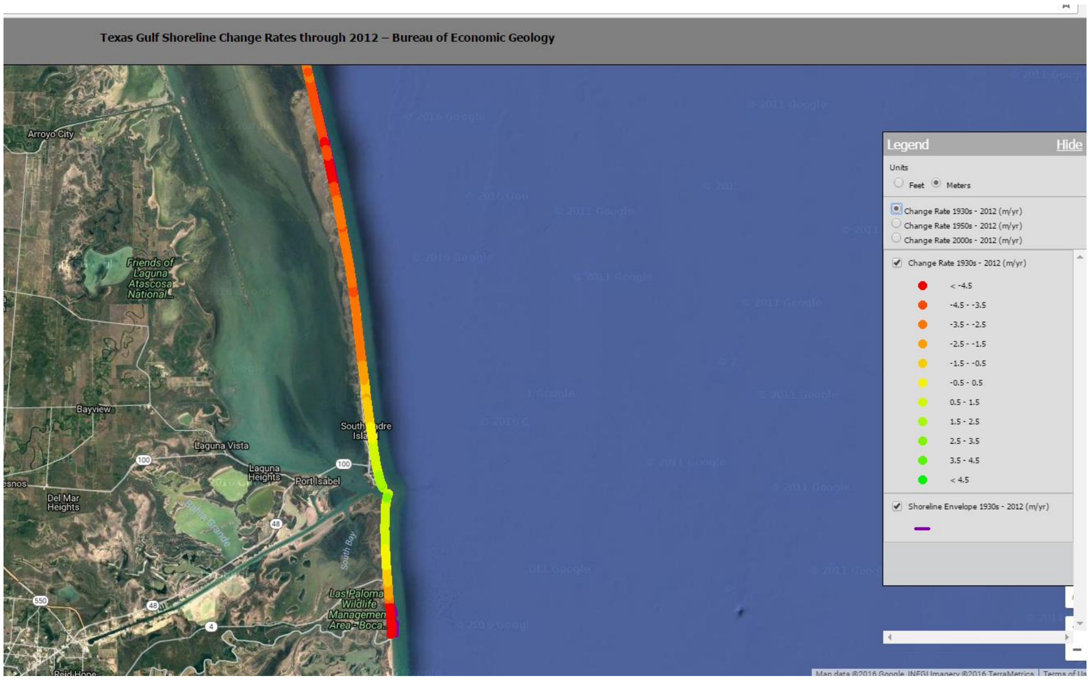


Figure 1. Shoreline change rates from 1930 to 2012[1]

II. What are the physics of the system that drive this vulnerability?

A number of physical conditions affect the erosion of Gulf-facing beaches. Natural cycles of erosion and accretion typically take place due to prevailing forcing conditions (i.e., storms, waves, fluctuations in sediment supply). For a variety of reasons (i.e., changes in sediment supply, changes to the natural littoral system due to man-made infrastructure, the effects of subsidence and sea level rise), much of the Texas coast has been in a persistent state of erosion for many decades.

Within Region 4, littoral transport is primarily north-directed. Conditions in the area show primary waves coming from the southeast. Wave Information Studies (WIS) modeled waves were extracted along the region coastline (Figure 2), and wave conditions were examined with respect to both wind-generated waves (seas) and longer period waves (swells). These were separated using a frequency cutoff. Figure 3 and Figure 4 show these conditions for the four stations within Region 4; all indicate that primary waves come from the southeast. Wind-generated seas come from a slightly more southerly direction, and swells come from a slightly more easterly direction. These wave conditions tend to induce a net northward longshore current and littoral transport.

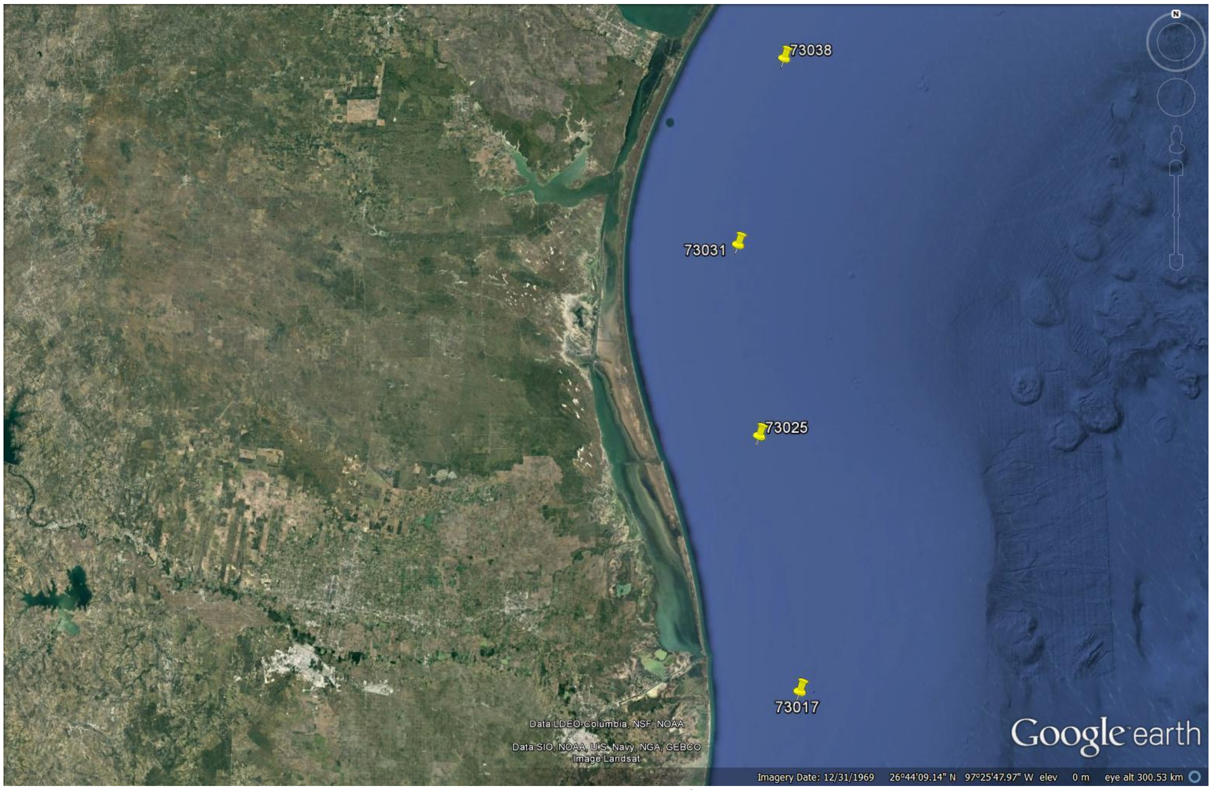


Figure 2. Location of WIS Stations Relevant to Region 4[2]

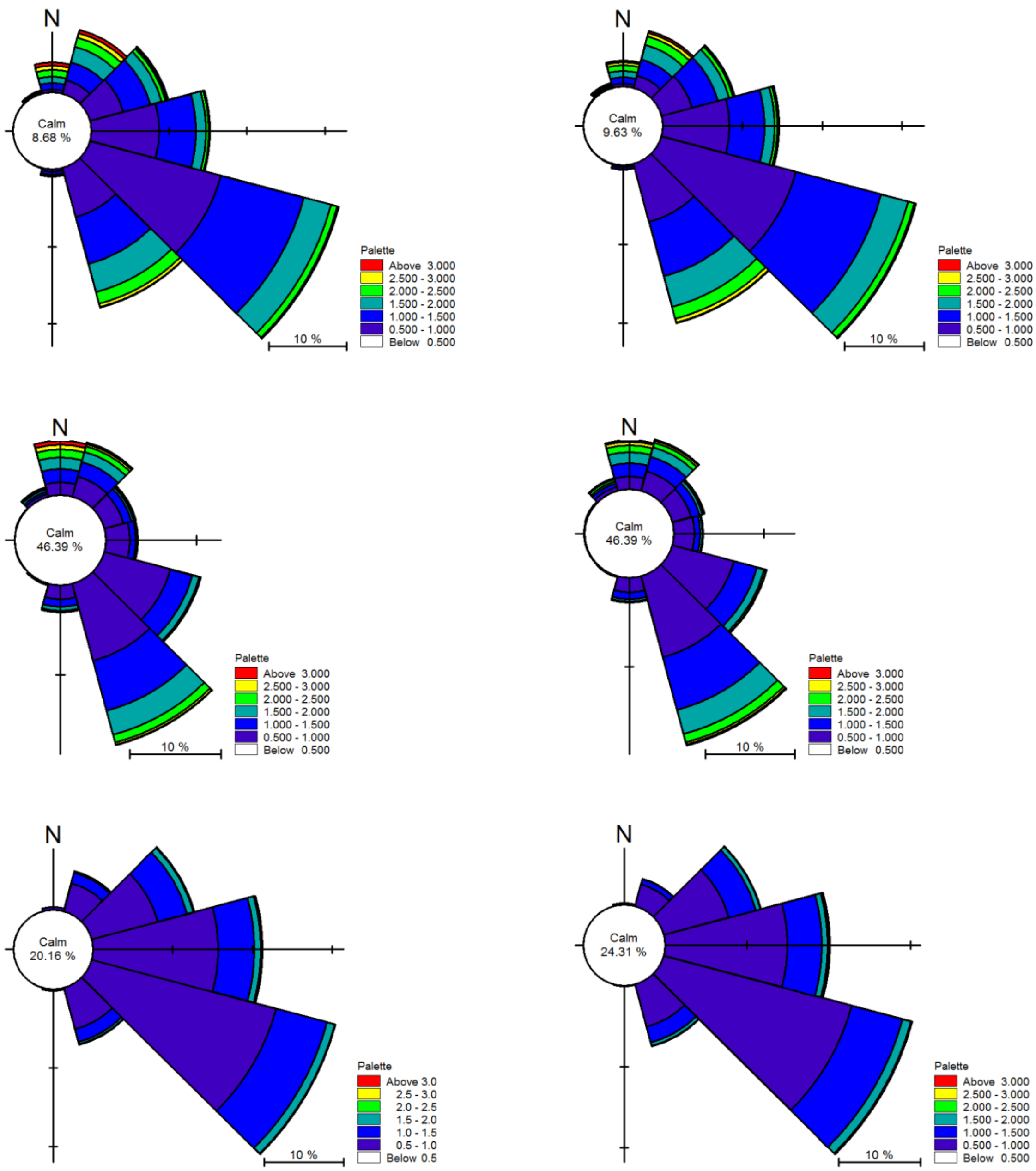


Figure 3. Wave Conditions for WIS Stations 73017 (left) and 73025 (right); Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom)[2]

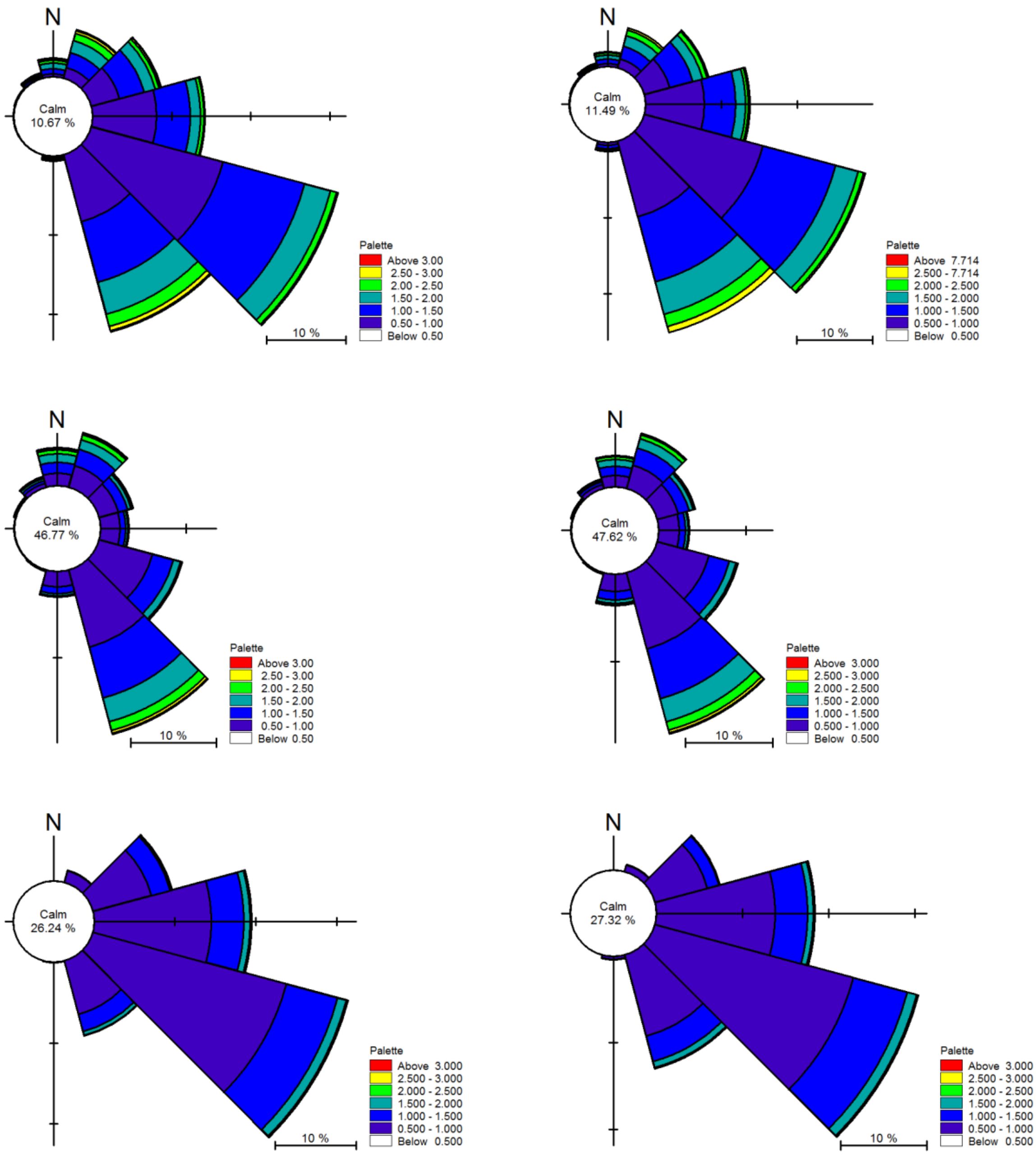
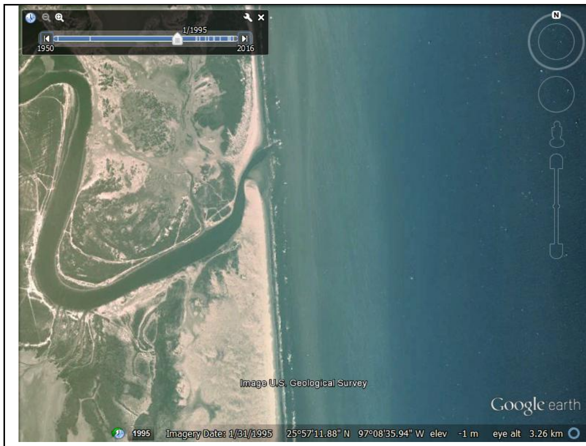


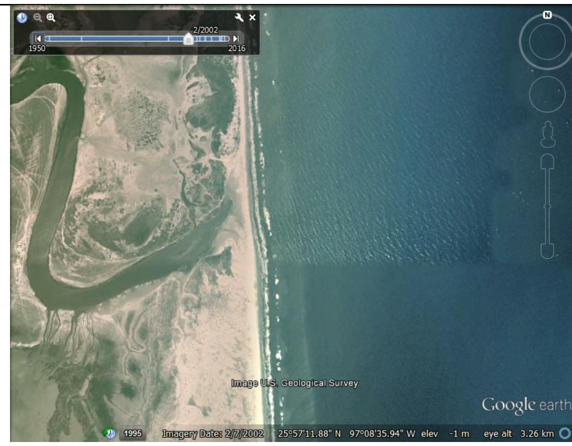
Figure 4 Wave conditions for WIS stations 73031 (left) and 73038 (right) ; Total Spectrum (top), Seas Spectrum (middle) and Swell Spectrum (bottom) [2]

Three major natural and man-made breaks are found in what is an otherwise continuous barrier island in Region 4.

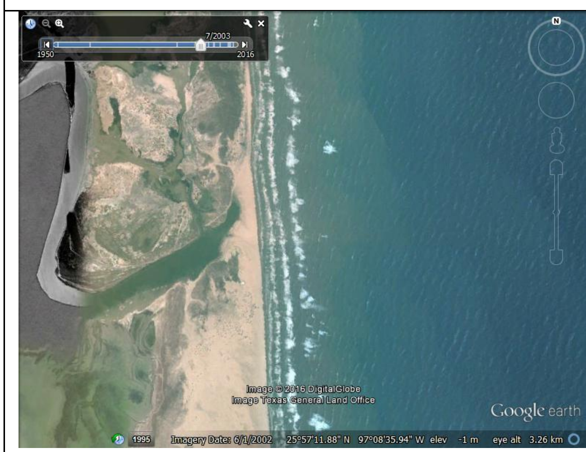
The southernmost break occurs at the Rio Grande River, where it interrupts sediment transport on Brazos Island. The river mouth of the Rio Grande has historically migrated (Figure 5), as has Brazos Island due to accretion and erosion cycles related to the position of the river mouth, and storms. The construction of Falcon Dam in 1953 interrupted the volume of water and sediment supply to the coastline, and the accretionary cycles showed a marked change. The river mouth does not always have sufficient flow to allow for natural bypassing, and has closed in recent years. Accretion toward the north end of Brazos Island is related to trapping of sediment by the south jetties.



1995

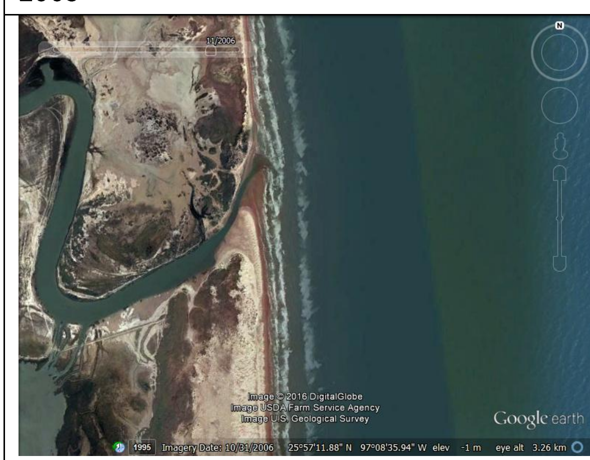


2002

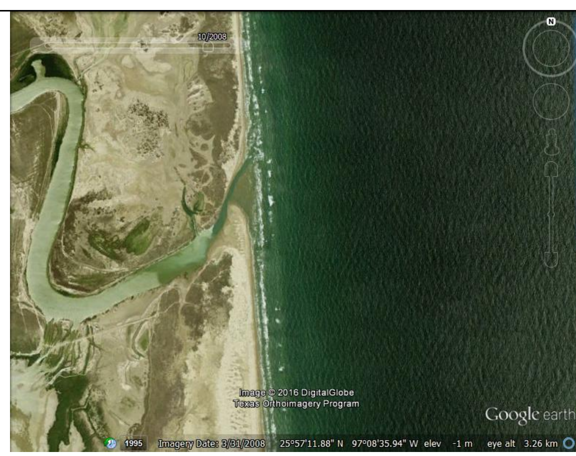


2003

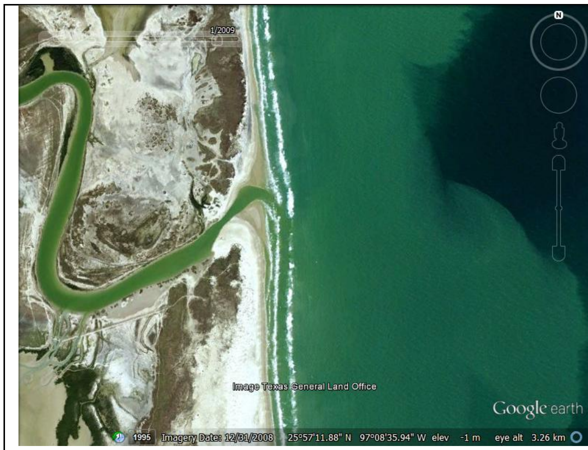
2005



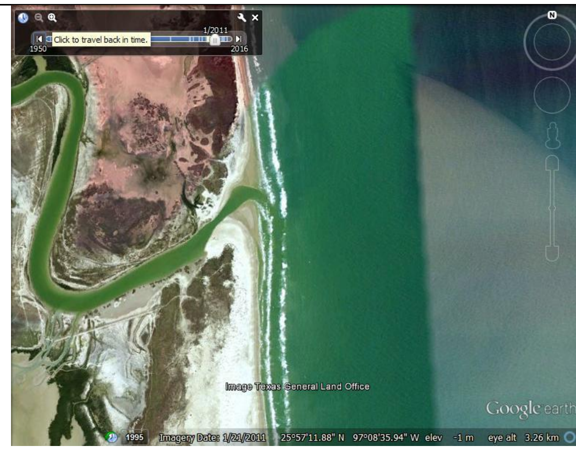
2006



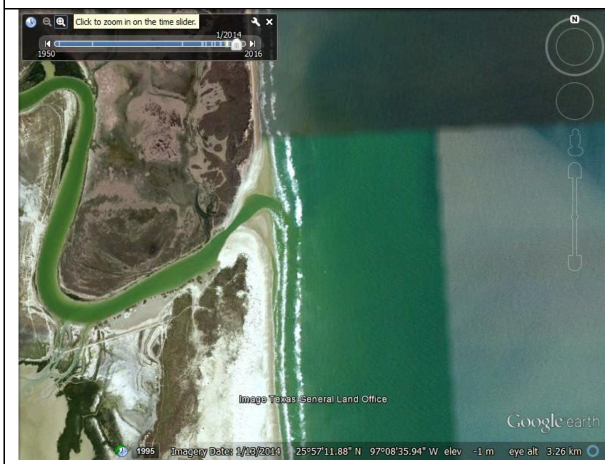
2008



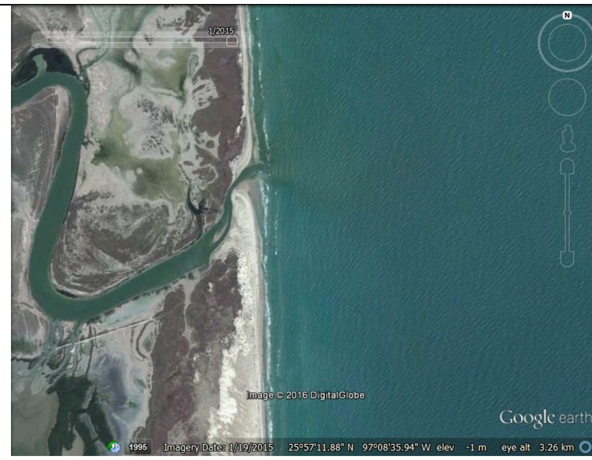
2009



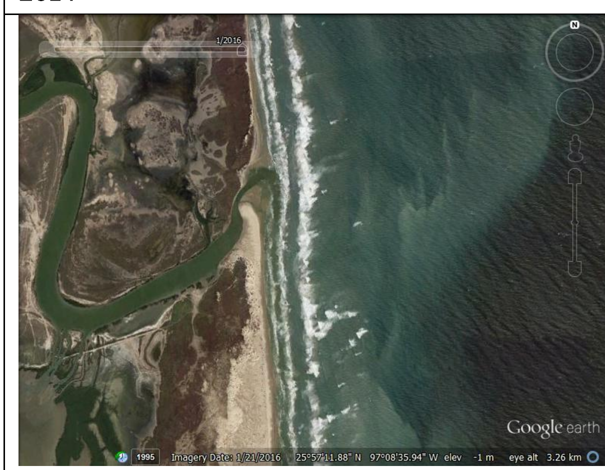
2011



2014



2015



2016

Figure 5. Historical imagery of Rio Grande River Mouth[3]

The second major interruption to littoral transport is at the Brazos Santiago Pass, where jetties were constructed in the 1930s and extend 2500 feet offshore. This causes sediment accretion along the south side of the south jetty. The southern end of South Padre Island, adjacent to the jetties, has shown accretion, per the erosion analysis shown in Figure 1. While the net transport is northerly, specific events can generate a southward directed transport, particularly winter events that include waves from the northeast quadrant. These events trap sediment near the north side of the north jetty that does not revert under more typical wave conditions. Although South Padre Island is undeveloped outside of the southernmost 6 miles, much of the rest of the island is erosion prone, likely due to a disruption in sediment supply, the influence of subsidence and sea level rise, and the influence of the dredged channels and constructed jetties that influence natural littoral processes.

The third break in the littoral transport occurs at the man-made Mansfield Cut between South and North Padre Islands. The channel was dredged in 1954, and jetties were constructed with tetrapods although they subsequently sank as no footings were laid. In 1962, USACE built new rock jetties that extend approximately 2000 feet from the shoreline. Erosion rates are very high just north of the northern jetty. Much of North Padre Island makes up the Padre Island National Seashore and is undeveloped.

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

In Region 4, eight projects address this vulnerability, as shown in Figure 6 and described in Table 1. Note that the project descriptions shown in this table, and throughout this appendix, are the draft descriptions used at various stages of the planning efforts. Many of these descriptions were refined during later stages of the planning process.

Figure 6. Projects Related to Gulf Beaches in Region 4[4]

Table 1 Projects Related to Restoration of Beaches and Dunes in Region 4

Project Number	Project Name	Project Description
145	Town of South Padre Island Gulf Shoreline	This project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline.
1094	Boca Chica Beach Coastal Conservation & Enhancement Project	The project would involve beach nourishment and construction of an erosion protection dune system along Boca Chica beach.
9037	Boca Chica Dune and Tidal-Flat Cable Fence Protection	The project involves the installation of a cable fence and signage to prevent ATV usage and other detrimental encroachment on sensitive areas of the refuge. This will prevent excessive dune erosion and protect least tern nesting and wintering shorebirds (piping plovers) using tidal flats.
9038	Cameron County Land Acquistion Program	A land acquistion program is needed to help proactively prepare for a stricter building setback line in Cameron County. While this would be initially expensive, implementation of such a program would help avoid future lawsuits in structure/debris removal and offset the costs of beach nourishment, dune restoration, and shoreline stabilization over an indefinite amount of time on a severely eroding stretch of beach. Such a program could potentially reduce TWIA & NFIP expenditures and would preserve dunes, beach, and public beach access.
9039	Native Plant Propagation for Restoration & Resiliency	The proposed project involves identifiaction or creation of a local source of native plants for coastal and dune restoration. At this time, there is no large-scale local source of these materials, which limits the ability of the community to respond to natural/anthropogenic events in a timely manner. Providing a more convenient source of native plants could improve the community's resiliency and ability to quickly return impacted sites to a previous desired state.
9040	South Padre Island Tidal Flats Protection	The project proposes the installation of bollards south of the Mansfield Cut on South Padre Island. The bollards would restrict illegal vehicles from accessing the tidal flats along the jetties and the ship channel.
9051	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	The project involves protection of 10,000 acres of beach and dune habitats on South Padre Island through acquisition of parcels from willing landowners. The protection of these habitats would benefit nesting sea turtles and migratory and resident shorebirds.
9060	Beach Re-Nourishment at Padre Island National Seashore	This project proposes to place dredged sediment from the Mansfield Channel and transferred sand from the south side of the jetties onto the Padre Island National Seashore from Mansfield Channel to 15 miles north of the channel. The beach on these 15 miles of seashore is currently eroding into the primary dune line and cutting off public access because sediment flow is blocked by the jetties. This area amounts to one fifth of the park's Gulf beach and is the most heavily used beach for nesting by the endangered Kempâ€™s Ridley sea turtle. Further erosion will result in inlets forming in old wash overs that are currently snowy plover nesting habitat. USACE had previously dredged the channel every 2 to 3 years, which was sufficient to maintain the beach; however, due to budget cuts, the channel has not been dredged since 2011.

These eight projects can be grouped into three geographic sets: Brazos Island, South Padre Island, and North Padre Island.

Brazos Island

Projects 1094 and 9038

Along the southern portion of Brazos Island, Project 1094 entails beach nourishment and dune creation, and is supported by Project 9038 involving the installation of a fence and signage to prevent All-Terrain Vehicle (ATV) access on the beach.

South Padre Island

Projects 145, 9038, 9039 and 9051

The second project grouping is along the southern eight miles of South Padre Island. Project 145 entails beach nourishment and dune restoration focused on the developed portion of the island.

Supporting projects (i.e., 9038, 9039, 9051) involve land acquisition and native plant sourcing, both of which contribute to the success of a beach restoration program.

North Padre Island

Project 9040 and 9060

On North Padre Island, Project 9060 entails beach nourishment using dredged material from the Mansfield Channel, as well as an artificial bypass of sand from the south side of the jetties. Complementing this is Project 9040 that restricts vehicular access just south of the jetties at Mansfield Channel.

IV. How does the project or grouping mitigate the vulnerability?

These beach nourishment and dune creation projects add additional beach width and dune features to coastal barrier islands, thereby slowing erosive forces. Additional mitigative measures are in the form of land acquisition and vehicle access restrictions, both of which minimize anthropogenic threats that can compromise the success of beach nourishment and dune creation efforts.

V. Is the project or grouping effective at mitigating the vulnerability?

These projects are effective at mitigating the vulnerability, recognizing that ongoing maintenance will be required for beach nourishment and dune creation. The beneficial use of dredged materials in this region are recommended to help ensure resilience of the system.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

Although beach nourishment and dune creation are effective mitigation measures, they do not address the underlying cause of erosion along the Texas coast. Issues such as wind and wave impacts, vessel wakes, land subsidence, structural interruptions of littoral processes and sea level rise are larger factors of causation. In order to address underlying causes, means to increase sediment supply via the Rio Grande would need to be determined and implemented. In addition, modifications to infrastructure to decrease the impact on longshore transport would need to be considered.

VII. What are the recommendations for a resilient coastline?

Beach nourishment has demonstrated effectiveness in mitigating the beach and dune erosion vulnerability, provided that it is part of an ongoing program. Continued monitoring of all coastal areas is advised, particularly where the width and crest of the barrier island make it prone to breaching, an occurrence that can have adverse consequences on water quality and ecosystem balance along the entire coast.

B. Bay Shoreline Stabilization and Estuarine Wetland Restoration

I. What vulnerability was assessed and what are the risks?

Coastal erosion and land loss in many of the Texas bay systems has intensified over the past several years, driven in part by increased vessel traffic and attendant wake impacts. Degradation of vegetative buffer zones, reef structures, and barrier islands (due to coastal storms, subsidence and human activity) also contributes to the problem. Shoreline erosion along the coast has major, negative implications for future projections of flooding and storm surge damages to coastal communities, with attendant impacts on public safety, infrastructure, and habitat loss and degradation. When coupled with projections of sea level rise, these damages increase measurably.

Erosion along the Texas coast has contributed to wetland degradation and, consequently, to reductions in habitat diversity as evidenced by loss of nursing and nesting grounds for birds, as well as loss of suitable fish spawning habitat. Large structures installed in bay systems (e.g., flood gates, channels cut into the bays) can significantly alter sediment transport mechanisms, which, in turn, lead to marsh loss. If mitigation efforts are not pursued, the loss of marshes and habitat will continue, exacerbated by sea level rise and continued coastal development.

II. What are the Physics of the System that Drive this Vulnerability?

Physical mechanisms driving shoreline erosion within Region 4 are generally related to one or more of the following:

- Ship wake from vessels, particularly on the GIWW, Brownsville Ship Channel, and Harlingen Ship Channel;
- Localized wake due to frequent recreational boating or jet skis;
- Structural intervention interrupting normal sediment patterns;
- Large fetch and natural shoreline migration;
- Relative sea level rise;
- Broader scale sediment starved barrier island system; and/or
- A change in sediment supply due to upstream modifications (e.g., dams).

Extreme weather events can destabilize shorelines in bay systems due to elevate water levels and wave action. However, once wetlands are compromised (i.e., fully inundated or flooded), wave action has less impact on sediment mobility than in un-inundated wetlands.

Vessel Induced Ship Wake

Within Region 4, most of the vessel-induced erosion is due to shallow draft navigation channels such as the GIWW, the Brownsville Ship Channel and the Harlingen Ship Channel. These channels are maintained to a depth of 12 feet, and the Harlingen Ship Channel has a freshwater source from the Arroyo Colorado.

Localized Wake Due to Recreational Boating or Jet Skis

Localized shoreline erosion can occur in places where recreational boating or jet skiing is common. These activities can cause wave effects that over time can have significant impact on shorelines.

Structural Intervention Disrupting Sediment Transport

Structures such as groins or jetties can disrupt sediment transport and lead to areas with limited sediment supply and pockets of erosion. This is often attributed to ocean-facing beaches where littoral transport is evident, but can also be present in bayside shorelines as well. This is best assessed project by project.

Large Fetch and Natural Shoreline Migration

Shorelines are not static: they have cycles of migration responding to factors such as storms, changes in sediment supply, and natural variability in wave conditions. Some shorelines are in a natural state of flux between periods of erosion and accretion. However, disruption of the accretion process (due to factors such as interruptions in sediment supply and/or se level rise) can place a system into a more continuous state of erosion.

Relative Sea Level Rise

Relative sea level rise is a function of two interacting factors; land subsidence and climate change-induced increases in sea level. Combined with land subsidence, elevated sea levels due to global climate change result in an increase to the mean sea level relative to its historic level. Given the topography of the Texas coast, even 0.5 feet of additional relative se level rise will cause significant land loss. In addition to direct effects, increased water depth adjacent to the shoreline allows for increased erosion from wave impacts.

Change in Sediment Supply

Rivers constitute one of the major sources to sediment supply in the inland coastal bays of Texas. These sources supply much of the sediment that balances natural erosion, and help to feed delta systems that supply shorelines via regional sediment transport. Upriver projects, such as dams, interrupt this natural supply mechanism and can lead to sediment-starved deltas. This causes direct loss of wetland habitat within the deltas and has an adverse impact on surrounding wetlands that depend on regional transport mechanisms. to continue to supply sediment.

Sediment supply can also be affected from the Gulf-facing side of barrier islands. Dune migration and wind weathering on the dunes supply sediment to the bay-facing beaches of barrier islands. As Gulf-facing beaches become increasingly sediment-starved, the impact is also experienced by the bay-facing beaches of the same islands.

III. WHAT PROJECTS/GROUPINGS ADDRESS THIS VULNERABILITY?

Table 2 shows four proposed Region 4 projects that address the Bay Shoreline Erosion and Estuarine Wetland Restoration vulnerability. Figure 7 shows project locations. Projects 98 and 9041 focus on shoreline erosion along the Harlingen Ship Channel. Project 1106 is a living shorelines initiative on the Bay side of South Padre Island. Project 9043, located along the western shoreline of the Laguna Madre, will establish a "no motor" zone to address shoreline erosion problems.

Table 2. Projects Related to Bay Shoreline Stabilization and Estuarine Wetland Restoration in Region 4

Project Number	Project Name	Project Description
98	Adolph Thomae Jr. County Park - Phase 3	The goal of the project is to stabilize the remaining 1,700 linear feet of shoreline at Adolph Thomae Jr. County Park from ongoing erosion and degradation in order to protect Laguna Atascosa NWR. Similar to Phases 1 and 2, bulkhead stabilization will be used.
1106	Cameron County Living Coastline	This project would develop a living coastline constructed from natural, regional materials such as rock and seagrass to stabilize the Laguna Madre shoreline and reduce the risk of dune washout.
9041	Harlingen Ship Channel Living Shoreline	There is a need for shoreline protection on the north side of the Harlingen Ship Channel (Arroyo Colorado), across from Adolph Thomae Jr. County Park. Construction of a living shoreline or breakwater infrastructure would be ideal to prevent erosion in this area.
9043	Lower Laguna Madre Pole and Troll Area	The project proposes the creation of a "no motor" zone in the Laguna Madre along the eastern shore of the Laguna Atacosa NWR. This area would include a fairly narrow zone within the shallow areas along the shoreline and only be accessible to kayal, canoes, and boats with trolling motors.

Figure 7. Location of Bay Shoreline Stabilization and Estuarine Wetland Restoration Projects in Region 4[2]

IV. How does the project or grouping mitigate the vulnerability?

Projects 98 and 9041

These two projects stabilize shorelines along the Harlingen Ship Channel via structural protection in the form of bulkheads, breakwaters or living shorelines. The channel is subject to barge traffic that causes erosion along adjacent shorelines. Stabilization will prevent or minimize erosion in protected areas.

Project 1106

This project stabilized the shore via installation of a living shoreline constructed from materials such as rock and seagrass. The barrier island is quite narrow at this location and, consequently, the likelihood of dune washout and destabilization of the barrier island is possible. A living shoreline will prevent bay side erosion, although it will not mitigate the impacts of a destabilizing event on the ocean side.

Project 9043

This project establishes a "no motor" zone to reduce a primary cause of wake erosion from jet skis, speedboats and other motorized watercraft.

V. Is the project or grouping effective at mitigating the vulnerability?

The projects are effective at mitigating the vulnerability, particularly the impacts navigation channels, using a variety of techniques, including implementing structural shoreline stabilization (e.g., breakwaters) and creating living shorelines. Living shoreline approaches would mitigate wetland losses noted for the region. Where structural methods are proposed, they should be designed to consider future conditions as well as potential impacts to the surrounding environments.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

These projects effectively mitigate or plan for the effects of the vulnerability, but in many cases are limited in their capacity to address the physics driving the vulnerabilities (which are largely related to navigation impacts). In some instances, the projects are able to directly address the physics driving the vulnerability (e.g., large fetch), however, many of the physical issues driving the vulnerability are expected to be persistent or even increasing (e.g., vessel wakes). Some of the physics driving the vulnerability may be able to be addressed when multiple Resiliency Strategies are implemented or when system-wide impacts are addressed (e.g., freshwater and sediment inflows). Future projects should consider projections of change along the coast, such as in the case of relative sea level rise and shifting weather patterns, to ensure that projects remain viable in the long term.

VII. What are the recommendations for a resilient coastline?

As identified above, the four proposed projects will enhance the resiliency of the Region 4 shoreline in the areas in which they are located. Additional study, including a regional assessment of wave conditions (as well as a more thorough understanding of relative sea level rise impacts), will provide the data needed to identify, design and implement future projects.

C. Bahia Grande System

The Bahia Grande encompasses several Resiliency Strategies (i.e., Freshwater Wetlands and Coastal Uplands Conservation, Bay Shoreline Stabilization and Estuarine Wetlands Restoration, Delta and Lagoon Restoration) and associated vulnerabilities and recommended project types (e.g., Land Acquisitions, Habitat Creation, Shoreline Stabilization, and Hydrologic Restoration). Given the interplay between the physical system and the proposed projects within the system, the Bahia Grande and recommended projects within the Bahia Grande are considered collectively in the following discussion.

I. What vulnerabilities were assessed and what are the risks?

The Bahia Grande is subject to a number of vulnerabilities, many of which are interrelated. The primary vulnerability of the system is the lack of adequate hydraulic linkage which was historically natural to the system. Because of this, the system has lost much of its important habitats for estuarine species.

The 10,000 acre Bahia Grande wetland complex consists of three shallow water basins: Bahia Grande, Little Laguna Madre and Laguna Larga. Historically, these embayments were connected to the tidal waters of the Laguna Madre as they would flood and drain with tidal conditions. However, a series of construction projects cut off all tidal connections with the Bahia Grande (e.g., railway connecting Brownsville and Port Isabell in the 1800s, dredging and construction of the Brownsville Ship Channel in the 1930s, construction of Stage Highway 48 in the 1950s). The dust blown out of this area caused respiratory health problems for residents and schools, and continues to pose implications to vehicle traffic today.

In 2005, a small pilot channel was constructed between the Brownsville Ship Channel and the Bahia Grande to reintroduce ocean waters from the Laguna Madre back into the basin (Figure 9). This small channel restores a tidal linkage to the estuary, but is not large enough to provide adequate exchange between the Ship Channel and Bahia Grande. Current assessment indicates that the flow exchange is approximately 2.5 percent of the total volume.[7] This continues to limit the productivity of the wetlands and species that inhabit it. In 2006-2007, internal channels were constructed that provide connections between Bahia Grande, Laguna Larga, and Little Laguna Madre (Figure 11).

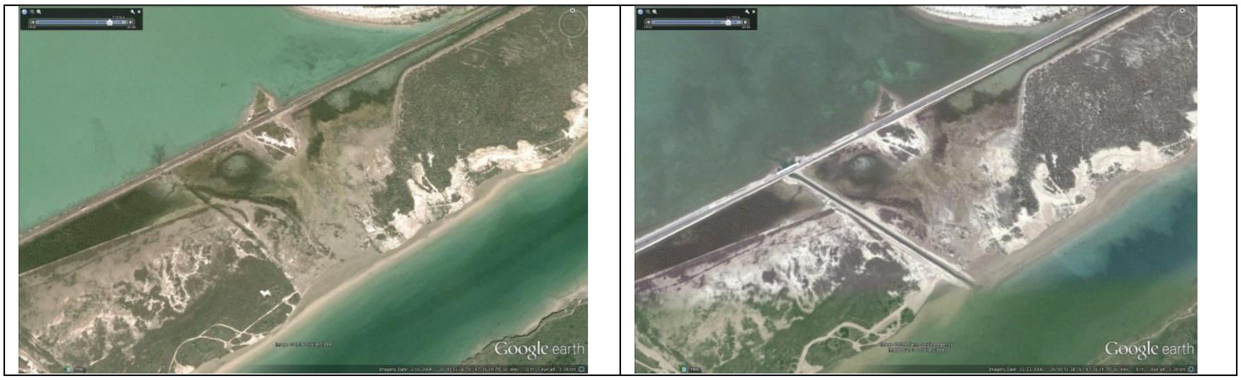


Figure 8 Constructed pilot channel connecting the Brownsville Ship Channel and the Bahia Grande (imagery from 2004 on the left, imagery from 2006 on the right)

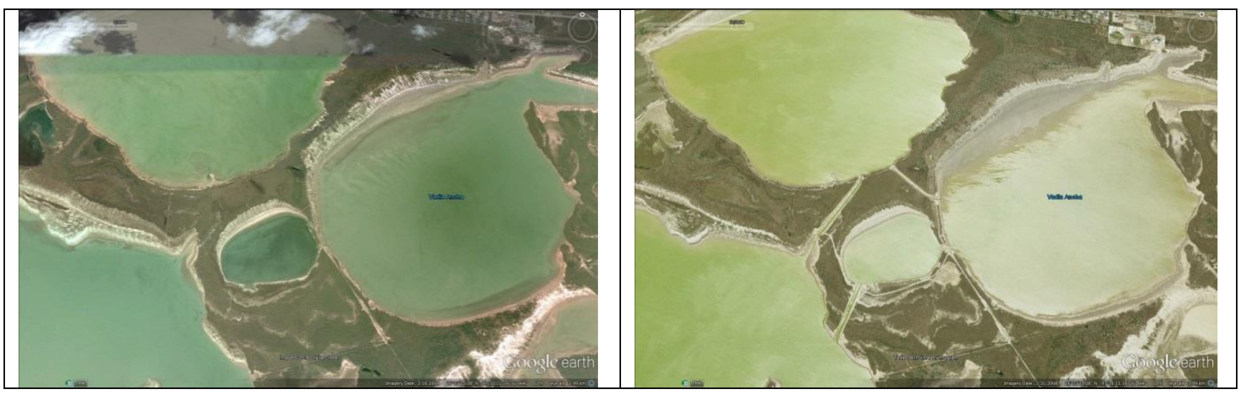


Figure 9 Constructed channels linking the basins within the Bahia Grande (imagery from 2004 on the left, imagery from 2007 on the right)

II. What are the physics of the system that drive these vulnerabilities?

Tidal exchange between the larger Laguna Madre and the Bahia Grande is limited, resulting in a hypersaline environment. Circulation in the shallow Bahia Grande estuary is primarily driven by tidal conditions, as there is only one point of exchange between the channel and the Bahia Grande, and it is limited by the size of the inlet. The current exchange is insufficient to maintain the required estuarine habitat. The enclosed estuary will fill with water, but the limited exchange means that the water within the estuary will act largely like a large lake, where the one of the primary sinks is evaporation.

III. What projects/groupings address the vulnerabilities associated with this system?

Twelve proposed project address the vulnerabilities noted for the Bahia Grande system. A key concern is the need to expand the Main Channel connecting the Brownsville Ship Channel with the Bahia Grande. Without this expansion, the habitat is likely to remain degraded due to the lack of exchange. The projects in the Bahia Grande Region are shown in Figure 10 and are described in Table 3.

Figure 10 **Projects in the Vicinity of the Bahia Grande**[4]

The proposed projects within the Bahia Grande area can be grouped into four categories, recognizing that there is some overlap:

- Land Acquisition (Projects 811, 9036, 9052, 9053, 9054, 9055)
- Habitat Creation (Projects 452, 837)
- Shoreline Stabilization (Projects 658, 9042)
- Hydrologic Restoration (Projects 96, 822)

Table 3. Projects in the Bahia Grande Region

Project Number	Project Name	Project Description	Type
96	Laguna Atascosa NWR- Bahia Grande- Intertidal Wetlands Hydrologic Restoration	In 2005, a pilot channel was constructed that connected the Brownsville Ship Channel to the Bahia Grande and began refilling the main basin. In 2007, two interior channels were cut that reconnected the larger basin to two smaller interior basins â€“ the Laguna Larga and the Little Laguna Madre - ensuring natural tidal flow and exchange throughout the whole system. The next major step is to widen and deepen the original pilot channel to improve tidal flow into the basins and thereby fully restore the natural biological functions of the wetlands.	Hydrologic Restoration
452	Bird and Heron Islands Restoration, Cameron County	The project includes construction of 0.8 miles of breakwaters to protect and restoration for Bird and Heron Rookery Islands. These improvements would increase critical habitat for the wintering piping plover, recognized as a threatened species in Cameron County. A feasibility study has been funded to determine the most effective methods to protect these islands from further erosion.	Habitat Creation and Shoreline Stabilization
658	Bahia Grande Living Shoreline and Public Access Project	This project would beneficially use the dredged material from the ongoing Bahia Grande Restoration Project. The material would be used to construct a platform for a parking area providing public access to area, as well as to stabilize a peninsula near the parking lot within Bahia Grande with 1,000 feet of living shoreline feature to create additional habitat and stabilize the existing 2.5 acres of habitat.	Shoreline Stabilization and Beneficial Use
822	Wetlands of Paso Corvinas at the Bahia Grande Unit of Laguna Atascosa - Phase II	The goal of the project is to restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar and thereby restoring connectivity between Paso Corvinas and the Bahia Grande. To do this, first a hydrological study will need to be performed to be followed by design and construction of the hydrologic restoration alternative. An improved low water crossing is needed on the northeastern side.	Hydrologic Restoration
811	Zarate Tract - Laguna Atascosa National Wildlife Refuge	The 914 acre Zarate Tract is located on the north side of the Bahia Grande unit of Laguna Atascosa National Wildlife Refuge, about 12 miles west of Port Isabel, Texas. The USFWS aims to acquire this land to better manage these coastal wetlands and improve wildlife access to existing and future/restored wildlife corridors.	Land Acquisition
837	Creation of Los Fresnos Nature Park	The proposed Los Fresnos Nature Park will preserve 23 acres of pristine native habitat, including an inactive resaca channel which is in need of rehabilitation. In addition to rehabilitation of the resaca and creation of fresh water marsh, the project will also provide planting, invasive species control, and flood water retention and mitigation of potential pollutants from storm water runoff.	Habitat Creation
9036	Laguna Madre Land Acquisition Endowment Initiative	The proposed project will protect and manage coastal prairie and tidal flats totaling approximately 80,000 acres for aplomado falcons and associated species, and thornscrub totaling approximately 20,000 acres for ocelot and associtaed species. Protection would be accomplished by easement or fee-simple acquisition form willing sellers. An endownment would be established to perpetually fund management. Properties targeted for protection include Zarate, Davis, Holly Beach, and Hardic. Protected sites targeted for management include Laguna Atascosa and Bahia Grande NWRs.	Land Acquisition
9042	Bahia Grande Living Shoreline	The project includes creation of a living shoreline through replacement of foreign-sourced riprap material with naturally-based, native materials. Additional proposed actions include creation of controlled access points for the public, bank / shoreline restoration using beneficial use dredged material, and installation of culverts or other structures under State Highway 48.	Shoreline Stabilization
9052	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	Two parcels located in Cameron County, adjacent to the Laguna Atascosa National Wildlife Refuge and comprising approximately 4,100 acres, will be protected through this project: the Waters Tract and Dulaney Farms. The Waters Tract is 797 acres located just south of Laguna Atascosa NWR and, when restored, could provide almost 90 acres of critical freshwater wetland habitat in an old river oxbow system. The Dulaney Farms (3,368 acres) is surrounded on three sides by the Laguna Atascosa NWR and includes over 400 acres of fresh water wetlands which, when restored, could provide valuable fresh water habitat. Fresh water habitats located on these properties are a critical resource for large concentrations of wintering redhead ducks using the Laguna Madre, as well as wading birds, shorebirds and other waterfowl. These properties are also located in the heart of one of the last remaining breeding populations of ocelots in the United States, and restoration will be critical to the recovery of the ocelot population.	Land Acquisition
9053	Protect Bahia Grande and Vadia Ancha Shorelines (Laguna Heights Acquisition)	The proposed project would protect wetland, coastal prairie and thornscrub habitat adjacent to the Bahia Grande unit of the Laguna Atascosa National Wildlife Refuge through acquisition of the 1,400-acre Laguna Heights parcel. The protection of this parcel will protect the shoreline of the Bahia Grande wetland complex and will assist in the maintenance of the functional values of the Bahia Grande wetland system, much of which has recently been restored.	Land Acquisition
9054	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	This project proposes to acquire and permanently protect with conservation easements two parcels within the Bahia Grande Coastal Corridor: Shrimp Farm and Holly Beach. Together, these parcels comprise over 2,000 acres of coastal wetland, prairie and thornscrub. The Shrimp Farm property (325 acres) is located between the recently protected Boswell-Jenkins tract and the Laguna Atascosa NWR and produces shrimp and game fish; portions are known ocelot habitat. Holly Beach (1,718 acres) provides important foraging habitat for nearby rookeries that support some of the largest populations of gull-billed terns, black skimmers, reddish egrets and brown pelicans in the Gulf of Mexico. These tracts are part of the Laguna Madre/Bahia Grande wetlands system, which hosts 85 percent of the world population of redhead ducks, one-third of the Great Plains population of endangered piping plover for nine months of the year, and hundreds of threatened peregrine falcons during migration.	Land Acquisition
9055	Bahia Grande Watershed Corridor Protection	Approximately 2,000 acres of oxbow wetlands and associated prairie and thornscrub habitat will be placed under a conservation easement to protect these habitats, which connect a historically-used corridor for ocelots. The property is located at the headwaters of the Bahia Grande, just north of the Bahia Grande Unit of the Laguna Atascosa NWR. The southern two-thirds of the property are very low and floods during heavy rains and tropical storms. Sheet flows through these brackish wetlands and salty prairie feed into the north basins of the Bahia Grande wetland complex. The northern one-third of the property connects with the 396-acre Waller Unit of the Lower Rio Grande NWR, which in turn connects to the Boswell-Jenkins tract of Laguna Atascosa NWR. This portion of the property has less saline wetlands and more diverse grassland and brush that could support breeding ocelots.	Land Acquisition

IV. How does the project or grouping mitigate the vulnerabilities in the system?

Land Acquisitions

Projects 811, 9036, 9052, 9053, 9054, 9055

The six land acquisition projects in the Bahia Grande mitigate the vulnerabilities by preserving undeveloped land, enhancing the natural resilience of the area, mitigating man-made imbalances, and preventing future physical changes to the system based on human influences.

Habitat Creation

Projects 452 and 837

The two proposed habitat creation projects in the Bahia Grande mitigate this vulnerability through land preservation and erosion control. The first of these, Project 837 (establishment of Los Fresnos Nature Park), entails the protection and restoration of a 23 acre expanse of pristine native coastal upland habitat.

Project 452 (Bird and Heron Islands Restoration) provides for approximately one mile of shoreline protection to prevent further erosion to the islands. Historical imagery was used to highlight erosion taking place between 2011 and 2016 (Figure 11), due primarily to:

- Variations in water levels (which may be impacted the future expansion);
- Wind-generated waves and setup within the Bahia Grande; and
- Natural wind-driven sediment transport.

Conditions in the area of Project 452 include strong southeast trade winds and equally strong northern winter storm fronts. Wave height is limited to approximately .8 feet, given that the water depth in this area is typically less than one foot[5] However, the sediment is quite fine and easily mobilized, and any wave conditions are likely to have an impact in the absence of shoreline stabilization.

Figure 11. Approximate Shoreline Extents from 2011 (green polygon) and 2016 (blue polygon)[6]

Shoreline Stabilization

Projects 658 and 9042

The two shoreline stabilization projects in the Bahia Grande mitigate this vulnerability through measures that include placement of dredged material, installation of living shorelines, and controlled access to erosion-prone areas. Project 658 is multi-faceted: it uses dredged material to construct a parking lot platform (to improve public access and enhance shoreline stability), complemented by installation of a living shoreline. Project 9042 also stabilizes the shoreline (and enhances habitat) via the installation of a living shoreline that replaces rip-rap (adjacent to Stage Highway 48) with naturally-based, native materials. Given the proximity to the State Hwy, the materials should be designed so as to be able to withstand the erosion under with the expanded tidal range and winter storm northerlies. This project also increases public access points and improves hydraulic exchange with the Brownsville Ship Channel via culverts under State Highway 48. The additional hydraulic exchange should be considered in conjunction with the overall hydraulic restoration plan. Additional beneficial use dredged material should be stabilized to prevent loss of material.

As part of ongoing resiliency activities in Region 4, shorelines adjacent to infrastructure (e.g., State Highway 48) and to critical habitat warrant continued monitoring. Further, given shallow depths in the area that limit wave growth, nature-based solutions (e.g., living shorelines) are particularly appropriate in addressing this vulnerability.

Hydrologic Restoration

Projects 96 and 822

The two proposed hydrologic restoration projects address the vulnerabilities in the Bahia Grande system by increasing the exchange of water between the Brownsville Ship Channel and the Bahia Grande. A wider channel, complemented by culverts under State Highway 48 allows more water to be exchanged during every tidal cycle. The proposed channel widening (as part of Project 96), is expected to provide approximately 32 percent of the total volume exchange within each tidal cycle.[7] Given the large shallow area of the Bahia Grande, evaporation and precipitation are still likely to have a significant impact on the salinity within the system. However, increased tidal exchange will moderate the extremes.

Project 822 will increase the exchange of water between Bahia Grande and Paso Corvinas by removing the southwestern sand bar to increase tidal exchange (Figure 14). Additional modeling and analysis is warranted to determine the effects of the increased exchange, and to assess the stability of the opening.

Figure 12. Sand Bar(s) to be Removed to Open Paso Corvinas to Tidal Exchange[8]

V. Is the project or grouping effective at mitigating the vulnerability?

Individually and collectively, the 12 projects described above mitigate the vulnerabilities noted in the Bahia Grande system. They do so in several ways (i.e., land acquisition, habitat creation, shoreline stabilization, hydrologic restoration) while employing structural and non-structural measures that range from breakwater construction, to the installation of living shorelines, to strategic dredging to restore compromised hydrologic systems.

VI. Does the project address the causation of the physics driving the vulnerability, or does it mitigate the effects?

While all 12 proposed projects mitigate the effects of the vulnerabilities in the Bahia Grande System, differences are found in their ability to address the factors of causation. Projects focusing on rebuilding, restoring and preserving shorelines, for example, are primarily mitigative actions, as the project locations remain vulnerable to both natural and man-made erosive forces. However, some projects do address the cause of the vulnerability through such measures as restricting access to erosive areas, and restoring natural hydrologic functions as a means to improve water exchanges, water quality and habitat. Addressing the causation of the vulnerability will also require actions that, for example, eliminate or minimize the adverse impacts of relative sea level rise, extreme weather events, and other climate change-related factors that contribute to shoreline loss and associated degradation.

VII. What are the recommendations for a resilient coastline?

The design and implementation of the 12 proposed Bahia Grande projects in Region 4 will result in the stabilization of bay shorelines and the restoration of estuarine wetlands. While all of the projects are focused primarily on a single vulnerability, they offer a mix of structural (e.g., breakwaters, dredging, living shorelines) and non-structural (e.g., land acquisition, easements, use limitations) measures. The design and implementation of these proposed projects should be complemented by:

- Continued water quality and habitat monitoring;
- Monitoring of shorelines to identify if the increased tidal exchange is causing changes in the morphology within the Bahia Grande;
- Monitoring the stability of the constructed channels; and/or
- Hydrodynamic modeling to assess the exchange between Bahia Grande and Paso Corvinas as well as the stability of the cut inlet.

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[1] University of Texas at Austin, Bureau of Economic Geology. 2014. Shoreline Change Rates 1950's-2012. Data available at: http://www.arcgis.com/home/item.html?id=7bd9c5bf9823451bb783ce22f18cecc9 (accessed Jan 30, 2017) and described in Paine, J. G., Caudle, T. and J. Andrews. 2014. Shoreline Movement along the Texas Gulf Coast, 1930's to 2012, Final Report to the Texas General Land Office. Bureau of Economic Geology, The University of Texas at Austin.

[2] U.S. Army Corps of Engineers. 2016. Wave Hindcast Model Domains for U.S. Coasts (Datasets). Wave Information Studies. Available at: http://wis.usace.army.mil/ (accessed Dec. 8, 2016)

[3] "Las Palomas Wildlife Management Area – Boca Chica Unit." 25°57'26.0"N 97°08'49.0"W. Google Earth (accessed Dec. 8, 2016)

[4] Aerial photographs taken from the project geospatial database, described in the Report.

[5] Van Valkenburg, Dianna. 2003. Analysis of Proposed Flooding of Bahia Grande, Cameron County, Texas. Ocean Engineering Program, Civil Engineering Department, Texas A&M University and National Oceanic and Atmospheric Administration. Available at: http://www.habitat.noaa.gov/toolkits/tidal_hydro/portfolio_resources/tidalhydro_bg_01_2003_floodinganalysis.pdf (accessed Dec. 8, 2016)

[6] "Bahia Grande, TX." 26°02'32.5"N 97°18'41.8"W. Google Earth (accessed Dec. 8, 2016)

[7] Ocean Trust. 2009. Bahia Grande Project: Bahia Grande Master Plan Overview, March 2009. National Oceanic and Atmospheric Administration. Available at: http://www.habitat.noaa.gov/toolkits/tidal_hydro/portfolio_resources/tidalhydro_bg_11_2009_masterplanoverview.pdf (accessed Dec. 8, 2016)

[8] "Paso Corvinas, Port Isabel, TX." 26°02'22.5"N 97°15'37.5"W. Google Earth (accessed Dec. 8, 2016)

Appendix F. Project Feasibility & Constructability Assessments

Constructability and Feasibility Assessment Results

A. Feasibility Assessment Results

Two feasibility assessments were conducted; one by the TAC and one by the Planning Team. The results of each assessment are discussed in detail, below.

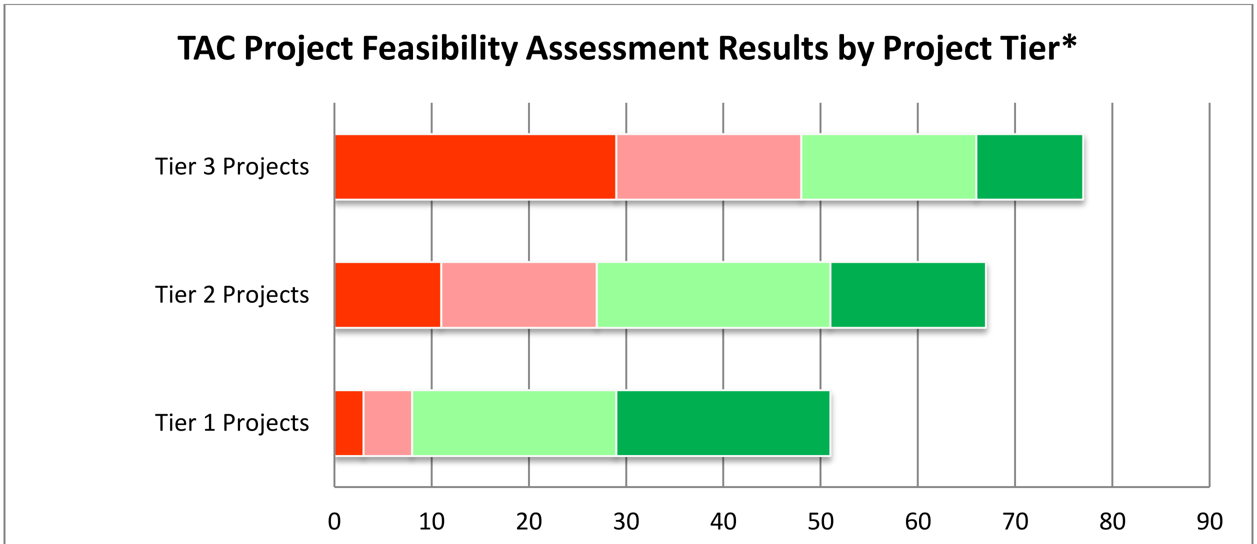
I. Technical Advisory Committee Results

The TAC was asked to look at feasibility from a holistic standpoint based on each person's knowledge of known impediments to implementing a project (e.g., unwilling sellers in the case of land acquisition projects, lessons learned from previous projects). This assessment was based primarily upon each TAC member's firsthand knowledge of work along the coast, and was supplemented with discussions during in-person TAC meetings.

During the TAC feasibility assessment, the TAC provided a score between 0 and 4 to evaluate the feasibility of executing each potential project. The scores indicate the following: 0 – not feasible; 1 – low feasibility; 2 – moderate feasibility; 3 – high feasibility; and 4 – certain feasibility. In the first TAC meeting, held in Region 3, the TAC was not asked to assess the feasibility of individual projects; this question was subsequently added and data was collected for Regions 1, 2 and 4. The maximum score attributed was a 3.33 and the minimum was 1.63, with a standard deviation of 0.31, indicating that the projects tend toward moderate feasibility.

For TAC feasibility results, a score of 2.8 or above indicated high feasibility, a score ranging from 2.2 to 2.8 indicated moderate feasibility, and a score ranging between 0 and 2.2 indicated low feasibility. Approximately 56 percent of projects were considered moderately feasible; the median feasibility score in this range was 2.5,indicating an even split between moderate to high feasibility. TAC feasibility assessment results are shown in the Project Evaluation Tables located at the end of the Report. In some instances, insights provided by the TAC were used to remove already completed projects or highly infeasible projects from Plan consideration. These more qualitative considerations were used to supplement the numerical assessments provided by the TAC.

TAC feasibility evaluations were used in some capacity to differentiate projects between the upper Tiers (1 and 2), and Tier 3. It should be noted, however, that the feasibility assessments, while an important consideration in the overall resiliency of a particular project, were not the only factors used to determine an individual project's placement in the various tiers. In general, the proportion of projects expected to have low feasibility or medium-low feasibilities are greater in Tier 3 (48 out of 77 total projects, or 62 percent) than the same proportions in Tier 1 (8 out of 51 projects, or 16 percent) and Tier 2 (27 out of 27 total projects, or 40 percent). The distributions for the numerical TAC assessment results are shown in Figure 1.



	Tier 1 Projects	Tier 2 Projects	Tier 3 Projects
Low Feasibility	3	11	29
Medium-Low Feasibility	5	16	19
Medium-High Feasibility	21	24	18
High Feasibility	22	16	11

Figure 1. TAC Project Feasibility Assessment Results Summary by Project Tier

*Only includes projects in Regions 1, 2, and 4. Region 3 project feasibilities were not assessed numerically by the TAC.

As evidenced from Figure 1, a number of projects prioritized in Tiers 1 and 2 have low to medium-low feasibilities. Future refinements to such low-scoring projects may be made to enhance their feasibility.

II. PLANNING TEAM RESULTS

The Planning Team analyzed project feasibility from the standpoint of project characteristics such as descriptions, construction costs, and anticipated benefits for coastal resiliency. Drawing on professional experience and best judgement, this yielded an impartial determination of feasibility. This assessment is based on construction experience and considers at project feasibilities compared to similar completed or ongoing projects in Texas. This technical analysis did not apply project-specific factors (e.g., community acceptability, availability of funds) or other subjective considerations that may affect feasibility; the TAC analysis addressed those broader considerations. Consequently, some projects the Planning Team identified as being highly feasible from a technical standpoint were ranked lower by the TAC if those projects were deemed to be less feasible for various practical reasons. A key component of the Planning Team's assessment was to identify if projects that were conceptually beneficial to coastal resiliency might be practically infeasible.

The Planning Team based its determination of feasibility on four assessment categories: bidability, constructability, environmental consideration, and overall analysis of feasibility. Under each category, several subcategories contributing to feasibility were identified and are given a ranking of qualitative feasibility, ranging from 1 to 5. A ranking of 1 indicates extremely low feasibility, whereas a ranking of 5 indicates extremely high feasibility for that subcategory. With a total of 15 subcategories, the maximum possible feasibility score for a project is a 75. Two of the 15 subcategories are optional, and may not apply to every project. The categories and subcategories are defined in Table 1.

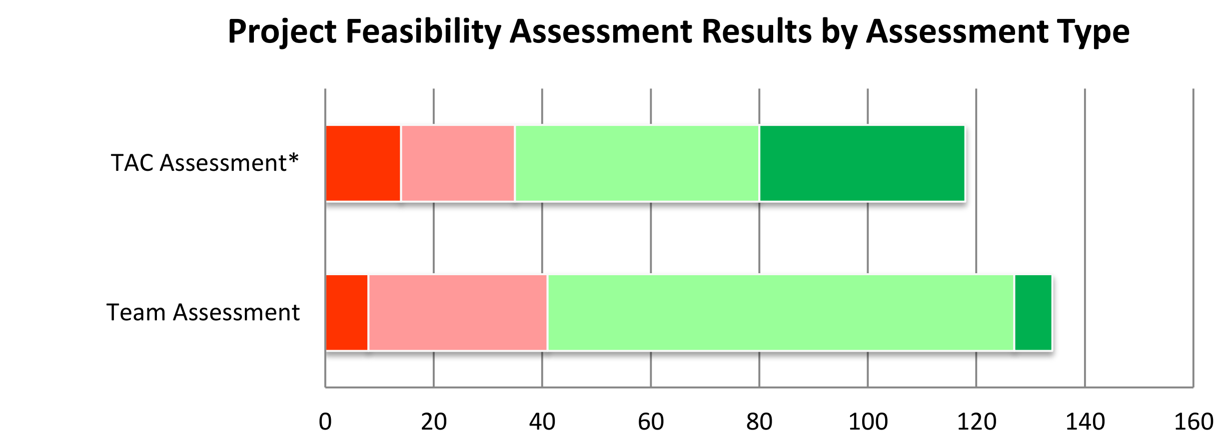
Table 1. Planning Team Feasibility Assessment Categories and Subcategories

Bidding	Project Costs
	Funding Availability
	Scheduling
	Post-Construction Site Maintenance & Monitoring
Constructability	Ability to Complete the Project
	Public Support and Community Outreach
	Multi-Agency Coordination
Environmental Consideration	Environmental Vulnerability
	Wildlife studies, policies, and programs
	Coastal Benefits (restoration, creation, nourishment)
	Coastal Resiliency
	Environmental Mitigation
	Long-Term Sustainability
Analysis of Feasibility (OPTIONAL)	Alternative consideration, including no work options
	Benefit-Cost Ratios

Tier 1 and Tier 2 projects were evaluated by the Planning Team. The maximum score awarded was a 58; the minimum score was a 28. The average feasibility score for the entire dataset was 42. Based on the distribution of scores and the feasibility statements provided on the project feasibility tables described in the assessment methodology in Section 7 of the Technical Report, it was concluded that projects scoring in the 52 to 75 range are highly feasible. These projects received mostly highly feasible to extremely feasible ratings, and collectively account for 5 percent of the evaluated projects. Projects that scored between a 52 and 32 qualified as feasible projects, with the understanding that additional development/refinement would be required as they are considered further. Moderately feasible projects accounted for approximately 64 percent of the projects. The average ranking of moderate feasibility projects was 39, a figure that was subsequently used to differentiate between medium-low feasibility and medium-high feasibility projects. Projects scoring 32 or below received qualitative rankings for each of the assessment subcategories of extremely low feasibility to low feasibility.

Numerical results of the Planning Team's feasibility assessment were compared to the results received from the TAC's review. Generally, the results of the Planning Team's feasibility assessment were more conservative in assigning high feasibility to projects than the results of the TAC process. However, the projects determined to be highly feasible by the Planning Team corresponded well with the projects that the TAC identified as highly feasible, as did assessments of projects determined to be less feasible. Projects determined to have low feasibility generally included those requiring high levels of coordination between multiple stakeholders (i.e., federal, state, and local sponsors) and/or funding sources. Lower feasibility scores were also given, in general, to projects that are too large for completion in one phase.

The Planning Team's feasibility assessment results are provided in the Project Feasibility Tables provided at the end of this appendix. Result distributions are shown in Figure 2. Since the Planning Team's assessment was conducted only for Tier 1 and Tier 2 projects, TAC assessment results are shown only for those two tiers as well.



	Team Assessment	TAC Assessment*
Low Feasibility	8	14
Medium-Low Feasibility	33	21
Medium-High Feasibility	86	45
High Feasibility	7	38

Figure 2. Project Feasibility Assessment Results Summary for TAC and Plan Technical Assessments

*Only includes projects in Regions 1, 2, and 4. Region 3 project feasibilities were not assessed numerically by the TAC.

These qualitative and quantitative feasibility analyses undertaken by the TAC and the Planning Team are "snapshots in time"; the rankings are likely to change in the future as additional project details are developed, and as coastal conditions, resiliency needs, and societal preferences evolve. Future iterations of the Plan will provide for updated feasibility assessments based upon new information.

B. Constructability Assessment Results

Constructability was an important component of the overall feasibility assessment process, and focused on three primary factors associated with construction activity: bidability, buildability, and project close out tasks. The subcategories within each of these major categories (e.g., permit requirements, project scheduling, seasonal constraints) were identified. Each subcategory was assigned a "Yes" (Y) or "No" (N) value based on the needs or potential issues for that project. Additional comments were provided if special considerations were warranted. A constructability statement was developed for each project, highlighting factors to be considered when designing or bidding the project, provided in the Project Constructability Tables at the end of this appendix.

Project Feasibility Tables

Project No.:	4	Developed by:	J Simmons Group JS
Project Name:	Brazos River to Cedar Lake Creek Shoreline Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	January 5, 2017

Region:	2	**Project Description:** Shoreline erosion along GIWW creates shoaling and erosion of adjacent marshes. The length of the GIWW included in the project area is approximately 20 miles per shoreline. The project proposes breakwaters or a living shoreline along the GIWW and restoration of marshes adjacent to the GIWW.
Sub Region:	24	
HUC 10 Region:	2	

Project Extents:	100,000 LF Breakwater; 100 ac Marsh
TOTAL Construction Costs:	52,034,600
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	Only works for 4T program, multi-year cost set aside
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	Overall several years
	Public Support and Community Outreach	1	Can create conflict for shrimpers, sport boating
	Multi-agency coordination	1	
III	**Environmental Consideration**		
	Environmental vulnerability	4	With erosion marine life has decreased, this will assist in restoring wildlife habitats over the years
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	5	None needed
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	39	

Statement of Feasibility: This is very expensive for 20 miles of repair, this represents $ 2.6 million dollars per mile. It is recommended repairing the most vulnerable areas first with an extensive review of long term resiliency. Data and studies should consider continuous erosion and promote methods to reduce vulnerability.

Project No.:	9	Developed by:	J Simmons Group JS
Project Name:	Brazoria National Wildlife Refuge Shoreline Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Marsh Revetment	Date:	January 5, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The narrow stretch of land separating the Brazoria National Wildlife Refuge GIWW Shoreline from Christmas Bay has been breached by erosion. The project strategies include reinforcing the banks on the Bay side to prevent further erosion, and creating emergent marsh habitat. Dredge material could be used to raise the elevation to the appropriate level for marsh creation. Closer monitoring of erosion along the shoreline, particularly at critical locations such as the narrow sections between the GIWW and Christmas Bay, Drum Bay, and Long Pond, is also recommended.
Project Extents:	480 acres marsh; 48,700 LF revetment
TOTAL Construction Costs:	$ 27,575,800
Construction Benefit:	Habitat Creation & Restoration; Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	Will maintenance and monitoring be an additional expense?
II	**Constructability**		
	Ability to complete the project	2	Define funding resources available
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	39	

Statement of Feasibility: The project is costly for such a low populated area; the priority to complete this project is relatively low. Erosion data has demonstrated the need for reinforcement and if dredged material and funding are available the project is feasible.

Project No.:	11	Developed by:	J Simmons Group JS
Project Name:	Follets Island Marshes	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The project proposes marsh habitat restoration on Follet's Island, on the west side of Christmas Bay, to protect critical habitat including estuarine and freshwater marshes and tidal flats.
Project Extents:	2,650 acres of marsh creation
TOTAL Construction Costs:	$ 40,784,400
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Justify expenses
	Funding Availability	2	Low population, unsure of long term benefits
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	If complete site should be sustainable
II	**Constructability**		
	Ability to complete the project	2	Define funding resources available
	Public Support and Community Outreach	2	With low population little impact on community
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	3	
	Environmental mitigation	3	
	Long term sustainability	3	High risk during hurricane seasons
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	36	

Statement of Feasibility: The project is costly for such a low populated area; the priority to complete this project is low dependent on the need of fresh water and habitat creation.

Project No.:	19	Developed by:	J Simmons Group JS
Project Name:	East Galveston Bay Ecosystem Oyster Reefs	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** 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 Extents:	130 acres of oyster reef
TOTAL Construction Costs:	$ 15,600,800
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	Significant commercial benefit for this region
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	Monitor success of oyster reef habitat
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Increases value of bay bed
	Wildlife studies, policies, and programs	4	Measure oyster developments
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	1	
	Long term sustainability	4	Side scan data will provide long-term study data
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	Contingent on development of oyster reefs
	TOTAL	54	

Statement of Feasibility: Restoration of habitats that were destroyed as the result of natural disasters should be a high priority. Oyster reef have been proven an effective way of determining the impact of water quality on marine life and the destruction of marine life as a result of unnatural causes is unacceptable. Many agencies should support the funding for this project.

Project No.:	21	Developed by:	J Simmons Group JS
Project Name:	Galveston Bay Ecosystem Rookery Islands	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-une Islands, Rollover Bay Islands, Chocolate Point Island, West Bay Bird Island, Smith Point Island, North and South Deer Islands, and other rookery islands in the area. The proposed project will create additional acres of potential nesting habitat by reestablishing intertidal marsh and will promote shoreline stabilization.
Project Extents:	40,000 LF breakwater, 600 acres marsh
TOTAL Construction Costs:	$ 65,771,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Benefits environment
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	Nourishment will promote stabilization
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: Despite the environmental benefits such as increased nesting areas and additional habitat creation, the cost of $ 46 million dollars could be difficult to fund. There may be a better use for this funding however additional shore protection for the islands can increase the useful life.

Project No.:	24	Developed by:	J Simmons Group PA
Project Name:	San Jacinto Battlefield Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 14 **HUC 10 Region:** 14	**Project Description:** The project would involve restoration of marsh at the San Jacinto Monument as well as shoreline stabilization and beach nourishment through Beneficial Use of Dredged Material. Control of invasive species would also help enhance the habitat.
Project Extents:	2,000 LF Breakwater; 100 acre Marsh
TOTAL Construction Costs:	$ 2,487,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	Historical preservation and Industrial options are available
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	5	Control invasive species
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	48	

Statement of Feasibility: This is a low cost project which is highly feasible in this region. San Jacinto Monument is historically significant and dredging is easily accomplished in this district. Marine life would benefit from the enhancement of the habitat, and preservation of the shoreline would increase sustainability.

Project No.:	25	Developed by:	J Simmons Group PA
Project Name:	Burnet Bay Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh Levees	Date:	February 8, 2017

Region:	1	**Project Description:** This project seeks to restore approximately 500 acres of marshes through use of BUDM. Strategies for marsh restoration include the construction of levees for shoreline protection, raising the site elevation with dredge material, and planting marsh vegetation.
Sub Region:	14	
HUC 10 Region:	14	

Project Extents:	500 acre Marsh; 12,000 LF Levee
TOTAL Construction Costs:	$ 11,651,300
Construction Benefit:	Habitat Creation & Restoration; Flood Risk Reduction
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Justify expenses
	Funding Availability	2	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	If complete site should be sustainable
II	**Constructability**		
	Ability to complete the project	4	Define funding resources available
	Public Support and Community Outreach	3	Volunteers can assists with planting to reduce costs
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	This will assist in restoring marine habitats over the years
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: The Burnet Bay marsh would benefit the estuaries. This would also increase habitat for fish and other aquatic organisms.

Project No.:	28	Developed by:	J Simmons Group PA
Project Name:	East Bay and GIWW Marsh Restoration and Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** The East Bay and GIWW Marsh Restoration and Protection project would create an estimated 47,100 linear feet of offshore rock breakwaters along the prioritized project areas to: reduce the wave energy impacting approximately 678 acres of saline marsh and promote shoreline stabilization; protect over 10,000 acres of fresh, intermediate, and brackish marshes and upland prairie from additional saltwater intrusion and habitat conversion.
Project Extents:	47,100 LF breakwater
TOTAL Construction Costs:	$ 22,919,700
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	41	

Statement of Feasibility: Marine life would benefit from restoration of marsh and long term, the abundance of the bay system will provide long term habitats for wild life.

Project No.:	29	Developed by:	J Simmons Group JS
Project Name:	Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	January 5, 2017

Region: 1 **Sub Region:** 9 **HUC 10 Region:** 9	**Project Description:** This project aims to restore marsh habitat along the GIWW using a living shoreline construction. The proposed project area is located along segments of shoreline adjacent to the Anahuac NWR. Of the targeted 9 miles of shoreline, an estimated 12,400 feet faces East Bay and 34,700 feet lies east of Oyster Bayou on the GIWW.
Project Extents:	48,000 LF Breakwater; 4,000 acres of marsh
TOTAL Construction Costs:	$ 82,301,900
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	Ensure wetlands maintain suitable tidal conditions
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	38	

Statement of Feasibility: Marine life would benefit from restoration of marsh and long term the abundance of the bay system will provide long term habitats for wild life.

Project No.:	30	Developed by:	J Simmons Group JS
Project Name:	McFaddin National Wildlife Refuge at Willow Lake	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	January 5, 2017

Region: **Sub Region:** **HUC 10 Region:**	1 6 6	**Project Description:** The project proposes to construct approximately 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 acres of emergent marsh habitat and protect 3,600 acres of existing coastal marsh from degradation. The project proposes to construct a 1,000-foot-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 Watershed. The proposed siphon would transport freshwater from north of the GIWW to the south, and benefit more than 29,000 acres of coastal wetlands.

Project Extents:	6,000 LF Breakwater; 150 acres of marsh
TOTAL Construction Costs:	$ 5,344,700
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	Post completion this is low maintenance project
II	**Constructability**		
	Ability to complete the project	4	Consider all current data with respect to erosion
	Public Support and Community Outreach	2	Not applicable
	Multi-agency coordination	3	Several agencies may be required
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	Need to study accomplishments
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	47	

Statement of Feasibility: This is a low cost project which is highly feasible and has a long term positive effect on marsh production, wetland continuation, and marine life.

Project No.:	35	Developed by:	J Simmons Group JS
Project Name:	McFaddin National Wildlife Refuge Shoreline Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Gulf Dune	Date:	January 5, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** 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. The project would also provide restoration of eroding Gulf-facing shoreline, dunes, and associated wetlands. Nourishing this beach will provide less-costly removal of abandoned oil wells.
Project Extents:	105,600 LF beach nourishment (Gulf facing); 105,00 LF Dune Restoration
TOTAL Construction Costs:	$ 151,053,400
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	
	Funding Availability	1	Low population, describe funding resources
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	2	Possible high maintenance considering environmental factors
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	1	
	Multi-agency coordination	2	Is there a private sector that utilizes this location?
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	30	

Statement of Feasibility: The NWR runs from High Island to Sea Rim State Park. There is hardly any population of people in this coastal area, but extensive beaches, dunes and wetlands. Provide information on water quality and commercial benefits. The project requires excessive funding, and can only be feasible dependent on the methods used for the removal of abandoned oil wells.

Project No.:	41	Developed by:	J Simmons Group PA
Project Name:	Texas Chenier Plain Refuge Complex	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region:	1	**Project Description:** The Texas Chenier Plain Refuges Complex supports a collection of National Wildlife Refuges, including Anahuac, McFaddin, Texas Point, and Moody. The project will involve conservation of 65,000 acres of additional riverine, subtidal, freshwater and marine/estuarine wetlands, beach/dune and upland habitats.
Sub Region:	11	
HUC 10 Region:	11	

Project Extents:	65,000 acres Acquisition
TOTAL Construction Costs:	$ 487,500,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	2	
	Scheduling	5	Not applicable
	Post Construction Site Maintenance and monitoring	3	Define resources for monitoring and maintenance
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Estuary is at risk if the property is not purchased
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: This purchase is an opportunity to conserve 65,000 acres of marsh / wetlands in an area that has demonstrated a significant interest in protecting wildlife. The basis of this purchase should focus on the available funding and assistance from interested agencies. More information is required on maintenance and monitoring plans that may be additional future expenses.

Project No.:	44	Developed by:	J Simmons Group JS
Project Name:	Trinity - San Jacinto Estuary Fresh Water Inflows	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Freshwater Inflow	Date:	January 5, 2017

Region: 1 **Sub Region:** 16 **HUC 10 Region:** 16	**Project Description:** The goal of the project is to acquire and convert some existing water rights from willing sellers for the purpose of freshwater inflow protection. Drought-reliable water rights that are not being fully utilized are potentially available for purchase on a voluntary basis. This project would be designed to provide an additional 100,000 acre-feet/year of drought-secure inflows to Galveston Bay from the Trinity River basin as compared to future conditions without the project.
Project Extents:	1 EA Freshwater Inflow
TOTAL Construction Costs:	$ 7,385,000
Construction Benefit:	Environmental
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Describe funding resources, and available sellers
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	Examine water quality
II	**Constructability**		
	Ability to complete the project	3	Need contributions from farmers
	Public Support and Community Outreach	3	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	There is long-term value if proper sanitation methods are used
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	1	
	Environmental mitigation	5	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	Depends on water quality and profitability
	TOTAL	41	

Statement of Feasibility: The purpose of this project will benefit the long term salinity level of the Galveston Bay during extreme droughts. The salinity has a significant impact on water quality and marine life.

Project No.:	45	Developed by:	J Simmons Group PA
Project Name:	Galveston Bay Debris Removal	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Abandoned Oil/ and or Gas Well	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project aims to remove marine debris from navigable waters and habitat areas of Galveston Bay, and its sub-bays and tributaries. Hundreds of derelict exploration and production structures and vessels lie abandoned in waterways and wetlands within Galveston, Harris, Chambers and Brazoria counties. Removal of these vessels allows safer access to and navigation of open-water areas for boaters and anglers; improved water quality by increasing water flow and circulation; enhanced marsh and open-water habitats for fisheries production; and improves the bay's appearance for all users of the bay.
Project Extents:	1 Abandoned Oil/ and or Gas Well
TOTAL Construction Costs:	$ 2,100
Construction Benefit:	Structure / Debris Removal
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	Low cost to remove obstructions
	Funding Availability	4	Galveston Region can acquire funding
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	5	
	Public Support and Community Outreach	4	Community would be satisfied with added navigation
	Multi-agency coordination	1	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	1	Not applicable
	Coastal Benefits (restoration, creation, nourishment)	5	Cleansing the bay bottom
	Coastal Resiliency	-	Not applicable
	Environmental mitigation	1	
	Long term sustainability	5	Contingent on future obstructions
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	42	

Statement of Feasibility: The Galveston Bay has exceptional economical value in the Gulf Region. Removing debris and obstructions will cleanse the bay bottom, and promote an increase use for the boaters, fishermen, etc. This region has improved over the last 20 years, and consistent maintenance of the bay will demonstrate the development a coast interested in exceeding environmental standards.

Project No.:	51	Developed by:	J Simmons Group JS
Project Name:	Boggy Cut GIWW Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh, Acquisitions	Date:	January 5, 2017

Region: 2 **Sub Region:** 24 **HUC 10 Region:** 24	**Project Description:** This project will protect the GIWW from erosion cause by wind, current, and ship wakes. Solutions may include breakwaters along the GIWW and restoration of marshes adjacent to the GIWW. The project may also include acquisition of private property adjacent to the GIWW. These efforts would improve wind and current hazards to navigation and mainland erosion.
Project Extents:	10,500 LF Breakwater; 20 acres of marsh, 20 acres Acquisitions
TOTAL Construction Costs:	$ 8,647,600
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration; Acquisitions
Longevity and Useful Life (yrs):	15+ years (25+ years for Acq.)

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	Low priority
	Funding Availability	2	
	Scheduling	2	The description should be more specific with relation to the method to protect from erosion
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	This is one of many projects in this area and has low priority
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	If land is purchased
	Environmental mitigation	1	
	Long term sustainability	2	Will continue to erode slowly
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	29	

Statement of Feasibility: Most of the GIWW has the same issue with erosion because Galveston Bay and material used to prevent erosions is typically sand. Review sediments studies to determine which method will be used as shore protection, and incorporate the tidal changes to develop the specifications that will promote resiliency, inclusive of rock shore protection.

Project No.:	52	Developed by:	J Simmons Group JS
Project Name:	Restoration of Chester's Island	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	January 5, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The project aims to slow the erosion on the island and add 30 acres of land. Potential solutions include sand filled 300-foot long geotubes or other breakwater structures, invasive species control, and other shoreline stabilization techniques. There is a need to study the hydrology of the area to reduce erosion and currents/tides in the area.
Project Extents:	3,000 LF Wave Break; 30 acres of Rookery Island Restoration
TOTAL Construction Costs:	$ 2,829,800
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	Is funding for study or construction
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	Define which method will add 30 the acres
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	Not applicable
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	38	

Statement of Feasibility: Geotubes have been used in Galveston and Houston Ship Channel area with limited success. The sun dries out the tubes causing tears, as well as traffic and boaters have caused damage. Study the hydrology of the area and specify which option to slow erosion yields the greatest cost benefit.

Project No.:	56	Developed by:	J Simmons Group JS
Project Name:	Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions Wetlands/Forested Wetlands	Date:	January 5, 2017

Region: 2 **Sub Region:** 16 **HUC 10 Region:** 38	**Project Description:** This project will acquire 3,440 acres of property located next to the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge on the north shoreline of Powderhorn Lake. In addition, there will be an estimated 500 to 600 acres of freshwater wetland/moist soil unit habitat created in the abandoned farmland. Water quality will be improved by constructing substantial amounts of wetland units in the abandoned farmland. This will reduce nutrient loading from cattle grazing.
Project Extents:	3,440 acres Acquisitions; 1 EA Wetland/Forested Wetlands (500-600 acres)
TOTAL Construction Costs:	$ 27,277,000
Construction Benefit:	Habitat Creation & Restoration; Land acquisition
Longevity and Useful Life (yrs):	15+ years (25+ years for Acq.)

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	Estimate the amount of maintenance required
II	**Constructability**		
	Ability to complete the project	4	Contingent on purchasing options
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	Will the acquired property be lease?
	TOTAL	40	

Statement of Feasibility: This will be a long term asset that will increase in value overtime if properly maintained. Like most acquisitions, price, management, and public approval might affect initial costs but are likely to have a long term benefit.

Project No.:	62	Developed by:	J Simmons Group JS
Project Name:	Welder Flats Wildlife Management Area	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Wetlands/Forested Wetlands	Date:	January 5, 2017

Region: 2 **Sub Region:** 17 **HUC 10 Region:** 39	**Project 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.
Project Extents:	12,000 LF Breakwater; 1 EA Wetlands/Forested Wetlands
TOTAL Construction Costs:	$ 7,532,700
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	Aim to schedule during a maintenance dredge cycle
	Post Construction Site Maintenance and monitoring	2	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	4	No construction during nesting season
	Public Support and Community Outreach	3	Implicate measures that reduce pollution
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Project is necessary for Whooping Cranes
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	Ensure wetlands maintain suitable tidal conditions
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: When there is an endangered species, nesting areas and habitats are a priority. The need for preservation of wild life is crucial for habitation and migration patterns and demonstrates a program that is proactive in protection of vulnerable species.

Project No.:	70	Developed by:	J Simmons Group JS
Project Name:	Goose Island State Park Habitat Restoration and Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater	Date:	January 5, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** The project involves shoreline and habitat protection of the critical intertidal estuarine marsh habitat that makes up 25 acres of Goose Island State Park.
Project Extents:	4,000 LF Breakwater
TOTAL Construction Costs:	$ 2,018,600
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	Contingent on State Park funding and local resources
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
0II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	This is a vital asset and requires protection
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	51	

Statement of Feasibility: The project is high priority and promotes the use of Texas State Parks and the long term sustainability of the land will improve.

Project No.:	72	Developed by:	J Simmons Group JS
Project Name:	Long Reef Shoreline Stabilization and Habitat Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	January 5, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** 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 Extents:	100 acre Marsh
TOTAL Construction Costs:	$ 1,467,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	5	No issue if USACE dredged material is used
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Raising elevation will reduce erosion, and increase to functionality of the nesting area
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	Effective use of funding
	TOTAL	52	

Statement of Feasibility: Rookeries are important to the long term survival of many species; the project is affordable and can be achieved yielding positive results. Monitoring or studying the effectiveness will provide additional data for future projects.

Project No.:	75	Developed by:	J Simmons Group JS
Project Name:	Nueces River Delta Shoreline Stabilization	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy causing emergent intertidal wetland losses.
Project Extents:	10,560 LF Breakwater
TOTAL Construction Costs:	$ 5,329,000
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	Post construction this is low maintenance
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	Low benefits to public
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Loss of wetlands is critical to proper eco-systems
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	
	Environmental mitigation	5	None required
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: The construction of rock break waters has been effective in the past, but there are other methods to reinforce the shoreline utilizing vegetation in combination with rock. The wetlands have promoted habitation and have provided a filtration system for storm water drainage.

Project No.:	86	Developed by:	J Simmons Group JS
Project Name:	Mustang Island State Park Acquisition	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project involves the acquisition of parts of Mustang Island and the protection of tidal marsh, emergent estuarine wetlands, and coastal prairie dune and beachfront habitats. This includes the Mustang Island State Park Conservation Initiative, which will create a contiguous 5,100+ acre conservation area along the barrier island that will enhance the net biological value of the island.
Project Extents:	750 acres Acquisitions
TOTAL Construction Costs:	$ 5,625,000
Construction Benefit:	Land Acquisitions
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	Define the seller / buying options
	Post Construction Site Maintenance and monitoring	3	What is the current biological value and are funding resources available for maintenance?
II	**Constructability**		
	Ability to complete the project	4	Define funding resources
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Describe methods of protection once property is purcahsed
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	47	

Statement of Feasibility: This historic island has been a main stay in Corpus Christi / Port Aransas area for many years. Assuming the property is owned by the State, liability of maintenance should be addressed with local community. The ability to coordinate a management program will promote protection of historical islands.

Project No.:	91	Developed by:	J Simmons Group JS
Project Name:	Coastal Bend Conservation Easements	Checked by:	J Simmons Group PA
Project Type: Project Subtype:	Conservation Easements Coastal Prairies	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The project aims to establish an endowment to purchase approximately 150,000 acres of conservation easements and to fund habitat restoration and maintenance in the Coastal Bend area. Additionally, the funds would provide for restoration and maintenance on South Texas coastal prairies and marshes.
Project Extents:	150,000 acre Conservation Easement
TOTAL Construction Costs:	$ 450,000,000
Construction Benefit:	Land Acquisitions; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	Could be difficult to find private and public contributions
	Funding Availability	1	
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	1	
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	This is a critical area in Texas, and projections could benefit nearly 1/3 of the coast
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	1	
	TOTAL	35	

Statement of Feasibility: This is a high risk purchase, more information will need to be assessed such as, maintenance programs, multi-agency coordination, current value, and future values to determine feasibility. The purchase cost reflects $3,000 per acre, does this cost include the restoration and maintenance? It could take years to establish an endowment for this purchase.

Project No.:	96	Developed by:	J Simmons Group JS
Project Name:	Laguna Atascosa NWR- Bahia Grande- Intertidal Wetlands Hydrologic Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Freshwater Inflow	Date:	January 5, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** In 2005, a pilot channel was constructed that connected the Brownsville Ship Channel to the Bahia Grande and began refilling the main basin. In 2007, two interior channels were cut that reconnected the larger basin to two smaller interior basins – the Laguna Larga and the Little Laguna Madre - ensuring natural tidal flow and exchange throughout the whole system. The next major step is to widen and deepen the original pilot channel to improve tidal flow into the basins and thereby fully restore the natural biological functions of the wetlands.
Project Extents:	1 EA Freshwater Inflow
TOTAL Construction Costs:	$ 7,385,000
Construction Benefit:	Environmental
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 – 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Dredging is the most feasible option need more information on channel depth, width, and length, and quantities to be removed
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	Define protection of wetlands after placement
II	**Constructability**		
	Ability to complete the project	5	Contingent on this cost being consistent
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	40	

Statement of Feasibility: This project benefits the mobility of usefulness of the channel. Utilizing dredge material to restore biological functions of the wetlands is also ecologically feasible, but more information on methods to protect the wetlands is also required.

Project No.:	112	Developed by:	J Simmons Group PA
Project Name:	Treasure Island Nourishment Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** The project focuses on developing alternatives for a beach nourishment project in the vicinity of the revetment and fishing pier area to widen the beach and provide a buffer to reduce storm impacts to the existing shoreline.
Project Extents:	2,800 LF Gulf
TOTAL Construction Costs:	$ 3,339,900
Construction Benefit:	Beach Nourishment
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	Define methods of restoration
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	May increase long-term sustainability and provide pertinent data for other restorations
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	43	

Statement of Feasibility: Alternative methods to beach nourishment project should be a priority. Typically restorations require dredged materials contingent on dredge cycles, and sediment testing. The ability to identify more cost effective methods will reduce costs; however this project incorporates a study with a construction phase.

Project No.:	136	Developed by:	J Simmons Group PA
Project Name:	Dune/Beach Restoration from Sargent Beach to the Colorado River	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Dune Gulf	Date:	February 8, 2017

Region: 2 **Sub Region:** 1 **HUC 10 Region:** 23	**Project Description:** The project involves approximately 30.8 miles of beach nourishment and dune restoration along the Gulf shoreline from Sargent Beach to the Colorado River.
Project Extents:	170,000 LF Gulf; 170,000 LF Dune
TOTAL Construction Costs:	$ 232,195,500
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: This project adds long term sustainability of marine life. The restoration of Sargent Beach will reduce wave impacts along the gulf coast.

Project No.:	138	Developed by:	J Simmons Group JS
Project Name:	Bay Shoreline from Magnolia Beach to Port O'Connor	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Jetty	Date:	January 5, 2017

Region: 2 **Sub Region:** 16 **HUC 10 Region:** 38	**Project Description:** The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.
Project Extents:	2 EA Groin; 52,800 LF Revetment; 1 EA Wetlands/Forested Wetlands
TOTAL Construction Costs:	$ 24,363,600
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Benefits Port O'Connor and Port Lavaca so increases ability to provide funding resources
	Scheduling	2	Low tide in the winter
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	Creates new fishing Jetty
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	Marsh/Wetland Enhanced
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	44	

Statement of Feasibility: This project can be completed and funded if state agencies work with local sponsors to share cost and the benefits that flow to the population.

Project No.:	142	Developed by:	J Simmons Group PA
Project Name:	Mustang Island Bay Shoreline Protection and Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project includes shoreline protection for approximately 8.25 miles of eroding shoreline and up to 215 acres of marsh land restoration.
Project Extents:	43,600 LF Breakwater; 215 acre Marsh
TOTAL Construction Costs:	$ 24,379,600
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	Define funding resources
	Scheduling	2	The description should be more specific with relation to the method to protect from erosion
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	32	

Statement of Feasibility: Protecting the shoreline and restoring the marsh benefit the long term sustainability of the coast, however the cost of the project exceed $ 2 million per mile, and do not effectively describe the benefits

Project No.:	145	Developed by:	J Simmons Group JS
Project Name:	Town of South Padre Island Gulf Shoreline	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Gulf Dune	Date:	January 5, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** This project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline.
Project Extents:	43,000 LF Gulf; 43,000 LF Dune
TOTAL Construction Costs:	$ 60,907,000
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	May require joint sponsorship
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	Will dredge material be used? Need info on sediment type
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	38	

Statement of Feasibility: Similar projects have been completed with high success on Galveston Island which have increased commercial development and tourisms. Promoting local sponsorship should be a priority.

Project No.:	180	Developed by:	J Simmons Group PA
Project Name:	Deer Island and Jigsaw Island Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will continue the expansion of the restoration of North and South Deer Islands and Jigsaw Island through BUDM opportunities. Island restoration will promote reestablishment of sea grass habitat. The project will also continue to develop alternative analyses and engineering designs on these islands in order to prepare them for future BUDM opportunities. The islands may need shoreline protection measures as part of the restoration.
Project Extents:	5,000 LF breakwater; 250 acre Rookery Island
TOTAL Construction Costs:	$ 21,343,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	2	Schedule during dredge cycle
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Benefits environment
	Wildlife studies, policies, and programs	3	Will provide data for future BUDM
	Coastal Benefits (restoration, creation, nourishment)	4	Nourishment will promote stabilization
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	39	

Statement of Feasibility: Despite the environmental benefits such as the reestablishment of sea grass habitat, the cost of $ 21 million dollars could be difficult to fund. There may be a better use for this funding however developing alternatives and engineering studies are pertinent data that may provide useful information and methods to improve containment and sustainability of dredged material.

Project No.:	232	Developed by:	J Simmons Group PA
Project Name:	Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project involves purchasing a conservation easement for approximately 3,200 acres or coastal prairie and estuarine marsh habitats adjacent to Green's Lake, near Hitchcock. The easement won't allow public access and Scenic Galveston will manage the property and restore the prairie.
Project Extents:	3,200 acre Conservation Easement
TOTAL Construction Costs:	$ 9,600,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	5	$ 3,000 per acre
	Funding Availability	4	Local sponsors are available in this region
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	Define maintenance options
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	This is a critical area in Texas, and projections could benefit nearly 1/4 of the coast
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	5	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	52	

Statement of Feasibility: Conservations are a priority for protecting species and improving water quality. This region has demonstrated the ability to recover and repair land post storm, and effectively utilize maintenance and monitoring program to reduce the natural environmental impacts of the coast

Project No.:	240	Developed by:	J Simmons Group JS
Project Name:	Coastal Heritage Preserve – Phase 4	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The Settegast Coastal Heritage Preserve project is envisioned as a conservation area on West Galveston Island adjacent to West Bay, which is part of the Galveston Bay system, an estuary of national significance. The next phase of the initiative involves acquisition of 635 acres from one owner and 205 acres from an adjacent owner. This would bring the total preserve area to 1,200 acres.
Project Extents:	840 acres Acquisition
TOTAL Construction Costs:	$ 6,300,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	2	
	Scheduling	5	Not applicable
	Post Construction Site Maintenance and monitoring	3	Define resources for monitoring and maintenance
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Estuary is at risk if the property is not purchased
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	43	

Statement of Feasibility: Galveston has been economically consistent with tourism, cruise terminals, and maintains nature preservation. This purchase is an opportunity to add 840 acres of marsh / wetlands in an area that has demonstrated the ability to effectively utilize, monitor, and maintain wetlands.

Project No.:	241	Developed by:	J Simmons Group JS
Project Name:	Sweetwater Preserve Expansion	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region:	1	**Project Description:** The project involves the purchase of 275 acres of land situated immediately west of Galveston Bay Foundation's Sweetwater Preserve and adjacent to Sweetwater Lake, West Galveston Bay, and 8 mile road. Key attributes of the subject property include coastal grasslands, brackish and estuarine wetlands, frontage along West Galveston Bay and Sweetwater Lake, and extensive salt barrens and sand flats. Preservation of Galveston Island's marshes, wetlands, and associated habitats promotes clean water and healthy fisheries and preserves the scenic beauty of the area.
Sub Region:	17	
HUC 10 Region:	17	

Project Extents:	275 acres Acquisitions
TOTAL Construction Costs:	$ 2,062,500
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	$7500 per acre
	Funding Availability	3	
	Scheduling	5	Not applicable
	Post Construction Site Maintenance and monitoring	3	Define resources for monitoring and maintenance
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: Galveston has been economically consistent with tourism, cruise terminals, and maintains nature preservation. This purchase is an opportunity to add 275 acres of marsh / wetlands in an area that has demonstrated the ability to effectively utilize, monitor, and maintain wetlands.

Project No.:	252	Developed by:	J Simmons Group JS
Project Name:	Bolivar Beach and Dune Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Gulf Dune	Date:	January 5, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** 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 Extents:	52,800 LF Gulf; 52,800 LF Dunes (Beach nourishment)
TOTAL Construction Costs:	$ 74,788,200
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	2	Dredging will reduce construction time
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	Contingent on funding availability
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	Restoring the beaches and dunes will reduce vulnerablity
	Wildlife studies, policies, and programs	5	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	2	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	49	

Statement of Feasibility: Since Hurricane Ike impacted the Gulf Coast in 2008, the need to restore has always been a high priority. This project will increase tourism and promote commercial economies and development.

Project No.:	261	Developed by:	J Simmons Group PA
Project Name:	East End Lagoon Nature Park & Preserve	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will preserve 684 acres of the East End Lagoon on the east end of Galveston Island
Project Extents:	680 acre Conservation Easement
TOTAL Construction Costs:	$ 2,040,000
Construction Benefit:	Land Acquistion
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	$ 2,900 per acre
	Funding Availability	4	Local sponsors are available in this region
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	Define maintenance options
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	This is a critical area in Texas, and projections could benefit nearly 1/4 of the coast
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	5	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	52	

Statement of Feasibility: Conservations are a priority for protecting species and improving water quality. This region has demonstrated the ability to recover and repair land post storm, and effectively utilize maintenance and monitoring program to reduce the natural environmental impacts of the coast.

Project No.:	309	Developed by:	J Simmons Group PA
Project Name:	Dune Restoration and Beach Nourishment, Surfside to Brazos River	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would restore approximately 1.9 miles of shoreline extending eastward from the Freeport East Jetty. The area protected by the shoreline is the City of Surfside.
Project Extents:	10,000 LF Dune (Shoreline)
TOTAL Construction Costs:	$ 13,658,600
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	2	Dredging will reduce construction time
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	Contingent on funding availability
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	Restoring the beaches and dunes will reduce vulnerability
	Wildlife studies, policies, and programs	5	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	2	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	49	

Statement of Feasibility: Since Hurricane Ike impacted the Gulf Coast in 2008, the need to restore has always been a high priority. This project will increase tourism and promote commercial economies and development.

Project No.:	310	Developed by:	J Simmons Group PA
Project Name:	Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would restore approximately 6.3 miles of shoreline. The area protected by this shoreline includes two popular recreation areas at Quintana and Bryan Beaches and several industrial facilities and placement areas.
Project Extents:	33,000 LF Dune (Shoreline)
TOTAL Construction Costs:	$ 45,483,000
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$ 7.2 per mile
	Funding Availability	2	Describe funding resources
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	Possible high maintenance considering recreational factors
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	2	Possible private and public conflicts?
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	35	

Statement of Feasibility: The project is constructible; however there are other areas with more critical concerns with relation to the environment, habitat restorations, and coastal resiliency. With open public access and industrial properties in the area, the feasibility is only a priority if erosion affects the commercial economy.

Project No.:	315	Developed by:	J Simmons Group JS
Project Name:	Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Groin Gulf	Date:	January 5, 2017

Region: **Sub Region:** **HUC 10 Region:**	1 1 1	**Project Description:** 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 Extents:	2 EA Groins; 74,000 LF Gulf
TOTAL Construction Costs:	$ 93,303,300
Construction Benefit:	Shoreline Stabilization; Beach Nourishment
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	
	Funding Availability	1	This has multiple projects and might not be able to fund this project
	Scheduling	2	May need to be separated into multiple projects.
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Repairing Beach nourishment benefits community
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	34	

Statement of Feasibility: This is a multiple purpose project that benefits the marsh from further erosion. But also provides a benefit to the community and local tourism with beach nourishment.

Project No.:	318	Developed by:	J Simmons Group PA
Project Name:	Groin at State Highway 332	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Groin Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would construct a groin extending into the Gulf at State Highway 332, in conjunction with the placement of beach nourishment, to keep the sediment in the system near eroding portions of Surfside Beach. This measure would only be implemented in conjunction with Project 309, "Dune Restoration and Beach Nourishment, Surfside to Brazos River" in order to retain the sediment placed as part of those efforts.
Project Extents:	1 Groin; 10,000 LF Dune
TOTAL Construction Costs:	$ 2,760,100
Construction Benefit:	Shoreline Stabilization; Beach Nourishment; Contingent on Project 309
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Benefits Surfside to Brazos River
	Scheduling	2	Contingent on Project 309
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	Contingent on Project 309
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	44	

Statement of Feasibility: This project can be completed and funded if state agencies work with local sponsors to share cost and the benefits that flow to the population. Bidding projects 309 and 318 individually does not affect the cost benefit ratio, and if no issue with jurisdictions exists, the projects should be available to bid together. In general, the project should consists of two phases with milestone options.

Project No.:	320	Developed by:	J Simmons Group JS
Project Name:	GIWW Barrier Island Restoration, Old River and Hickory Coves	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Barrier islands Breakwater	Date:	January 5, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** 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 Extents:	50 acres Barrier Islands; 10,000 LF Breakwater
TOTAL Construction Costs:	$ 11,016,300
Construction Benefit:	Habitat Creation & Restoration; Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	Restoration of an island that eroded is a plus for GLO
	Funding Availability	3	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	Great benefit for Wildlife to restore fishing
	Multi-agency coordination	4	Agencies would support efforts.
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	Restoration and protecting is needed in this area.
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	36	

Statement of Feasibility: The restoration of an island that already exists is always a plus to the environment and communities. This is a great project.

Project No.:	322	Developed by:	J Simmons Group JS
Project Name:	GIWW Barrier Island Restoration, North Pleasure Island	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Barrier islands Breakwater	Date:	January 5, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** This measure would restore an island that once protected the GIWW at the northern end of Sabine Lake at Pleasure Island. Some island remnants exist.
Project Extents:	15 acre Barrier Island; 2,000 LF Breakwater
TOTAL Construction Costs:	$ 3,570,800
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	Restoring an existing island is a plus for all.
	Funding Availability	3	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Reclaiming the island would increase habitat and be supported by Texas Parks & Wildlife
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	4	Coastal benefit of restoration
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	35	

Statement of Feasibility: This project would bring back stability to the area and reclaim what has been lost. Community and Agency support should be strong in this area.

Project No.:	337	Developed by:	J Simmons Group JS
Project Name:	Marsh Restoration, Old River Cove	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** 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 Extents:	1,210 acre Marsh
TOTAL Construction Costs:	$ 19,257,000
Construction Benefit:	Habitation Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	Project cost of $14,000/acre to restore marsh seems reasonable
	Funding Availability	1	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	Reclaiming and expanding to increase shrimp, fish, bird and habitat for animals.
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	2	Texas Park & Wildlife, NOAA, and other agencies would support.
	Coastal Benefits (restoration, creation, nourishment)	4	Restoration
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	31	

Statement of Feasibility: The Brackish marsh would benefit the estuaries of the coastal rivers with heavy freshwater released when conditions of low tidal range. This would also increase habitat for fish and other aquatic organisms.

Project No.:	341	Developed by:	J Simmons Group JS
Project Name:	Marsh Restoration, Long Point Marsh, Galveston County	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	January 5, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** The project will restore 1,661 acres of emergent marsh with a containment dike of 13.2 miles and 9.6 miles of shoreline protection.
Project Extents:	1,660 acre Marsh; 50,700 LF Misc. Wave Break
TOTAL Construction Costs:	$ 27,426,100
Construction Benefit:	Flood Risk Reduction; Habitat Creation & Restoration; Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	1	Need multiple funding sources to fund such a large project
	Funding Availability	1	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Benefit for tourism and community.
	Multi-agency coordination	3	Agencies would support this effort of shoreline and marsh. Which would increase the habitat
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	2	
	Environmental mitigation	2	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	30	

Statement of Feasibility: This project impacts the marsh and wave break of the Galveston County area. This provides double impact of benefit for the environment and the region.

Project No.:	344	Developed by:	J Simmons Group JS
Project Name:	Marsh Restoration, Pierce Marsh, Galveston County	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** 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 Extents:	2,080 acre Marsh; 8,500 LF Misc. Wave Break
TOTAL Construction Costs:	$ 32,539,300
Construction Benefit:	Flood Risk Reduction; Habitation Creation & Restoration; Shoreline Stablization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	
	Funding Availability	1	
	Scheduling	2	Coordinate dredging
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	2	Combination of Marsh & Breakwater
	Public Support and Community Outreach	3	Community support would be positive – increase fishing in the area
	Multi-agency coordination	3	Agencies would support
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	Coastal benefits with breakwater
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	1	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	29	

Statement of Feasibility: The benefit would be to restore the marsh area. This would increase the birds and aquatic organism at the marsh and breakwater.

Project No.:	346	Developed by:	J Simmons Group JS
Project Name:	Marsh Restoration, IH-45 Causeway, Galveston County	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed 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 Extents:	630 acre Marsh; 8,500 LF Misc. Wave Break
TOTAL Construction Costs:	$ 10,654,300
Construction Benefit:	Flood Risk Reduction; Habitat Creation & Restoration; Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Protecting the marsh benefits the ecological system
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The project should be conducted during GIWW dredging periods. This will reduce costs provide material to stabilize the berm. The specifications of rock and shore protection need to ensure long term sustainability.

Project No.:	360	Developed by:	J Simmons Group PA
Project Name:	West Bay Water Quality Protection Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements Acquisition	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The purpose of this project is to protect the water quality of West Galveston Bay through an initiative to conserve farm and ranchlands as well as native coastal habitats in watersheds that drain into West Galveston Bay. The initiative will use conservation easements, purchase of development rights and fee title purchases to conserve properties held by willing land owners.
Project Extents:	70 acre Conservation Easement
TOTAL Construction Costs:	$ 1,482,700
Construction Benefit:	Land Acquistion
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	21,000+ per acre
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	2	Define specified locations available for purchase
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	This is a critical area in Texas, and projections could benefit nearly 1/4 of the coast
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	5	Improving water quality will reduce salinity
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	1	
	TOTAL	49	

Statement of Feasibility: There are many agencies that are available in this region that can assist with increasing feasibility. Private sectors such as Galveston Bay Foundation, Galveston County, Oyster Harvest, are available and have environmental obligations to this region. The opportunity to improve water quality is contingent on location and buyer / sellers options.

Project No.:	380	Developed by:	J Simmons Group JS
Project Name:	Gordy Marsh Restoration & Shoreline Protection - Phase 1	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh Misc. Wave Break	Date:	January 5, 2017

Region: 1 **Sub Region:** 10 **HUC 10 Region:** 10	**Project Description:** This project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1,700 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 Extents:	3,000 LF Misc. Wave Break; 1,700 acres Marsh
TOTAL Construction Costs:	$ 24,968,300
Construction Benefit:	Habitat Creation & Restoration; Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	Cost share between Chambers & Galveston
	Funding Availability	1	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	Help with Agricultural land in the area
	Multi-agency coordination	3	Agencies would support
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	Benefit the Prairies and local area
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	2	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	28	

Statement of Feasibility: Benefits the region with Prairie habitat that seems to be a low priority for environment feature.

Project No.:	414	Developed by:	J Simmons Group JS
Project Name:	Galveston County Oyster Reef Creation	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project will create 100 acres of oyster reef throughout Galveston County.
Project Extents:	100 acre Oyster Reef
TOTAL Construction Costs:	$ 12,000,600
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	Local oyster harvesters and other agencies should have a high interest in supporting the reef
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Adds value to bay bottom and oyster development
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: There are many agencies that are available in this region that can assist with increasing feasibility. Private sectors such as Galveston Bay Foundation, Galveston County, Oyster Harvest, are available and have environmental obligations to this region. The commercial value and benefits to the Galveston Bay are necessary and oyster population is a priority.

Project No.:	417	Developed by:	J Simmons Group PA
Project Name:	GIWW Island Restoration, Orange County	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Barrier Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** The project involves the creation of 131 acres of new barrier island habitat along the GIWW in Orange County that would include both wetland and vegetated shallows.
Project Extents:	131 acre Barrier Island
TOTAL Construction Costs:	$ 21,756,600
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	$ 166,000 per acre
	Funding Availability	2	
	Scheduling	2	Effective use of dredged material
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	Contingent on funding availability
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	3	
	Environmental mitigation	3	Provides additional habitats
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: The creation of new barrier islands is more cost effective than restoration and rehabilitation of many other projects. The ability to increase resiliency will reduce the impact of waves and other natural causes that continue to erode the shore. Wetlands will improve water quality post storm and provide additional habitats for wildlife.

Project No.:	418	Developed by:	J Simmons Group JS
Project Name:	Sargent Beach Dune/Beach Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Gulf Dune	Date:	January 5, 2017

Region: 2 **Sub Region:** 1 **HUC 10 Region:** 23	**Project Description:** The project involves approximately 8 miles of beach and dune restoration in Sargent Beach.
Project Extents:	45,000 LF Gulf; 45,000 LF Dune
TOTAL Construction Costs:	$ 63,739,900
Construction Benefit:	Beach Nourishment; Dune Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	1	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	Funding might be the determining factor
	Public Support and Community Outreach	4	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	35	

Statement of Feasibility: This beach nourishment project has been discussed for several years though funding has always been the negative factor. Replenishing this area of beach is beneficial to the coast, but does not justify spending 61 million dollars, estimating 8 million per mile. The dune restoration does reduce the impact of waves to the coast however the cost benefit ratio cannot feasibly be justified, without considering the purpose.

Project No.:	423	Developed by:	J Simmons Group JS
Project Name:	Matagorda Bay System Hydrologic Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region: 2 **Sub Region:** 6 **HUC 10 Region:** 28	**Project Description:** The proposed project includes hydrologic restoration of the Matagorda Bay System. This would result in the preservation of aquatic habitat and marshes in Matagorda, East Matagorda, Tres Palacios, Carancuhua and Lavaca Bays.
Project Extents:	100 acre Marsh
TOTAL Construction Costs:	$ 1,922,400
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Project cost of $19,200/acre to restore marsh seems slightly excessive
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	Texas Park & Wildlife, NOAA, and other agencies would support.
	Coastal Benefits (restoration, creation, nourishment)	2	Restoration
	Coastal Resiliency	3	
	Environmental mitigation	3	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	36	

Statement of Feasibility: The Matagorda Bay System would benefit the estuaries of the coastal rivers with heavy freshwater released when conditions of low tidal range. This would also increase habitat for fish and other aquatic organisms.

Project No.:	430	Developed by:	J Simmons Group JS
Project Name:	Redfish Lake on Carancahua Bay Shoreline Stabilization	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	January 5, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The proposed project includes 3 miles of breakwaters. The restoration of the protective barrier, oyster reefs, marsh, and sea grasses would preserve special aquatic sites such as wetlands and vegetated shallows.
Project Extents:	15,900 LF Breakwater; 100 acre Marsh
TOTAL Construction Costs:	$ 9,594,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Local sponsors are available in this region
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Public support is available but may request pre-construction scheduling options
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The community support in this area will accept restoration and filling of the shoreline for environmental protection and commercial reasons. The marsh planting should reduce erosion and increase longevity.

Project No.:	437	Developed by:	J Simmons Group JS
Project Name:	Fulton Beach Road Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	January 5, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** 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 Extents:	18,500 LF Breakwater, 50 acre Marsh
TOTAL Construction Costs:	$ 10,150,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Local sponsors are available in this region
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Public support is available but may request pre-construction scheduling options
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The community support in this area will accept restoration and filling of the shoreline for environmental protection and commercial reasons. The marsh planting should reduce erosion and increase longevity.

Project No.:	443	Developed by:	J Simmons Group PA
Project Name:	Nueces County Hydrologic Restoration Study	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region:	3	**Project Description:** The project involves hydrologic restoration in Nueces, Corpus Christi, Aransas, and Copano Bays to restore special aquatic sites such as wetlands, mudflats, and vegetated shallows recognized as nationally significant by the Clean Water Act.
Sub Region:	10	
HUC 10 Region:	49	

Project Extents:	Studies
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	Define high priorities areas
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	Complex data may require the support from various regions
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	May improve water quality
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	Data can be used as a comparison to future studies
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: Study can provide information on how to improve water quality, and restore aquatic sites. The cost associated with this project only seem to justify expenses for the study, and do not incorporate any construction costs.

Project No.:	452	Developed by:	J Simmons Group JS
Project Name:	Bird and Heron Islands Restoration, Cameron County	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	January 5, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The project includes construction of 0.8 miles of breakwaters to protect and restoration for Bird and Heron Rookery Islands. These improvements would increase critical habitat for the wintering piping plover, recognized as a threatened species in Cameron County. A feasibility study has been funded to determine the most effective methods to protect these islands from further erosion.
Project Extents:	4,250 LF Breakwater, 15 acre Rookery Island
TOTAL Construction Costs:	$ 3,642,900
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	Break waters are up for bid frequently
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	48	

Statement of Feasibility: Breakwaters are bid frequently and the construction resources are readily available. The protections of Rookery Islands are essential to the life and monitoring of rare species.

Project No.:	457	Developed by:	J Simmons Group JS
Project Name:	GIWW Island Restoration, Jefferson County	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** The proposed project aims to restore 42 acres of island habitat in Jefferson County. The new island habitat would contain special aquatic sites such as wetlands and vegetated shallows.
Project Extents:	40 acre Marsh
TOTAL Construction Costs:	$ 927,700
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	1	Very cost efficient but consider combining with another project
	Funding Availability	2	
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	High density population
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	Benefits Sabine Lake
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	33	

Statement of Feasibility: This is an agency tasks and any major steps that improve the environment benefit the bays and lakes. This is a net positive increase for estuary systems.

Project No.:	458	Developed by:	J Simmons Group JS
Project Name:	Marsh Restoration, Jefferson County	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** The project would involve restoration of 9,304 acres of marsh habitat. Doing so would preserve special aquatic sites such as wetlands and vegetated shallows recognized as nationally significant by the Clean Water Act (33 USC 1344) and would preserve exceptionally scarce and declining estuarine intertidal and emergent marsh as determined by the latest USFWS/NOAA status and trends report.
Project Extents:	9,300 acre Marsh
TOTAL Construction Costs:	$ 138,391,400
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	Define criticalness of project to justify costs
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	1	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	1	
	TOTAL	36	

Statement of Feasibility: This project type will require multi-agency coordination, it is unlikely private business would invest funding for this marsh land. The restoration will be beneficial for storm water drainage and habitat creation.

Project No.:	600	Developed by:	J Simmons Group JS
Project Name:	Half Moon Reef Restoration in Matagorda Bay - Phase III	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The proposed project would restore 30 acres of reef habitat in Matagorda Bay. This particular restoration design approach will greatly enhance the biodiversity and productivity of critically important Essential Fish Habitat and contribute to the overall fisheries resources in the nearby bay and offshore waters through marine species recruitment. Improved water quality, increased recreational fishing opportunities, enhanced marine biodiversity and other ecosystem benefits are anticipated with a completed project.
Project Extents:	30 acre Oyster Reef
TOTAL Construction Costs:	$ 3,600,200
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	Short term, as long as reef material is placed properly
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	4	Monitor water quality pre construction, and post construction
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: All projects related to increasing the diversity of fish increases interest for sporting fisherman. The public will promote spending and support educational benefits.

Project No.:	605	Developed by:	J Simmons Group JS
Project Name:	Guadalupe Delta Estuary Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater	Date:	January 5, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** The 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 Extents:	8,800 LF Breakwater
TOTAL Construction Costs:	$ 4,440,800
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Recommend using dredged material which restores river flow and can create the shoreline easily
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	38	

Statement of Feasibility: The project is seemingly of high value contingent on the current value of this estuary and ecological systems. The creation of the living shoreline should be a priority especially when displacing natural habituations that result from erosion.

Project No.:	607	Developed by:	J Simmons Group JS
Project Name:	Moses Lake Wetlands Restoration & Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The third phase of the Moses Lake Wetlands Restoration and Protection project seeks funding for construction of the preferred alternatives developed in the engineering, design, and permitting phase. The alternatives include construction of nearshore segmented breakwater structures in Moses Lake and placement of materials to restore elevations suitable to support emergent vegetation and upland coastal species.
Project Extents:	4,000 LF Breakwater; 30 acres marsh
TOTAL Construction Costs:	$ 2,524,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Phase 1 and Phase 2, is sponsorship already available?
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options	2	Define prior projects
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The project requires completion to increase benefit to cost ratios. After Phase 1 and Phase 2, ongoing construction activities affect funding availability for other programs.

Project No.:	616	Developed by:	J Simmons Group PA
Project Name:	Alligator Point Island Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 19 **HUC 10 Region:** 19	**Project Description:** To support colonial water bird populations, this project seeks to enhance the existing island to a sustainable elevation and increase its size. The island as currently designed will be similar to its configuration is 1990 of approximately 10 acres in size and at approximately 4 ft. elevation mean tide. The island will be protected by the placement of approximately 4,000 ft. of breakwater and will be planted with desirable plant species that will support platform and ground nesting species.
Project Extents:	4,000 LF Breakwater; 10 acre Rookery Island
TOTAL Construction Costs:	$ 2,971,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Benefits environment
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	Nourishment will promote stabilization
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	43	

Statement of Feasibility: Breakwaters are bid frequently and the construction resources are readily available. The protection of Rookery Islands are essential to the life and monitoring of rare species and will increase ecological value.

Project No.:	618	Developed by:	J Simmons Group PA
Project Name:	Jig Saw Island Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will aim to restore Jigsaw Island to support and sustain the multiple bare ground nesting bird species that inhabit the island. The project will include 2,900 linear feet of reef structures to mitigate erosive wave action and 3.4 acres of restored island habitat, 1.26 acres of which would support ground nesting birds (elevation above 2 feet MTL).
Project Extents:	2,900 LF Misc. Wave Break; 3 acre Rookery Island
TOTAL Construction Costs:	$ 1,192,900
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	No issue if USACE dredged material is used
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Raising elevation will reduce erosion, and increase to functionality of the nesting area
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	Effective use of funding
	TOTAL	52	

Statement of Feasibility: Rookeries are important to the long term survival of many species; the project is affordable and can be achieved yielding positive results. Mitigating erosive waves will increase the long term sustainability of the islands and create increase longevity.

Project No.:	637	Developed by:	J Simmons Group PA
Project Name:	Port Freeport Regional Sediment Management-Habitat Restoration Initiative	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Sediment Management	Date:	February 8, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** Port Freeport (PF) will develop a Regional Sediment Management Plan and Restoration Initiative with the dredge material (DM) that is coming from the present and future expansion, associated with the deepening and widening of the Port navigation channel and creation of new infrastructure. PF has a commitment dedicating the entire DM from its expansion exclusively to restoration.
Project Extents:	Plans
TOTAL Construction Costs:	$ 1,000,000
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	5	
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	5	Not applicable
	Multi-agency coordination	5	Not applicable
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	5	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	1	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	58	

Statement of Feasibility: The use of funds for this project is within reason and necessary for long-term coastal studies, but costs do not reflect a price inclusive of construction phases or dredging. The effective use of dredge material demonstrates a proactive approach to ecological preservations. In addition, deepening and widening a port provides increased commercial opportunities. The information obtained from this management program will provide information to determine the most suitable approach to the creation of the undetermined infrastructure.

Project No.:	641	Developed by:	J Simmons Group PA
Project Name:	Oyster Reef Restoration in Upper Galveston Bay	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 16 **HUC 10 Region:** 16	**Project Description:** This project seeks to restore 150 acres of degraded Galveston Bay oyster reefs using a landscape approach to create a network of spatially separated oyster populations. A network of high vertical relief source and sink oyster reefs will be created in Upper Galveston Bay. This will allow for increased oyster population sustainability and oyster habitat resiliency.
Project Extents:	150 acre Oyster Reef
TOTAL Construction Costs:	$ 17,358,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	Short term, as long as reef material is placed properly
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	4	Monitor water quality pre construction, and post construction
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: There are many agencies that are available in this region that can assist with increasing feasibility. Private sectors such as Galveston Bay Foundation, Galveston County, Oyster Harvest, are available and have environmental obligations to this region. The commercial value and benefits to the Galveston Bay are necessary and oyster population is a priority when assessing water quality.

Project No.:	645	Developed by:	J Simmons Group PA
Project Name:	Long-Term Recovery of Gulf Shorebirds and Waterbirds	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The project will create and maintain seasonal freshwater wetland habitat for multiple important shorebird species. The project will also aim to increase the regional breeding populations by improved management of critical nesting and stopover habitats along the Gulf Coast.
Project Extents:	1 Wetlands / Forested Wetlands; 1 Program
TOTAL Construction Costs:	$ 6,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	1	
	Funding Availability	2	Seek funding from education departments, grants from government agencies
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	5	Contingent on location preference
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	5	
	Wildlife studies, policies, and programs	5	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	5	
	Environmental mitigation	5	Suitable migration approach for birds
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	51	

Statement of Feasibility: Program benefits long-term studies. This project is likely to not only create and maintain freshwater, but develop habitats for bird species. In general, the project can improve migration of birds and provide safe nesting locations. The project needs to be more specific with relation to location.

Project No.:	658	Developed by:	J Simmons Group PA
Project Name:	Bahia Grande Living Shoreline and Public Access Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** This project would beneficially use the dredged material from the ongoing Bahia Grande Restoration Project. The material would be used to construct a platform for a parking area providing public access to area, as well as to stabilize a peninsula near the parking lot within Bahia Grande with 1,000 feet of living shoreline feature to create additional habitat and stabilize the existing 2.5 acres of habitat.
Project Extents:	1,000 LF Breakwater; 3 acre Marsh
TOTAL Construction Costs:	$ 544,000
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	Not sure if dredging costs are included
	Funding Availability	3	
	Scheduling	3	Contingent on dredge cycle
	Post Construction Site Maintenance and monitoring	2	May require additional maintenance due to public access
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Increases parking availability
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	
	Environmental mitigation	5	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The protection of the habitat will increase ecological value. The description mentions two phases of construction activities, but the costs are non-reflective of the total project extents. The use of dredged material is an effective method to create additional habitats, and improve the living shoreline. The stability of the peninsula should be assessed post completion to determine if the land is feasible for public parking access.

Project No.:	678	Developed by:	J Simmons Group JS
Project Name:	Indian Point Shoreline Protection – Phase II	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** Phase I of this project included the construction of approximately 1,040 linear feet of limestone revetment and offshore breakwaters. Phase II of the 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 Extents:	1,040 LF Breakwater
TOTAL Construction Costs:	$ 524,800
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	Define phase 2
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	2	No public issues
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Completion required to protect habitation
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	50	

Statement of Feasibility: The protection of the habitat will increase ecological value. The description mentions two phases of construction activities, but the costs are non-reflective of the total project extents.

Project No.:	680	Developed by:	J Simmons Group PA
Project Name:	Nueces Delta Marsh Plan and Restoration Project – Phase II	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** This project will continue management and restoration of approximately 4,700 acres of vital habitat within the Nueces River Delta and conserve diverse estuarine marsh and prairie habitat. Numerous aquatic species and endangered or threatened avian species utilize the areas within the delta as breeding and nursery grounds. This project will develop and implement a comprehensive management plan for the area to allow for protection and restoration of the terrestrial and estuarine habitats.
Project Extents:	1 EA Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 1,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	47	

Statement of Feasibility: This project is a low-cost effective way to increase the ecological value. When there is an endangered species, nesting areas and habitats are a priority. The need for preservation of wild life is crucial for habitation and migration patterns and demonstrates a program that is proactive in protection of vulnerable species.

Project No.:	696	Developed by:	J Simmons Group JS
Project Name:	Shamrock Island Restoration – Phase II	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	January 5, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** This project involves 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 breakwaters will protect 2,045 linear feet of prime beach nesting habitat, 11.5 acres of saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat from erosion. Improvements to the 150-acre rookery island will enhance the habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, and the American Oystercatcher.
Project Extents:	900 LF Breakwater; 150 acre Rookery Island
TOTAL Construction Costs:	$ 12,524,100
Construction Benefit:	Shoreline Stabilization; Habitat Creation
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: This is a significant area of Texas State and National estuary inventory. The affect that the project would have on the island is extraordinary, and multi-agencies are likely to support the project and scope of work.

Project No.:	705	Developed by:	J Simmons Group JS
Project Name:	Packery Channel Nature Park Enhancement and Wildlife Rehabilitation Center	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	January 5, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The Packery Channel Nature Preserve property has been identified as a preferred location for a wildlife rescue and rehabilitation center. One project goal is the creation and restoration of ecologically important oak motte woodland habitat, which is critical to migratory and resident birds, insects, reptiles, and mammals in this area.
Project Extents:	1 EA Wetlands/ Forested Wetlands
TOTAL Construction Costs:	$ 1,477,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Volunteers maybe available to assist with seeding or planting
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	Planting of tress typically have a long life
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	47	

Statement of Feasibility: Environmentally adding vegetation promotes wild life habitats, and this project is a low-cost effective way to increase the ecological value.

Project No.:	713	Developed by:	J Simmons Group PA
Project Name:	Middleton Wetlands Creation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 9 **HUC 10 Region:** 9	**Project Description:** The project aims to construct 300 acres of freshwater wetlands in abandoned rice farmland on the Middleton unit of the Anahuac NWR. Included in this project is the creation of a 70 acre reservoir/moist soil unit that will provide water to the wetland units. The improvements will provide wetland habitat to migratory and resident wildlife, including significant numbers of ducks, geese, shorebirds and wading birds.
Project Extents:	1 EA Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 1,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	47	

Statement of Feasibility: This is a low cost project which is highly feasible and has a long term positive effect on marsh production, wetland continuation, and marine life. With the limited amount of available fresh water the project will increase the natural resource of the State of Texas improving habitation and increasing the ecological value.

Project No.:	716	Developed by:	J Simmons Group PA
Project Name:	Galveston Bay Bird Nesting Islands Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 10 **HUC 10 Region:** 10	**Project Description:** The objective of the project is to restore various rookery islands' footprints to historical size and increase elevations that will better support colonial water birds over the long term. Dredged material will be strategically added to the Vingt-Et-Un Islands to increase elevation and prevent over wash of ground nesting birds. Shrubs and other vegetative plantings will be added to stabilize sediment and provide nesting sites for shrub-nesting colonial water birds. A structure to reduce wave action/intensity will likely be needed.
Project Extents:	2,000 LF Misc. Wave Break; 100 acre Rookery Island
TOTAL Construction Costs:	$ 8,507,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Funding will be available if coordinated with government or private sectors
	Scheduling	3	Perform during dredging cycle
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	Promotes nesting habitations
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	Define structure used to reduce wave impact
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	40	

Statement of Feasibility: Rookeries are important to the long term survival of many species; the project is affordable and can be achieved yielding positive results. The ability to conduct the phase of construction during an ongoing construction project will reduce costs, and provide the ability to share costs with commercial or government agencies.

Project No.:	717	Developed by:	J Simmons Group PA
Project Name:	Galveston Bay Bird Nesting Islands Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project involves the acquisition and restoration of South Deer Island to ensure that the site is properly managed and to protect the important ecological site to directly benefit the various species that use the island for nesting.
Project Extents:	100 acre Acquisition; 100 acre Rookery Islands
TOTAL Construction Costs:	$ 10,817,600
Construction Benefit:	Land Acquisition; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$100,000 per acre
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	1	Define buyer / seller options
	Public Support and Community Outreach	2	
	Multi-agency coordination	1	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	33	

Statement of Feasibility: This purchase will be a beneficial asset. However, more information is required on maintenance and monitoring plans that may be additional expenses. The project may also require repair or restorations that were not included in the initial costs.

Project No.:	764	Developed by:	J Simmons Group PA
Project Name:	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region:	1	**Project Description:** This project involves the acquisition of 1,700 acres of non-tidal, fresh water marsh adjacent to the J.D. Murphree WMA. The property supports a variety of wetland plants and provides habitat for species of concern, such as mottled ducks and pig frogs. Acquisition of this property would increase opportunities to conserve and manage valuable coastal habitat and would increase public access and public recreation opportunities.
Sub Region:	6	
HUC 10 Region:	6	
		1,000 LF Acquisition, 20 acre Marsh
TOTAL Construction Costs:		$ 12,750,000
Project Extents:		Land Acquisition
Longevity and Useful Life (yrs):		25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits, however the approval of these purchases may be timely, and increase long term.

Project No.:	769	Developed by:	J Simmons Group PA
Project Name:	San Jacinto North Shore Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 14 **HUC 10 Region:** 14	**Project Description:** San Jacinto Battleground State Historic Site preserves 1100 acres of the battleground where Texas won independence from Mexico. This area has experienced the loss of roughly 200 acres of land, including riparian forests and wetlands, fringing wetlands, wet meadows, and marshes due to subsidence and erosion from ship wakes. The North Shore Restoration Project proposes to restore approximately 20 acres of uplands and tidally influenced wetlands using a combination of rock breakwaters, backfilling, marsh restoration, and planting. These efforts would also assist in the recovery of valuable parkland for public access, recreation, and interpretation.
Project Extents:	1,000 LF Breakwater; 20 acre Marsh
TOTAL Construction Costs:	$ 823,000
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	5	
	Public Support and Community Outreach	5	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	2	
	Environmental mitigation	2	
	Long term sustainability		
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	45	

Statement of Feasibility: The project has high value with respect to the historical preservations of San Jacinto Monument. This region has the unique ability to raise funds for construction, and ongoing maintenance. In recent years the Harris County flood plans have influenced the storm water flow through this geographic location and have increased erosion. The project is constructible, but may require additional shoreline protection for future erosions.

Project No.:	777	Developed by:	J Simmons Group JS
Project Name:	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions Marsh	Date:	January 5, 2017

Region: 2 **Sub Region:** 15 **HUC 10 Region:** 37	**Project Description:** This project would protect and restore whooping crane habitat along the Texas coast by working with water users to maintain environmental flows. Funds would be used to purchase water rights or pay for water use reductions in order to capture or retain excess water for environmental flows. Funding for this project would also be used to purchase and restore riparian areas in the basins utilized by whooping cranes from willing sellers where an acquisition is strategically feasible and advantageous.
Project Extents:	10,000 acres Acquisitions; 10,000 acre Marsh
TOTAL Construction Costs:	$ 219,380,200
Construction Benefit:	Land Acquisition; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	1	
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	4	Define funding available for water quality sampling and methods for effective ways of measuring whooping crane migration in this area
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	Public will support the purchase of water rights
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	Whooping cranes are on endangered species providing habitation is needed
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	41	

Statement of Feasibility: The expense associated with this project is seemingly high however may be justified if whooping cranes will be inhabiting the area of land. The advantages should be more specific, and information on the amount of land available needs to be provided.

Project No.:	779	Developed by:	J Simmons Group PA
Project Name:	Copano Bay Oyster Reef Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 3 **Sub Region:** 7 **HUC 10 Region:** 46	**Project Description:** The primary goals for the project are to design and construct a segmented reef structure that enhances the recruitment and productivity of native oysters, provides a biologically rich and diverse collection of reef-dependent estuarine organisms, and builds resiliency into the Copano Bay estuarine ecosystem. The project also includes a monitoring program to assess project performance over 3 to 5 years post-construction.
Project Extents:	50 acre Oyster Reef
TOTAL Construction Costs:	$ 5,786,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	Local oyster harvesters and other agencies should have a high interest in supporting the reef
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	Including the maintenance and monitoring in the costs increased feasibility
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Adds value to bay bottom and oyster development
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	44	

Statement of Feasibility: This project has high priority, but this specific area is in need of additional funding. Improving water quality and oyster reefs are factors that contribute to the benefit to cost ratios and incorporating the monitoring program into the costs, the long term effectiveness can produce data that will benefit similar projects.

Project No.:	793	Developed by:	J Simmons Group PA
Project Name:	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed initiative includes a number of measures to rehabilitate several high profile properties owned by the GBF with the purpose of increasing the potential wildlife habitat value. These include creation of 14 acres of ephemeral freshwater wetlands and construction of 2,000 linear feet of erosion control structures along the shorelines of Sweetwater Preserve and Frost-Deen tract. The plan also proposes implementation of best management practices including brush management and prescribed fire in an effort to promote native plant diversity on coastal prairies located in Chambers and Galveston Counties.
Project Extents:	2,000 LF Breakwater; 1 EA Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 2,397,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	Aim to schedule during a maintenance dredge cycle
	Post Construction Site Maintenance and monitoring	2	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	4	No construction during nesting season
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Project is necessary to increase habitat value
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	Ensure wetlands maintain suitable tidal conditions
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: The need for preservation of wild life is crucial for habitation and migration patterns and demonstrates a program that is proactive in protection of vulnerable species. Including the implementation of improved management practices will increase the long term sustainability.

Project No.:	794	Developed by:	J Simmons Group JS
Project Name:	Galveston Bay Oyster Reef Restoration and Enhancement	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project would result in the restoration of 400 acres of oyster reef within three areas of Galveston Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
Project Extents:	400 acre Oyster Reef
TOTAL Construction Costs:	$ 48,002,500
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	2	Agencies will support these efforts
III	**Environmental Consideration**		
	Environmental vulnerability	4	High risk of continued losses
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	Adds value to bay bottom
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	46	

Statement of Feasibility: Oyster reef have been proven an effective way of determining the impact of water quality on marine life and the destruction of marine life as a result of unnatural causes is unacceptable. Many agencies should support the funding for this project.

Project No.:	797	Developed by:	J Simmons Group JS
Project Name:	Restore Colonial Water Bird Rookery Habitat in Dickinson Bay	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The objective of this project is to restore two 5 to 7 acre colonial water bird rookery island in Dickinson Bay, which will be Phases II and III of the original Dickinson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approximately 5 acres of nesting space for colonial water birds and 2-acres of oyster reef. Approximately 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 and around Dickinson Bay. Partial funding is in place for these phases.
Project Extents:	2 acre Oyster Reef; 5 acre Rookery Islands
TOTAL Construction Costs:	$ 1,333,500
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Define methods to achieve additional funding resources
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	Oyster reef have been proven an effective way of determining the impact of water quality on marine life
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	45	

Statement of Feasibility: This project has high priority; notably the area is in need of additional funding but improving water quality and oyster reefs are factors that contribute to the benefit to cost ratios.

Project No.:	801	Developed by:	J Simmons Group PA
Project Name:	West Galveston Bay Marsh Restoration – Chocolate Bay	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 18 **HUC 10 Region:** 19	**Project Description:** The project involves restoration of approximately 1,600 acres of intermediate marsh on the north side of West Galveston Bay between Halls and Chocolate Bayou's. The project will also include the placement of two large water control structures to drain the marsh and stabilize the project area with rock and other similar materials. This will allow the marsh to function as it did historically by restoring the hydrology to pre-GIWW conditions.
Project Extents:	1,600 acre Marsh
TOTAL Construction Costs:	$ 24,229,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	Low population, unsure of long term benefits
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	If complete site should be sustainable
II	**Constructability**		
	Ability to complete the project	2	Define funding resources available
	Public Support and Community Outreach	2	With low population little impact on community
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	
	Environmental mitigation	1	
	Long term sustainability	1	High risk during hurricane seasons
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	31	

Statement of Feasibility: The project is costly for such a low populated area; the priority to complete this project is low dependent on the need of fresh water and habitat creation.

Project No.:	806	Developed by:	J Simmons Group PA
Project Name:	Restoration of Rookery Islands in Upper Laguna Madre	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 14 **HUC 10 Region:** 53	**Project Description:** The objectives of this project will be to determine the appropriate size and location for the creation of a new rookery island and to obtain preliminary feasibility analysis, engineering, and cost estimates.
Project Extents:	5 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 3,183,800
Construction Benefit:	Habitat Creation & Restoration
Estimated Construction Duration:	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	5	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	5	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	41	

Statement of Feasibility: The ability to conduct studies demonstrates a proactive approach in the development of creation and restoration of the Texas coast. The costs associated with this project are expensive in comparison to other studies, this project is not a priority, and does not justify the use of funding.

Project No.:	809	Developed by:	J Simmons Group JS
Project Name:	Barrier Island Habitat Conservation - Coastal Bend	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 2 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project aims to purchase land, purchase development rights, and donate conservation easements to protect essential habitat on Mustang and North Padre Islands.
Project Extents:	100 acre Acquisitions
TOTAL Construction Costs:	$ 750,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	$ 7,500 per acre
	Funding Availability	4	
	Scheduling	4	Not applicable
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Purchase to protect habitat
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	47	

Statement of Feasibility: The purchase of the land may require maintenance and a monitoring program. If funding is available the habitat will benefit the coastal estuary growth.

Project No.:	811	Developed by:	J Simmons Group PA
Project Name:	Zarate Tract - Laguna Atascosa National Wildlife Refuge	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The 914 acre Zarate Tract is located on the north side of the Bahia Grande unit of Laguna Atascosa National Wildlife Refuge, about 12 miles west of Port Isabel, Texas. The USFWS aims to acquire this land to better manage these coastal wetlands and improve wildlife access to existing and future/restored wildlife corridors.
Project Extents:	915 acre Acquisition
TOTAL Construction Costs:	$ 6,862,500
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$ 7500 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits, however the approval of these purchases may be timely, and increase long term.

Project No.:	822	Developed by:	J Simmons Group JS
Project Name:	Wetlands of Paso Corvinas at the Bahia Grande Unit of Laguna Atascosa - Phase II	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The goal of the project is to restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar and thereby restoring connectivity between Paso Corvinas and the Bahia Grande. To do this, first a hydrological study will need to be performed to be followed by design and construction of the hydrologic restoration alternative. An improved low water crossing is needed on the northeastern side.
Project Extents:	1 EA Wetlands/Forested Wetlands
TOTAL Construction Costs:	$ 1,477,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	Define difference in study and construction expenses
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	If not restored high risk of losing wetlands overtime
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: This is a high priority. By conducting the studies, the data could provide necessary information for methods and means of restoration. With the diversity of Texas hydrologists this project is achievable and can provide long term study data for projects with similar tidal conditions.

Project No.:	827	Developed by:	J Simmons Group PA
Project Name:	South Padre Island American Land Conservancy Tract	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The project involves acquisition of 186 acres of land currently owned by the American Land Conservancy. The goal is to acquire this property for the Laguna Atascosa National Wildlife Refuge as a part of the Laguna Atascosa National Wildlife Refuge Comprehensive Conservation Plan.
Project Extents:	185 acre Acquisition
TOTAL Construction Costs:	$ 1,387,500
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$ 7500 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Is it possible to acquire joint ownership, for shared costs
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: The purchase of the land may require maintenance and a monitoring program. If funding is available the habitat will benefit the coastal estuary growth.

Project No.:	829	Developed by:	J Simmons Group JS
Project Name:	Oyster Reef Restoration in Nueces and Corpus Christi Bays	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** 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.
Project Extents:	5 acre Oyster Reef
TOTAL Construction Costs:	$ 600,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	High priority to restore habitats destroyed by unnatural factors
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	High probability to complete
	Public Support and Community Outreach	3	
	Multi-agency coordination	2	Agencies will support these efforts
III	**Environmental Consideration**		
	Environmental vulnerability	4	High risk of continued losses
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	Adds value to bay bottom
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	46	

Statement of Feasibility: Restoration of habitats that were destroyed as the result of dredging should be a high priority. Oyster reef have been proven an effective way of determining the impact of water quality on marine life and the destruction of marine life as a result of unnatural causes is unacceptable. Many agencies should support the funding for this project.

Project No.:	834	Developed by:	J Simmons Group JS
Project Name:	Salt Bayou Siphons	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Hydrologic Restoration	Date:	January 5, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** The project involves the placement of siphons at two locations in the Salt Bayou system in southern Jefferson County. These locations are on the J.D. Murphree WMA and the McFaddin NWR. These siphons will restore a hydrologic connection between the freshwater marsh systems north of the Gulf Intracoastal Waterway (GIWW) and degraded marshes south of the GIWW. Hydrologic modeling indicates benefits to at least 4,300 acres of marsh from a siphon set in J.D. Murphree WMA, and up to 22,500 acres of marsh from a siphon set in McFaddin NWR, and up to 43,000 acres of marsh if both siphon sets are installed.
Project Extents:	1 EA Hydrologic Restoration
TOTAL Construction Costs:	$ 14,770,000
Construction Benefit:	Environmental
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	Contractor resources may not be available
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	Seek guidance from USACE and review similar projects with a compatible scope
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	34	

Statement of Feasibility: This offers a non-traditional approach that will likely increase the flow of fresh water, the primary issue of concern relates to finding contractors available that can perform this type of work. The scope of work may require detailed RFIs in order to reduce liability. The project should possibly be even conducted as a study and coordinate with USACE.

Project No.:	842	Developed by:	J Simmons Group PA
Project Name:	West Bay Estuarine Habitat Restoration and Protection Project	Checked by:	J Simmons Group TSN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** Bayou, Starvation Cove, Dana/Carancahua Coves, Jumbile Cove, Bird Island Cove, and McAllis Point, in West Galveston Bay. The project will use dredged material to expand marsh areas, and will install and repair approximately 38,900 linear feet breakwaters to protect and enhance estuarine marsh and seagrass habitats.
Project Extents:	10,000 Breakwater, 12 acre Rookery Island
TOTAL Construction Costs:	$ 30,342,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	3	
	Environmental mitigation	3	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	37	

Statement of Feasibility: The community support in this area will accept restoration and filling of the shoreline for environmental protection and commercial reasons. The marsh enhancement of estuarine marsh and sea grass planting should reduce erosion and increase longevity.

Project No.:	844	Developed by:	J Simmons Group PA
Project Name:	Rookery Island Creation in Coastal Bend	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Revetment Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project involves the creation of 3 rookery islands, each approximately 4 acres in size, lined with erosion control material such as limestone rock. The islands will be placed in San Antonio Bay, Nueces Bay, and the Upper Laguna Madre. These rookery islands would allow for consistent nesting grounds for a declining waterbird population. Specific locations are to be determined.
Project Extents:	10,000 LF Revetment; 12 acre Rookery Island
TOTAL Construction Costs:	$ 5,051,800
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	3	No construction during nesting season
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	Ensure wetlands maintain suitable tidal conditions
	Long term sustainability	2	Focus on controls to reduce damages
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	41	

Statement of Feasibility: When there is a declining waterbird species, nesting areas and habitats are a priority. The need for preservation of wild life is crucial for habitation and migration patterns and demonstrates a program that is proactive in protection of vulnerable species.

Project No.:	853	Developed by:	J Simmons Group JS
Project Name:	Texas Mid-Coast Oyster Restoration and Enhancement	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** This project would result in the restoration of 450 acres of oyster reef within the four major bay systems along the middle Texas coast: Matagorda/Lavaca Bay, San Antonio Bay, Aransas Bay and Copano Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
Project Extents:	450 acre Oyster Reef
TOTAL Construction Costs:	$ 36,562,500
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	Not as one project – need multiple bidders; multiple years and more effective.
	Funding Availability	1	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	Needed if done
II	**Constructability**		
	Ability to complete the project	3	Long term: Multiple years
	Public Support and Community Outreach	2	Commercial Markets needs to be analyzed.
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Status of these reefs today
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: Hard to determine total value of this Ratio and Cost associated. Obviously a strong oyster growth fees fish, etc. But what is the size of commercial oyster market in our state including exports out-of-state. Feasibility is there, but should we spend $54 million on it?

Project No.:	855	Developed by:	J Simmons Group PA
Project Name:	Sabine Lake Oyster Reef Restoration and Enhancement	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** This project will restore oyster reef habitats along the western shore of Sabine Lake. The project area will encompass a total of 40 acres. By placing 1,800 mounded, highly dense reef patches throughout the project area, the structurally complex character of the nearby unfished oyster reefs will be replicated.
Project Extents:	40 acre Oyster Reef
TOTAL Construction Costs:	$ 4,628,800
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	2	Local oyster harvesters and other agencies should have a high interest in supporting the reef
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Adds value to bay bottom and oyster development
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: This project has high priority; notably the area is in need of additional funding but improving water quality and oyster reefs are factors that contribute to the benefit to cost ratios.

Project No.:	865	Developed by:	J Simmons Group PA
Project Name:	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** TPWD is currently partnering with Golden Pass LNG Terminal (GPLNG) to restore marsh in the Salt Bayou unit of the J.D. Murphree Wildlife Management Area with dredged material from the shipping berth at the GPLNG terminal. For the current dredging cycle, TPWD has funding from National Marine Fisheries Service to pay for marsh surveys, environmental monitors, and site planting. Additional funding will be needed to retain monitors and to plant the site.
Project Extents:	1,500 acre Marsh
TOTAL Construction Costs:	$ 22,781,400
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	5	Resources are available
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	5	If complete site should be sustainable
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Utilize volunteers for planting
	Multi-agency coordination	4	Coordination with dredge cycle increases feasibility
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	2	
	Coastal Resiliency	2	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options	2	Opportunity to utilize alternatives volunteer programs
	Benefit –Cost Ratios	4	Define the available funding less any additional funding
	TOTAL	49	

Statement of Feasibility: The project defines all resources available to complete the construction. This project should be a high priority contingent on dredge cycle scheduling, and coordination of surveys. Marsh restoration will increase the ecological value; the primary concern includes the methods utilized to protect the marsh.

Project No.:	869	Developed by:	J Simmons Group PA
Project Name:	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The objective of this project will be to enhance 1,875 acres of freshwater wetlands along the Texas coast. These wetlands will be designed to function as feeding, resting, and breeding habitat for mottled ducks.
Project Extents:	1,800 acre Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 1,799,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	Enhancement "along" the coast; how will priority be determined
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	May require participation of various counties
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	Define locations that will benefit
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	45	

Statement of Feasibility: Assuming current land is sustainable, long term expectations should be consistent with current erosion pattern. Enhancement of 1875 acres is numerical data, more subjective data is required to determine scheduling conflicts.

Project No.:	873	Developed by:	J Simmons Group PA
Project Name:	Anahuac National Wildlife Refuge Wetlands Creation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 9 **HUC 10 Region:** 9	**Project Description:** The project involves the construction of 550 acres of wetland/moist soil units and the restoration of 100 to 150 acres of native prairie in previously converted farmland of the Anahuac NWR. The constructed wetland/moist soil units will be valuable to waterfowl, shorebirds, grassland birds and wading birds.
Project Extents:	1 EA Wetlands / Forested Wetlands; 125 acre Conservation Easement
TOTAL Construction Costs:	$ 1,799,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	3	No construction during nesting season
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	Ensure wetlands maintain suitable tidal conditions
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: When there is an species, nesting areas and habitats are a priority. The need for preservation of wild life is crucial for habitation and migration patterns and demonstrates a program that is proactive in protection of vulnerable species.

Project No.:	922	Developed by:	J Simmons Group JS
Project Name:	Oliver Point and Chinquapin Oyster Reef Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	January 5, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The project involves oyster reef restoration on legacy reefs in Matagorda Bay and along the GIWW.
Project Extents:	25 acre Oyster Reef
TOTAL Construction Costs:	$ 3,000,200
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	If reef is dying then need restoration or lose oysters.
	Wildlife studies, policies, and programs	3	Must monitor oyster development
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: Let's help fund these critical oyster reefs by continuing to market the commercial leases to Oyster Companies. Critical and Feasible.

Project No.:	1187	Developed by:	J Simmons Group JS
Project Name:	Regional Sediment Management Plan	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Plan	Date:	January 5, 2017

Region:	0	**Project Description:** Develop a regional Sediment Management Plan for the entire Texas coast to allow for coastwide coordination in sediment resources. Efforts would include developing geologic and geomorphologic analyses of the coast, determining regional impacts on sediment accretions and losses, cataloging available dredging and BUDM data, and analyzing available circulation studies. The final report would include regional maps, tables, and descriptions of potential sediment sources, RSM priorities, and potential scenarios for RSM applications.
Sub Region:	0	
HUC 10 Region:	0	

Project Extents:	1 EA Plans
TOTAL Construction Costs:	$ 1,000,000
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	5	
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	Will the program be conducted periodically?
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	5	Not applicable
	Multi-agency coordination	5	Not applicable
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	5	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	5	
	Environmental mitigation	1	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	58	

Statement of Feasibility: The use of funds for this project are within reason and necessary for long-term coastal studies. In addition, the documentation of the erosion patterns can be used for benefit to cost ratios for future projects by developing guidelines for coastal resiliency.

Project No.:	2311	Developed by:	J Simmons Group JS
Project Name:	Statewide Beach Monitoring and Maintenance Program	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Program	Date:	January 5, 2017

Region:	0	**Project Description:** GLO's Beach Monitoring and Maintenance Program - Ongoing monitoring and maintenance of CEPRA beach nourishment and restoration sites along the Texas coast to maintain post-storm FEMA eligibility.
Sub Region:	0	
HUC 10 Region:	0	

Project Extents:	1 EA Program
TOTAL Construction Costs:	$ 5,000,000
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	5	
	Funding Availability	5	
	Scheduling	5	Provide periodic scheduling
	Post Construction Site Maintenance and monitoring	5	Not applicable
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	2	Will this cover private and public sectors
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	54	

Statement of Feasibility: The ability for GLO to have budgeted funds to continuously monitor coastal estuaries and beach systems is critical to sustainability of marine life, beach life, and coastal protection for future generations.

Project No.:	9001	Developed by:	J Simmons Group JS
Project Name:	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** 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 Extents:	6,000 LF Misc. Wave Break; 50 acre Marsh
TOTAL Construction Costs:	$ 980,000
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	Important to fund projects that affect the city coastal infrastructure
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Public and Community should support due to protecting infrastructure.
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	5	Benefits shoreline and impact water quality.
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	39	

Statement of Feasibility: The benefits that mitigate impacts on water quality in Nueces Bay are an important to the community and environments. The enhanced marsh affects the impacts of storm surge on the city's coastal infrastructure and would be supported by the Communities.

Project No.:	9002	Developed by:	J Simmons Group PA
Project Name:	Lower Nueces River Freshwater Inflows	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The proposed study would determine the impacts of limited or regulated freshwater inflow on the water quality of the Lower Nueces River below the saltwater barrier and Nueces Bay. There is a need of long-term monitoring of these systems across the Texas coast to capture these effects on the water quality and habitat and to understand all types of freshwater inflows for improved water and system-wide nutrient budgets.
Project Extents:	Studies
TOTAL Construction Costs:	$ 7,406,100
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	Recommend periodic site monitoring
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	Public access arrangements need review
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	2	Focus on controls to reduce damages
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	41	

Statement of Feasibility: The coast has benefited from fresh water and monitoring the ecosystem may provide pertinent data relevant to preservation of fresh water and increase the inflow. The project increases environmental vulnerability, but this study may be difficult to fund, and may require long-term research.

Project No.:	9003	Developed by:	J Simmons Group JS
Project Name:	Coastal Prairie Estuarine Wetland and Mima Mound Complex Habitat Protection at Shell Point Ranch	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 3 **Sub Region:** 4 **HUC 10 Region:** 43	**Project Description:** The project proposes the acquisition of approximately 400 acres of coastal habitats that support coastal prairie, freshwater, and estuary wetlands and the southernmost extents of Mima mounds at Shell Point Ranch in Texas. This mosaic of habitats supports Mottled Duck and whooping cranes, in addition to other wildlife.
Project Extents:	400 acre Acquisition
TOTAL Construction Costs:	$ 3,000,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Project cost affect prairie, freshwater, and estuary wetlands
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	Agencies support should be positive to protect habitat for Mottle Duck and Whooping Crane
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	1	Coastal habitat would benefit
	Coastal Resiliency	1	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	33	

Statement of Feasibility: This is a great project to accomplish with having prairie, freshwater, and estuary wetland. Plus the environmental benefit to protect Mottle Duck and Whooping Crane birds.

Project No.:	9004	Developed by:	J Simmons Group PA
Project Name:	Lamar Beach Road Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region:	3	**Project Description:** 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 along with marsh planting to establish a living shoreline system. Lamar Beach Road was recently damaged in 2015/2016 with high winds and above-average tides. The current shoreline hardening is non-engineered rubble and concrete riprap, which is deteriorating and threatens the road infrastructure and access for public and private users. This road provides water access for St. Charles Bay and popular kayak launching for the public. The living shoreline solution would also address extensive marsh / estuarine habitat loss along this shoreline.
Sub Region:	3	
HUC 10 Region:	42	

Project Extents:	5,280 LF Breakwater
TOTAL Construction Costs:	$ 2,569,300
Construction Benefit:	Shoreline Stabilization; Habitat Restoration & Creation
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	2	Schedule during dredge cycle
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Benefits environment
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	Increases sustainability
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	Define methods of protection from future erosion
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	41	

Statement of Feasibility: The project is seemingly of high value contingent on the current value economic benefits. The restoration of the living shoreline should be a priority especially when displacing natural habituations that result from erosion. Repairing the damages provide a short tem solution but alternative approaches to protecting the coast should be considered.

Project No.:	9008	Developed by:	J Simmons Group JS
Project Name:	Flour Bluff / Laguna Shores Road Living Shoreline	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	January 5, 2017

Region: 3 **Sub Region:** 14 **HUC 10 Region:** 53	**Project Description:** 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 Extents:	7,920 LF Misc. Wave Break; 50 acre Marsh
TOTAL Construction Costs:	$ 1,033,000
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	Could possibly cost share with TXDOT
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	Public and Community should support efforts especially to protect transportation infrastructure.
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	1	Protect the shoreline erosion
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	33	

Statement of Feasibility: This is a great project that improves water quality and the viability of existing transportation infrastructure.

Project No.:	9010	Developed by:	J Simmons Group PA
Project Name:	Tidal Datums and Inundation Frequency Markers	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Understanding and visualizing tidal datums is difficult along the Texas coast. Non-tidal forcings are very important in Texas and existing tidal datums are not practical for beach management. There is a need for practical datums such as Frequency of Inundation as well as a way to visualize these vertical levels on local landmarks. One way of implementing this program would be to install new Inundation Frequency Markers.
Project Extents:	Study
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	Feasible considering benefits of the markers
	Funding Availability	2	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	4	Requires post site monitoring program that tracks data
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Little to no effect on public
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	Provides pertinent data for long term studies
	Coastal Benefits (restoration, creation, nourishment)	1	
	Coastal Resiliency	2	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: Inundation Frequency Markers don't negatively impact the environment and are necessary to track tidal data. This project is feasible but installing all new markers may not be required. Conducting an inspection of the Inundation Frequency Markers and replacing them as needed will reduce costs.

Project No.:	9011	Developed by:	J Simmons Group PA
Project Name:	Hydrologic Study of the Freshwater Inflows to the Upper Laguna Madre	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 14 **HUC 10 Region:** 53	**Project Description:** The proposed study would evaluate changes in freshwater inflows to the Upper Laguna Madre. The Laguna Madre is one of the world's few hypersaline lagoons; it is suggested that the salinity is increasing and it's unclear what impacts this might have to the ecosystems it houses. Anecdotal evidence indicates that groundwater discharge - the lagoon's main source of freshwater - has been decreasing, thereby increasing the lagoon's salinity.
Project Extents:	Studies; Freshwater Inflow
TOTAL Construction Costs:	$ 7,406,100
Construction Benefit:	Studies, Policies & Programs; Environmental
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	Recommend periodic site monitoring
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	Public access arrangements need review
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	2	Focus on controls to reduce damages
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	41	

Statement of Feasibility: The coast has benefited from fresh water and monitoring the ecosystem may provide pertinent data relevant to preservation of fresh water and specifically protect the lagoon. The project increase environmental vulnerability, this study may be difficult to fund, and may require long-term research.

Project No.:	9013	Developed by:	J Simmons Group PA
Project Name:	Nueces Bay Productivity Enhancement through Wastewater Delivery	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** In this river basin there is very limited potential for transactions to purchase water upstream to provide increased freshwater inflows to the estuary. Accordingly, this project proposes to pipe treated wastewater for delivery to the bay at an advantageous location. A demonstration project that ended in 2003 has already illustrated the ecological benefits of this approach. This project would provide infrastructure to deliver between 5 to 8 MGD (5 to 9 thousand acre-ft./yr.) of freshwater and beneficial nutrients from treated wastewater from a somewhat distant treatment plant to a key portion of the Nueces Delta each year.
Project Extents:	1 Freshwater Inflow
TOTAL Construction Costs:	$ 7,121,300
Construction Benefit:	Environmental
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	1	Define protection of fresh water after placement
II	**Constructability**		
	Ability to complete the project	5	Contingent on this cost being consistent
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	40	

Statement of Feasibility: This is a great project that improves water quality and with limited amounts of freshwater reservations available for purchases, this is a good opportunity to obtain water upstream.

Project No.:	9014	Developed by:	J Simmons Group JS
Project Name:	Causeway Island Rookery Habitat Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	January 5, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** This project will address actions needed to protect important rookery island habitat at Causeway Island. The island supports approximately 3,070 pairs of breeding colonial waterbirds per year and harbors numerous threatened and priority avian species. The erosion of the island's shoreline is causing the on-going loss of critical rookery island habitat; the primary benefit from this project is the protection of the rookery island from wind and wave erosion.
Project Extents:	600 LF Misc. Wave Break; 10 acre Rookery Island
TOTAL Construction Costs:	$ 1,079,200
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	
	Funding Availability	5	
	Scheduling	3	Need to schedule repairs after nesting season
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	Support from community and public should be positive
	Multi-agency coordination	5	Agencies would support efforts due to protection to animal's habitat.
III	**Environmental Consideration**		
	Environmental vulnerability	3	Birds and nesting could decrease
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	5	Protect important rookery island habitat
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	46	

Statement of Feasibility: The benefit of protecting the island's wind and wave erosion is significant for the wildlife and potential damage it could cause for nesting. This could have a huge financial impact if this is not protected sooner rather than later and need more funding to repair

Project No.:	9015	Developed by:	J Simmons Group PA
Project Name:	Coastal Zoning and Flood Study	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** A cost-effective way to improve coastal resiliency is to avoid building in areas that are prone to flooding and hence reduce National Flood Insurance Program liabilities. This is particularly important as our coastal cities will continue to grow for the foreseeable future. This study will review the recent flood maps, the zoning and the overall zoning process for the Texas Gulf Coast based on updated tidal datums and latest ADCIRC modeling.
Project Extents:	Study
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	5	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	Provides public with a visionary plan for asset protection
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	Not applicable
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	48	

Statement of Feasibility: Study areas that fluctuate with tidal change with respect to historical data; however the data may not reflect future expectations. Some areas are higher risk and others are less populated with low economies. Funding for most studies and projects are available from a variety of resources, and the development of the program is resourceful.

Project No.:	9016	Developed by:	J Simmons Group PA
Project Name:	Swan Lake Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region:	1	**Project Description:** The project proposes the beneficial use of dredged material for restoring salt marshes and associated channels in Swan Lake in lower Galveston Bay.
Sub Region:	17	
HUC 10 Region:	17	

Project Extents:	5 acre Marsh
TOTAL Construction Costs:	$ 190,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	Project cost of $38,600/acre to restore marsh seems slightly excesssive
	Funding Availability	1	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	2	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	33	

Statement of Feasibility: The Swan Lake would benefit the estuaries of the Galveston Bay. This would also increase habitat for fish and other aquatic organisms.

Project No.:	9018	Developed by:	J Simmons Group PA
Project Name:	Hydrologic Restoration of Upper Cow Bayou	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands /Forested Wetlands	Date:	February 8, 2017

Region:	1	**Project Description:** The goal of the proposed project is to return Upper Cow Bayou, a tributary to Sabine River, to its natural hydrologic state by restoring meanders and reducing saltwater intrusion. This will in turn protect the existing Cypress-Tupelo habitat. A study may be required to determine the best methodology to restore the hydrology and protect the wetlands.
Sub Region:	4	
HUC 10 Region:	4	

Project Extents:	1 EA Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 1,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	Does not seem to incorporate dredge costs
	Funding Availability	3	
	Scheduling	3	During a dredge cycle
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	2	Define dredge quantities and availablity
	Public Support and Community Outreach	3	Volunteers maybe available to assist with seeding or planting
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	Planting of tress typically have a long life
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	45	

Statement of Feasibility: Environmentally the restoration of the marsh promotes wild life habitats, and this project is a low-cost effective way to increase the ecological value. The extents of the project do not seem to incorporate the cost associated with dredging and don't differentiate the study from the construction.

Project No.:	9019	Developed by:	J Simmons Group PA
Project Name:	Rose City Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands /Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 5 **HUC 10 Region:** 5	**Project Description:** The project involves the beneficial use of dredged material to restore substrate for marsh and forested wetlands in former Cypress-Tupelo swamp.
Project Extents:	1 Wetlands / Forested Wetlands
TOTAL Construction Costs:	$ 1,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	Does not seem to incorporate dredge costs
	Funding Availability	3	
	Scheduling	3	During a dredge cycle
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	2	Define dredge quantities and availablity
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	5	
	TOTAL	45	

Statement of Feasibility: Environmentally the restoration of the marsh promotes wild life habitats, and this project is a low-cost effective way to increase the ecological value. The extents of the project do not seem to incorporate the cost associated with dredging.

Project No.:	9020	Developed by:	J Simmons Group PA
Project Name:	Alternative Solutions for Beach Erosion	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The project aims to promote alternative solutions to beach and dune restoration and armoring, such as raising of structures, hardening of utilities, and managed retreat.
Project Extents:	Study
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies &Programs
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	Define high priorities areas
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	Complex data may require the support from various regions
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	May Reduce damages in vulnerable areas
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	Data can be used as a comparison to furture studies
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: Study can provide information on how to reduce erosion without the use of dredging equipment. For examples an area in North Padre has eroded and due to lack of funding the USACE has not nourished the beach with dredged materials. Areas similar need restoration but don't have funding resources.

Project No.:	9022	Developed by:	J Simmons Group PA
Project Name:	Jones Bay Oyster Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed project would restore and/or create oyster reef habitat within the Jones Bay system. Included in the project is a study of the Bay to determine locations with favorable conditions for oyster reef habitat.
Project Extents:	200 acre Oyster Reef
TOTAL Construction Costs:	$ 24,144,100
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	Define additional funding resources
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	Adds value to bay bottom and oyster development
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: This project has high priority; notably the area is in need of additional funding but improving water quality and oyster reefs are factors that contribute to the benefit to cost ratios. Restoration maybe a required, but other areas have more critical concerns.

Project No.:	9024	Developed by:	J Simmons Group PA
Project Name:	Maintain Freshwater Inflows to Trinity River Delta	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Fresh Water Inflow	Date:	February 8, 2017

Region: 1 **Sub Region:** 12 **HUC 10 Region:** 12	**Project Description:** The project proposes to maintain freshwater inflows and sediment transport to the Trinity River Delta, thereby maintaining habitat for Vallisneria and brackish water clams. A study may be required to determine the best methods for maintaining freshwater inflows.
Project Extents:	Freshwater Inflow
TOTAL Construction Costs:	$ 7,121,300
Construction Benefit:	Environmental
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	Does the project include the study costs?
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	48	

Statement of Feasibility: Freshwater marsh inflow systems benefit increase the estuary and ecological value of the Texas Coast. Multiple agencies should support the maintenance and monitoring of Trinity River Delta to increase longevity. Though funding may not be available this area is a natural habitat to many species, and freshwater is vital resources that needs to be continuously monitored.

Project No.:	9025	Developed by:	J Simmons Group JS
Project Name:	Bessie Heights Marsh Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Marsh	Date:	January 5, 2017

Region:	1	**Project Description:** The proposed project would restore a historical marsh complex at Bessie Heights Marsh in the Lower Neches WMA that has been lost to subsidence. The marsh restoration methodology will be BUDM cells with sacrificial containment berms.
Sub Region:	5	
HUC 10 Region:	5	

Project Extents:	1,000 acre Marsh
TOTAL Construction Costs:	$ 16,076,600
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	Coordinate with dredging in area
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	Define quantities that need repair versus those that are lost
	Public Support and Community Outreach	3	Historical land is typically a priority
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	Restoration enhances environmental factors
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	40	

Statement of Feasibility: Historical lands preservations are a high priority especially when reestablishing of marsh areas have promoted coastal resiliency. This will benefit the upper coastal area and could possibly aid areas such as Sabine Lake.

Project No.:	9026	Developed by:	J Simmons Group JS
Project Name:	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Misc. Wave Break Gulf	Date:	January 5, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** The project proposes to provide shoreline stabilization along the Gulf beach of Galveston's West End and the creation of a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road through natural transport.
Project Extents:	5,000 LF Misc. Wave Break; 5000 LF Gulf
TOTAL Construction Costs:	$ 6,323,000
Construction Benefit:	Shoreline Stabilization; Beach Nourishment
Longevity and Useful Life (yrs):	10+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	Beach nourishment should improve tourism.
	Funding Availability	3	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	1	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	High support from the locals and increase tourism.
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	3	Nourishment
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	1	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	31	

Statement of Feasibility: Rookeries are important to the long term survival of many species; the project is affordable and can be achieved yielding positive results. Monitoring or studying the effectiveness will provide additional data for future projects.

Project No.:	9027	Developed by:	J Simmons Group JS
Project Name:	San Antonio Bay Rookery Island Restoration	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Rookery Islands	Date:	January 5, 2017

Region: 2 **Sub Region:** 17 **HUC 10 Region:** 39	**Project Description:** San Antonio Bay bird rookery islands have significantly declined due to erosion. An inventory of rookery islands within San Antonio Bay shows only two marginally functioning islands where there had been 10. The loss of suitable nesting habitat has led to a decline in herons, egrets, black skimmers and brown pelicans. An initial site assessment of San Antonio Bay identified five locations of previously functioning islands that are suitable for reconstruction. This project proposes restoration of a historical rookery island utilizing one or more of these locations. BUDM would be used from the adjacent channels, if possible.
Project Extents:	50 acre Rookery Islands
TOTAL Construction Costs:	$ 12,885,000
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	Coordinate when dredging cycle occurs in the reach of San Antonio Bay.
	Post Construction Site Maintenance and monitoring	5	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	2	No apparent issues with the public
	Multi-agency coordination	3	Texas Park & Wildlife
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	5	None needed
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	35	

Statement of Feasibility: As we continue to review migration patterns of birds, promoting nesting areas and restoring the rookery islands will bring back stability in an area that has lost its original purpose. Methods to protect the islands should be implicated to reduce erosion.

Project No.:	9028	Developed by:	J Simmons Group JS
Project Name:	Schicke Point Living Shoreline and Marsh Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	January 5, 2017

Region:	2	**Project Description:** The project proposes shoreline protection to prevent further recedence of intertidal marsh from Schicke Point on the Matagorda Bay shoreline to the east. Potential protection method includes construction of a living shoreline combined with sediment addition.
Sub Region:	7	
HUC 10 Region:	29	

Project Extents:	12,000 LF Misc. Wave Break; 100 acre Marsh
TOTAL Construction Costs:	$ 1,901,800
Construction Benefit:	Shoreline Stabilization; Habitat Creation
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	5	Will promote the protection of marsh and shoreline
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	Not needed: Repairing Environment
	Long term sustainability		
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	42	

Statement of Feasibility: The idea of saving marsh and creating a living Shoreline is very feasible for this stretch of shore and funding at this level shouldn't be too difficult.

Project No.:	9030	Developed by:	J Simmons Group PA
Project Name:	Matagorda Peninsula and East Matagorda Bay State Scientific Area	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 2 **Sub Region:** 24 **HUC 10 Region:** 24	**Project Description:** The project proposes the acquisitions of the East Matagorda Peninsula Barrier Island (from bay shoreline to Gulf dunes) and the Matagorda Peninsula to establish a state scientific area. The adjacent bays are a refuge for sea turtles, critical fish habitat, and support oyster and sea grass habitats. The recent establishment of a Texas Parks and Wildlife Department Ecosystem Resources Program Habitat Team provides staff for monitoring and ecosystem studies.
Project Extents:	4,000 acre Acquisition
TOTAL Construction Costs:	$ 30,000,000
Construction Benefit:	Land Acquistion
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	Educational oppurtunity
	Multi-agency coordination	4	Project cost affect Texas Parks and Wildlife
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	1	Coastal ecosystem would benefit
	Coastal Resiliency	1	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	33	

Statement of Feasibility: The establishment of a state scientific area demonstrates a proactive approach to coastal protection long term. As with other acquisitions there is a need to establish a system to rank the land current value, and future value.

Project No.:	9031	Developed by:	J Simmons Group PA
Project Name:	Traylor Cut (Mission Lake - Guadalupe River)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** In the 1930s, the Guadalupe River was partially rerouted into Mission Lake through Traylor's Cut. Today, the Guadalupe Delta is eroding and sinking, at least in some measure due to lack of sediment disposition. Closing Traylor's Cut and reestablishing flows in the lower river could increase over banking onto the delta. A study is proposed to determine possible effects of closing the cut.
Project Extents:	Studies
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	5	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	48	

Statement of Feasibility: Study areas that fluctuate with tidal change with respect to historical data; however the data may not reflect future expectations. Some areas are higher risk and others are less populated with low economies. Funding for most studies and projects are available from a variety of resources, and the development of the program is resourceful

Project No.:	9032	Developed by:	J Simmons Group PA
Project Name:	Aransas NWR San Antonio Bay Shoreline Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break	Date:	February 8, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** The Ingleside Barrier Island strandplain upland is eroding and large live oaks are falling into San Antonio Bay. A wave-break of some type could prevent or slow down loss of this important habitat.
Project Extents:	1,000 LF Misc. Wave Break
TOTAL Construction Costs:	$ 276,700
Construction Benefit:	Shoreline Stabilization
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	Monitor effectiveness
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	4	With erosion marine life has decreased, this will assist in restoring wildlife habitats over the years
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	44	

Statement of Feasibility: This project adds long term sustainability of marine life, and adding the wavebreak will reduce wave impacts along the gulf coast.

Project No.:	9036	Developed by:	J Simmons Group PA
Project Name:	Laguna Madre Land Acquisition Endowment Initiative	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easement	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The proposed project will protect and manage coastal prairie and tidal flats totaling approximately 80,000 acres for aplomado falcons and associated species, and thornscrub totaling approximately 20,000 acres for ocelot and associated species. Protection would be accomplished by easement or fee-simple acquisition form willing sellers. An endowment would be established to perpetually fund management. Properties targeted for protection include Zarate, Davis, Holly Beach, and Hardic. Protected sites targeted for management include Laguna Atascosa and Bahia Grande NWRs.
Project Extents:	100,000 acre Conservation Easement
TOTAL Construction Costs:	$ 300,000,000
Construction Benefit:	Land Acquistion
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$3,000 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits, however the approval of these purchases may be timely, and increase long term.

Project No.:	9038	Developed by:	J Simmons Group PA
Project Name:	Cameron County Land Acquisition Program	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Program	Date:	February 8, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** A land acquisition program is needed to help proactively prepare for a stricter building setback line in Cameron County. While this would be initially expensive, implementation of such a program would help avoid future lawsuits in structure/debris removal and offset the costs of beach nourishment, dune restoration, and shoreline stabilization over an indefinite amount of time on a severely eroding stretch of beach. Such a program could potentially reduce TWIA & NFIP expenditures and would preserve dunes, beach, and public beach access.
Project Extents:	Program
TOTAL Construction Costs:	$ 5,000,000
Construction Benefit:	Studies, Policies & Programs
Longevity and Useful Life (yrs):	25+ years

Project Extents:	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	5	
	Funding Availability	5	
	Scheduling	5	Provide periodic scheduling
	Post Construction Site Maintenance and monitoring	5	Not applicable
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	2	Will this cover private and public sectors
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	1	
	TOTAL	51	

Statement of Feasibility: The ability for GLO to have budgeted funds to continuously monitor coastal estuaries and beach systems is critical to sustainability of marine life, beach life, and coastal protection for future generations. If the project is conducted as a protection from liability and legal issues it should have more priority contingent on a risk assessment for each project.

Project No.:	9041	Developed by:	J Simmons Group PA
Project Name:	Harlingen Ship Channel Living Shoreline	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region:	4	**Project Description:** There is a need for shoreline protection on the north side of the Harlingen Ship Channel (Arroyo Colorado), across from Adolph Thomae Jr. County Park. Construction of a living shoreline or breakwater infrastructure would be ideal to prevent erosion in this area.
Sub Region:	5	
HUC 10 Region:	64	

Project Extents:	8,200 lf Breakwater, 100 acre Marsh
TOTAL Construction Costs:	$ 5,504,600
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	2	With erosion marine life has decreased, this will assist in restoring wildlife habitats over the years
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	38	

Statement of Feasibility: The project is seemingly of high value contingent on the current value of this estuary and ecological systems. The creation of the living shoreline should be a priority especially when displacing natural habituations that result from erosion.

Project No.:	9042	Developed by:	J Simmons Group JS
Project Name:	Bahia Grande Living Shoreline	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	January 5, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The project includes creation of a living shoreline through replacement of foreign-sourced riprap material with naturally-based, native materials. Additional proposed actions include creation of controlled access points for the public, bank / shoreline restoration using beneficial use dredged material, and installation of culverts or other structures under State Highway 48.
Project Extents:	5,000 LF Misc. Wave Break; 100 acre Marsh
TOTAL Construction Costs:	$ 1,708,500
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	Coordinate dredge
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	2	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	43	

Statement of Feasibility: The introduction of native materials that will displace foreign material will enhance the ability to develop a living shoreline that will be sustainable.

Project No.:	9045	Developed by:	J Simmons Group PA
Project Name:	Packery Channel Nature Park Habitat Restoration - Phase II	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh / Walkovers	Date:	February 8, 2017

Region:	3	**Project Description:** Portions of the original project narrative have been completed under a CIAP grant. The remaining work to be completed that still needs funding is an additional 2 acres of habitat restoration, additional elevated boardwalk for public access, and a living shoreline stabilization along the parks boundary on Packery Channel, which has been extremely erosive since the channel was opened. The habitat in this area is critical to neotropical migratory birds for food and cover as well as resident bird populations, and a key element of the project is to have funding to collect data on how the bird populations are responding to the restored habitat. A portion of the habitat restoration work also involves continued control and removal of invasive grasses and trees, such as Brazilian Pepper Trees.
Sub Region:	11	
HUC 10 Region:	50	

Project Extents:	400 LF Misc. Wave Break; 2 acre Marsh
TOTAL Construction Costs:	$ 158,100
Construction Benefit:	Shoreline Stabilization; Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	4	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	1	Define resources for monitoring and maintenance
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	4	Public support is available but may need additional grants or donations
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	5	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios		
	TOTAL	39	

Statement of Feasibility: The project requires completion to increase benefit to cost ratios. After CIAP grants have been utilized, ongoing construction activities affects habitation and public access. The project should have higher priority in order to achieve the intentional benefits.

Project No.:	9046	Developed by:	J Simmons Group JS
Project Name:	Follets Island Conservation Initiative	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	January 5, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The Follets Island Conservation Initiative is a partnership effort to acquire and protect an additional 1,300 acres on the island and transfer title to the Texas Parks and Wildlife Department. Critically important wildlife habitats on the island include tall grass prairies, salt and fresh water marshes, sea grass meadows, oyster reefs, mud flats, sand dunes, and Gulf beaches. The island is important for Kemp's Ridley sea turtles, piping plovers, waterfowl, wading birds and shorebirds. Follets Island helps protect the entire estuary system, including Drum and Christmas Bays, from degradation from storms and allows the natural movement and restoration of habitats after storm events.
Project Extents:	1,300 acre Acquisition
TOTAL Construction Costs:	$ 9,750,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	3	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	44	

Statement of Feasibility: This project adds long term sustainability of marine life. The restoration of Christmas Bay will reduce wave impacts along the gulf coast.

Project No.:	9047	Developed by:	J Simmons Group JS
Project Name:	Sabine Ranch Habitat Protection	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region:	1	**Project Description:** Sabine Ranch is a critical, 12,100-acre component of the largest remaining contiguous coastal freshwater marsh system in Texas. Protection of the Sabine Ranch, almost entirely within the McFaddin NWR boundary, is the U.S. Fish and Wildlife Service's (USFWS) top conservation priority for the upper Texas coast. Sabine Ranch's central position within 100,000+ acres of federal and state protected beach and marshland make the permanent protection of this coastal habitat critical to the entire complex. Conserving and restoring these lands will avert further losses of marshland and biological diversity. Sabine Ranch's coastal marshes, prairies and woodlots provide important habitat for 35 of the 48 avian species that are USFWS Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.
Sub Region:	6	
HUC 10 Region:	6	

Project Extents:	12,100 acre Acquisition
TOTAL Construction Costs:	$ 90,750,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	
	Scheduling	3	
	Post Construction Site Maintenance and monitoring	4	
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	1	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	47	

Statement of Feasibility: Freshwater marsh systems are scarce and need a long-term permanent protection solution. Multiple agencies should support the maintenance and monitoring of Sabine Ranch to increase longevity. Though funding may not be available this area is a natural habitat to many species, and freshwater is vital resources that needs to be continuously monitored.

Project No.:	9048	Developed by:	J Simmons Group JS
Project Name:	Baer Ranch Addition to San Bernard NWR	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 2 **Sub Region:** 3 **HUC 10 Region:** 27	**Project Description:** The Baer Ranch proposed addition to San Bernard National Wildlife Refuge consists of approximately 10,000 acres and is adjacent to East Matagorda Bay. It has several miles of frontage on the bay and contains tidal bayous and marshes, transitional habitats, bottomland habitats, coastal prairies and pothole wetlands. East Matagorda Bay is one of the most intact Texas bay systems remaining, and there is at present an opportunity to preserve much of the associated shoreline and watershed to ensure the health of the bay for fish, wildlife and future generations.
Project Extents:	10,000 acre Acquisition
TOTAL Construction Costs:	$ 75,000,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits, however the approval of these purchases may be timely, and increase long term.

Project No.:	9049	Developed by:	J Simmons Group PA
Project Name:	Lake Austin Shoreline Addition to Big Boggy NWR	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisition	Date:	February 8, 2017

Region:	2	**Project Description:** This is a proposed addition to Big Boggy National Wildlife Refuge of 757 acres of prime wetlands and salty prairie, which encompasses approximately 1/4 of the shoreline of Lake Austin. The addition will provide important habitat for a diverse bird population including large numbers of waterfowl, wading birds and shorebirds. The conservation of this land will improve resilience by: preventing further development in a floodplain subject to Gulf storms, allowing the natural movement and restoration of habitats after storms, and providing protection to the inland fields and wildlife habitat adjacent to the lake. The addition will allow the U.S. Fish and Wildlife Service to expand public use programs on the refuge, including waterfowl hunting, fishing, canoe and kayak access and environmental education.
Sub Region:	4	
HUC 10 Region:	26	
Project Extents:		757 acre Acquisition
TOTAL Construction Costs:		$ 5,677,500
Construction Benefit:		Land Acquistion
Longevity and Useful Life (yrs):		25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$7200+ per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits; however the approval of these purchases may be timely, and increase long term.

Project No.:	9050	Developed by:	J Simmons Group JS
Project Name:	Sargent Ranch Addition to San Bernard NWR	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Acquisitions	Date:	January 5, 2017

Region: 2 **Sub Region:** 2 **HUC 10 Region:** 24	**Project Description:** Sargent Ranch consists of approximately 8,000 acres of habitat surrounded by the San Bernard National Wildlife Refuge. The U.S. Fish and Wildlife Service would like to purchase the ranch. The ranch stretches from the Gulf inland and includes beaches, dunes, prairies, extensive salt and fresh water wetlands, and Columbia Bottomland forests dominated by large old live oaks. The acquisition of the ranch would connect large portions of the refuge and make it possible to protect important coastal dune and beach habitat for nesting sea turtles, piping plovers and a great diversity of waterfowl and water birds. The protection of the beach dunes would also improve the resiliency of this portion of the coast to storms and sea level rise and allow the natural migration of marshes and wetlands and other habitats over time.
Project Extents:	8,000 acre Acquisition
TOTAL Construction Costs:	$ 60,000,000
Construction Benefit:	Land Acqusition
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	1	
	Public Support and Community Outreach	2	
	Multi-agency coordination	1	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	33	

Statement of Feasibility: This purchase will be a beneficial asset to the USFW preserves. However, more information is required on maintenance and monitoring plans that may be additional expenses. The project seems to also require repair or restorations that were not included in the initial costs.

Project No.:	9051	Developed by:	J Simmons Group PA
Project Name:	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisition	Date:	February 8, 2017

Region: 4 **Sub Region:** 4 **HUC 10 Region:** 63	**Project Description:** The project involves protection of 10,000 acres of beach and dune habitats on South Padre Island through acquisition of parcels from willing landowners. The protection of these habitats would benefit nesting sea turtles and migratory and resident shorebirds.
Project Extents:	10,000 acre Acquisition
TOTAL Construction Costs:	$ 75,000,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	2	
	Scheduling	2	With multiple sellers the purchase may have conflicting boundaries
	Post Construction Site Maintenance and monitoring	2	
II	**Constructability**		
	Ability to complete the project	1	Are sellers available?
	Public Support and Community Outreach	2	Some communities may object selling property or inflate the price of land
	Multi-agency coordination	1	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	33	

Statement of Feasibility: This purchase will be a beneficial asset. However, more information is required on maintenance and monitoring plans that may be additional expenses. The project may also require repair or restorations that were not included in the initial costs.

Project No.:	9052	Developed by:	J Simmons Group PA
Project Name:	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisition	Date:	February 8, 2017

Region: 4 **Sub Region:** 7 **HUC 10 Region:** 67	**Project Description:** Two parcels located in Cameron County, adjacent to the Laguna Atascosa National Wildlife Refuge and comprising approximately 4,100 acres, will be protected through this project: the Waters Tract and Dulaney Farms. The Waters Tract is 797 acres located just south of Laguna Atascosa NWR and, when restored, could provide almost 90 acres of critical freshwater wetland habitat in an old river oxbow system. The Dulaney Farms (3,368 acres) is surrounded on three sides by the Laguna Atascosa NWR and includes over 400 acres of fresh water wetlands which, when restored, could provide valuable fresh water habitat. Fresh water habitats located on these properties are a critical resource for large concentrations of wintering redhead ducks using the Laguna Madre, as well as wading birds, shorebirds and other waterfowl. These properties are also located in the heart of one of the last remaining breeding populations of ocelots in the United States, and restoration will be critical to the recovery of the ocelot population.
Project Extents:	4,100 acre Acquisition
TOTAL Construction Costs:	$ 30,750,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	1	
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	4	Define funding available for water quality sampling and methods for effective ways of measuring ecological benefits
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	3	
	Coastal Resiliency	3	
	Environmental mitigation	4	Ocelots are on endangered species providing habitation is needed
	Long term sustainability	5	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	2	
	TOTAL	41	

Statement of Feasibility: The expense associated with this project is seemingly high however may be justified if Ocelots will be inhabiting the area of land. The advantages should be more specific, and information on the amount of land available needs to be provided.

Project No.:	9053	Developed by:	J Simmons Group PA
Project Name:	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisition	Date:	February 8, 2017

Region: 4 **Sub Region:** 7 **HUC 10 Region:** 66	**Project Description:** Two parcels located in Cameron County, adjacent to the Laguna Atascosa National Wildlife Refuge and comprising approximately 4,100 acres, will be protected through this project: the Waters Tract and Dulaney Farms. The Waters Tract is 797 acres located just south of Laguna Atascosa NWR and, when restored, could provide almost 90 acres of critical freshwater wetland habitat in an old river oxbow system. The Dulaney Farms (3,368 acres) is surrounded on three sides by the Laguna Atascosa NWR and includes over 400 acres of fresh water wetlands which, when restored, could provide valuable fresh water habitat. Fresh water habitats located on these properties are a critical resource for large concentrations of wintering redhead ducks using the Laguna Madre, as well as wading birds, shorebirds and other waterfowl. These properties are also located in the heart of one of the last remaining breeding populations of ocelots in the United States, and restoration will be critical to the recovery of the ocelot population.
Project Extents:	1,400 Acquisition
TOTAL Construction Costs:	$ 10,500,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$7500 per acre
	Funding Availability	2	
	Scheduling	5	Not applicable
	Post Construction Site Maintenance and monitoring	3	Define resources for monitoring and maintenance
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	3	
	Multi-agency coordination	3	
III	**Environmental Consideration**		
	Environmental vulnerability	3	Wildlife is at risk if the property is not purchased
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	4	
	TOTAL	43	

Statement of Feasibility: The purchase of the land may require maintenance and a monitoring program. If funding is available the habitat will provide habitat for Ocelot, and other various species of birds.

Project No.:	9054	Developed by:	J Simmons Group PA
Project Name:	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easement	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** This project proposes to acquire and permanently protect with conservation easements two parcels within the Bahia Grande Coastal Corridor: Shrimp Farm and Holly Beach. Together, these parcels comprise over 2,000 acres of coastal wetland, prairie and thornscrub. The Shrimp Farm property (325 acres) is located between the recently protected Boswell-Jenkins tract and the Laguna Atascosa NWR and produces shrimp and game fish; portions are known ocelot habitat. Holly Beach (1,718 acres) provides important foraging habitat for nearby rookeries that support some of the largest populations of gull-billed terns, black skimmers, reddish egrets and brown pelicans in the Gulf of Mexico. These tracts are part of the Laguna Madre/Bahia Grande wetlands system, which hosts 85 percent of the world population of redhead ducks, one-third of the Great Plains population of endangered piping plover for nine months of the year, and hundreds of threatened peregrine falcons during migration.
Project Extents:	2,000 acre Conservation Easement
TOTAL Construction Costs:	$ 6,000,000
Construction Benefit:	Land Acquisition
Longevity and Useful Life (yrs):	25+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	$3,000 per acre
	Funding Availability	1	Define the current value
	Scheduling	1	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	2	
	Public Support and Community Outreach	2	
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	4	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		Can the land be purchased in increments?
	Benefit –Cost Ratios	3	
	TOTAL	37	

Statement of Feasibility: After reviewing several acquisitions of property purchases along the Texas Coast, a program should be established that reviews all acquisitions and ability to negotiate with sellers. The project does yield great benefits, however the approval of these purchases may be timely, and increase long term.

Project No.:	9057	Developed by:	J Simmons Group PA
Project Name:	Wetland Restoration, Water Quality Improvement, and Flood Risk Reduction	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands /Forested Wetlands	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Traditional methods of channelization to reduce flood risk have resulted in a loss of wetlands, recreational opportunities and water quality in Texas coastal counties. Opportunities exist to develop approaches that restore wetlands, improve water quality and reduce flood risk by working with coastal drainage and flood control districts, interested private landowners, public land managers and natural resource agencies. These opportunities may include creation/restoration of wetland basins, in-channel wetlands, and restoration of historic flow patterns. These approaches require a multi-disciplinary analyses and assessments. Results would improve conditions for fish and wildlife, improve water quality and create/restore natural resource based recreational opportunities.
Project Extents:	1 Wetlands /Forested Wetlands
TOTAL Construction Costs:	$ 1,424,300
Construction Benefit:	Habitat Creation & Restoration
Longevity and Useful Life (yrs):	15+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	3	
	Funding Availability	3	Support from public and private landowners will increase opportunity for funding availability
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	May require implication of maintenance and monitoring program
II	**Constructability**		
	Ability to complete the project	4	
	Public Support and Community Outreach	4	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	4	
	Coastal Benefits (restoration, creation, nourishment)	4	Restoration will improve lost wetlands
	Coastal Resiliency	4	
	Environmental mitigation	2	
	Long term sustainability	2	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	45	

Statement of Feasibility: The coast has benefited from existing wetlands and restoring the forested lands has improved flood control. Consideration of methods that are long term sustainable may be difficult to develop. The project increase environmental vulnerability, but can erode and develop issues that may continually require funding.

Project No.:	9058	Developed by:	J Simmons Group PA
Project Name:	Dune and Wetland Protection and Public Access	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Observations and review of aerial imagery show a distinct increase in off-road vehicle impacts to sensitive natural resources along the coast. The resources at risk include wetlands, salt flats, dunes, nesting and roosting birds, and sea turtles. In order to protect sensitive resource areas from damage while maintaining public access, a concerted effort and public investment are required. Approaches may include increased law enforcement, bollards and cables, signage, education and outreach. Some example locations include Bryan Beach, San Luis Pass, and Mitchell's Cut.
Project Extents:	Studies
TOTAL Construction Costs:	$ 284,900
Construction Benefit:	Studies, Policies & Program
Longevity and Useful Life (yrs):	25+ years

Section	**Description**	**RANK 1 - 5**	**COMMENTS**
I	**Bidability**		
	Project Costs	4	
	Funding Availability	3	
	Scheduling	4	
	Post Construction Site Maintenance and monitoring	2	Recommend periodic site monitoring
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	2	Public access arrangements need review
	Multi-agency coordination	2	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	3	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	3	
	Long term sustainability	2	Focus on controls to reduce damages
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options		
	Benefit –Cost Ratios	3	
	TOTAL	42	

Statement of Feasibility: The study requires study education, law enforcement and signage. With respect to the relatively low cost the project should have continuous monitoring and multi-agency coordination.

Project No.:	9060	Developed by:	J Simmons Group JS
Project Name:	Beach Re-Nourishment at Padre Island National Seashore	Checked by:	J Simmons Group PA
Project Type: **Project Subtype:**	Gulf	Date:	January 5, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** This project proposes to place dredged sediment from the Mansfield Channel and transferred sand from the south side of the jetties onto the Padre Island National Seashore from Mansfield Channel to 15 miles north of the channel. The beach on these 15 miles of seashore is currently eroding into the primary dune line and cutting off public access because sediment flow is blocked by the jetties. This area amounts to one fifth of the park's Gulf beach and is the most heavily used beach for nesting by the endangered Kemp's Ridley sea turtle. Further erosion will result in inlets forming in old wash overs that are currently snowy plover nesting habitat. USACE had previously dredged the channel every 2 to 3 years, which was sufficient to maintain the beach; however, due to budget cuts, the channel has not been dredged since 2011.
Project Extents:	37,000 LF Gulf (Beach Restoration)
TOTAL Construction Costs:	$ 45,768,500
Construction Benefit:	Beach Nourishment
Longevity and Useful Life (yrs):	5+ years

Section	Description	RANK 1 - 5	COMMENTS
I	**Bidability**		
	Project Costs	2	
	Funding Availability	2	
	Scheduling	2	
	Post Construction Site Maintenance and monitoring	3	
II	**Constructability**		
	Ability to complete the project	3	
	Public Support and Community Outreach	3	
	Multi-agency coordination	4	
III	**Environmental Consideration**		
	Environmental vulnerability	3	
	Wildlife studies, policies, and programs	1	
	Coastal Benefits (restoration, creation, nourishment)	4	
	Coastal Resiliency	4	
	Environmental mitigation	1	
	Long term sustainability	4	
III	**Analysis of Feasibility**		
(OPTIONAL)	Alternative consideration including no work options	1	Seek alternatives
	Benefit –Cost Ratios	5	
	TOTAL	42	

Statement of Feasibility: The Padre Islands have high property value in an area that is a commercial asset to the region. The restoration of beaches only has become an issue due to budget reductions. A proposal for USACE to dredge the beach is a feasible option but the dredge cycle may continue to be inconsistent. Developing alternatives of partial restoration maybe an option.

Project Constructability Tables

Project No.:	4	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Brazos River to Cedar Lake Creek Shoreline Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 2 **Sub Region:** 24 **HUC 10 Region:** 2	**Project Description:** Shoreline erosion along GIWW creates shoaling and erosion of adjacent marshes. The length of the GIWW included in the project area is approximately 20 miles per shoreline. The project proposes breakwaters or a living shoreline along the GIWW and restoration of marshes adjacent to the GIWW.
Project Extents:	100,000 LF Breakwater; 100 ac Marsh
Estimated Construction Costs TOTAL:	$ 44,601,054
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Breakwater or living shoreline? Which method will be pursued; will require separate contractors to accomplish this solicitation
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		No project duration presented; need additional input upon bid solicitation
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Option to build living shoreline system in addition to breakwater structure
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Restoration of existing marsh – check on nesting season
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	No construction planned for publically visible attractions
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Project will have to bid in a multi-stage fashion. Extremely long stretch of breakwater would require either separate solicitations or multiple concurrent contractors to achieve completion in a timely fashion

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Brazoria National Wildlife Refuge Shoreline Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh Revetment	Date:	February 8, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The narrow stretch of land separating the Brazoria National Wildlife Refuge GIWW Shoreline from Christmas Bay has been breached by erosion. The project strategies include reinforcing the banks on the Bay side to prevent further erosion, and creating emergent marsh habitat. Dredge material could be used to raise the elevation to the appropriate level for marsh creation. Closer monitoring of erosion along the shoreline, particularly at critical locations such as the narrow sections between the GIWW and Christmas Bay, Drum Bay, and Long Pond, is also recommended.
Project Extents:	480 acres marsh; 48,700 LF revetment
Estimated Construction Costs TOTAL:	$ 23,636,390
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Multiple solicitations will be required; it would not be advantageous for the same contractor to perform both revetment construction and marsh construction; resources and time will be better allocated with multiple contractors
	Plans and Technical Specifications	Y		Proposed 3' marsh raise; breaks with the 1' issued in the project subtype specs (pending approval)
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Dredging vs use of earthen borrow for marsh fill (alternatives)
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		Area for revetment construction stone
	Season Options - nesting periods, etc.	Y		Need to account for seasonality in the marshes affected by dredge filling/raise
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: IN order to complete the project in a timely fashion, consideration must be given to the possibility of concurrently contracting different portions of the project. Otherwise, a multi-stage and multi-year approach will be required; marsh fill and construction will take significantly less time than the revetment construction

Project No.:	11	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Follets Island Marshes	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh N/A	Date:	February 8, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The project proposes marsh habitat restoration on Follet's Island, on the west side of Christmas Bay, to protect critical habitat including estuarine and freshwater marshes and tidal flats.
Project Extents:	2,650 acres of marsh creation
Estimated Construction Costs TOTAL:	$ 33,096,083
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	**15+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Assess debris and obstructions if dredging is preferred option for fill; a single contractor will be able to handle the scope of work but consider adding additional options for greater access to dredged material.
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be essential for progress payments and management of any potential ship traffic
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Assess tide, wind, and climate status; water quality will need to be managed as dredge material is used to construct the marsh
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Restoration of marsh – already existing marsh and need to check for nesting season.
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: Sourcing to a single contractor should prove efficient and time effective; multiple award contract will likely be needlessly cumbersome

Project No.:	19	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	East Galveston Bay Ecosystem Oyster Reefs	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef N/A	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** 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 Extents:	130 acres of oyster reef
Estimated Construction Costs TOTAL:	$ 13,372,125
Estimated Construction Duration:	>5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		Permitting for stone placement
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Bonding will likely be required; due to the scope and scale of this project, it will likely be advantageous to issue multiple contracts concurrently; if such an approach is adopted, the estimated construction duration could be reduced significantly
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		If it is determined that multiple contractors will be involved concurrently, scheduling will be essential to prevent overlaps and task conflicts
II	**Buildability**			
	Right of Way	Y		Prevent harvesting to ensure viable attachment of oysters to substrates
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Asses tide, wind, climate, water salinity, etc. to better promote survival of oyster specimens; salinity testing would also be beneficial
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Though benefit may be deemed negligible, prime nesting seasons for oyster larvae should be taken into consideration
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: In order to complete this contract in a time effective manner, it is suggested that multiple contractors work on the project concurrently. Otherwise, a multi-stage, multi-year approach will likely be required

Project No.:	21	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Galveston Bay Ecosystem Rookery Islands	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-une Islands, Rollover Bay Islands, Chocolate Point Island, West Bay Bird Island, Smith Point Island, North and South Deer Islands, and other rookery islands in the area. The proposed project will create additional acres of potential nesting habitat by reestablishing intertidal marsh and will promote shoreline stabilization.
Project Extents:	40,000 LF breakwater, 600 acres marsh
Estimated Construction Costs TOTAL:	$ 56,375,545
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Assess which islands are deemed necessary in relation to the others; work should be awarded concurrently for the rookery island and breakwater construction in order to minimize project duration
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Due to the award of multiple contractors, coordination between the two will likely be required; progress payments will also likely need to be issued. Thus, scheduling will be beneficial
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		No apparent conflicts but should remain aware of the potential issues which could arises (negligence should be avoided at all costs)
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Cannot risk disturbing existing habitats
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Tracking seasonality of bird nesting periods will be pivotal to project success; Cannot risk disturbing nesting habits of local bird species
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Create marketing material to show creation of new habitats; highlight positive environmental effect
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: This contract will likely need to be issued between two or more different contractors in order to minimize construction duration

Project No.:	24	Developed by:	J Simmons Group DG
Project Name:	San Jacinto Battlefield Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 14 **HUC 10 Region:** 14	**Project Description:** The project would involve restoration of marsh at the San Jacinto Monument as well as shoreline stabilization and beach nourishment through Beneficial Use of Dredged Material. Control of invasive species would also help enhance the habitat.
Project Extents:	2,000 LF Breakwater; 100 acre Marsh
Estimated Construction Costs TOTAL:	$ 2,211,154
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting period
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Since it is in a historic area
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	25	Developed by:	J Simmons Group DG
Project Name:	Burnet Bay Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh Levees	Date:	February 8, 2017

Region: 1 **Sub Region:** 14 **HUC 10 Region:** 14	**Project Description:** This project seeks to restore approximately 500 acres of marshes through use of BUDM. Strategies for marsh restoration include the construction of levees for shoreline protection, raising the site elevation with dredge material, and planting marsh vegetation.
Project Extents:	500 acre Marsh; 12,000 LF Levee
Estimated Construction Costs TOTAL:	$ 10,356,748
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor marsh
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	28	Developed by:	J Simmons Group DG
Project Name:	East Bay and GIWW Marsh Restoration and Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** The East Bay and GIWW Marsh Restoration and Protection project would create an estimated 47,100 linear feet of offshore rock breakwaters along the prioritized project areas to: reduce the wave energy impacting approximately 678 acres of saline marsh and promote shoreline stabilization; protect over 10,000 acres of fresh, intermediate, and brackish marshes and upland prairie from additional saltwater intrusion and habitat conversion.
Project Extents:	47,100 LF breakwater
Estimated Construction Costs TOTAL:	$ 20,373,105
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor condition of breakwater
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	29	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region:	1	**Project Description:** This project aims to restore marsh habitat along the GIWW using a living shoreline construction. The proposed project area is located along segments of shoreline adjacent to the Anahuac NWR. Of the targeted 9 miles of shoreline, an estimated 12,400 feet faces East Bay and 34,700 feet lies east of Oyster Bayou on the GIWW.
Sub Region:	9	
HUC 10 Region:	9	

Project Extents:	48,000 LF Breakwater; 4,000 acres of marsh
Estimated Construction Costs TOTAL:	$ 70,544,446
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		This project will likely need to be awarded to multiple contractors in order to minimize construction duration. Otherwise, a multi-year, multi-stage approach will likely need to be established
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		In consideration of the award of this contract to multiple contractors (if this approach is adopted) coordination of the two parties will likely need to be arranged
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		No apparent conflicts are prevalent from project description. However, if any information to the contrary should arise, this provision is subject to change.
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Minimize impact to National Wildlife Refuges
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		Ensure NWR can be used for staging
	Season Options - nesting periods, etc.	Y		Monitor nesting and wildlife activity within NWR
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	Marketing material could be considered but would not be deemed absolutely necessary
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Concurrent award of the varying tasks called for by this project would be preferable. Doing so would have a positive net effect on overall construction duration as well as project costs (more efficient use of contractor resources)				

Project No.:	30	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	McFaddin National Wildlife Refuge at Willow Lake	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region:	1	**Project Description:** The project proposes to construct approximately 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 acres of emergent marsh habitat and protect 3,600 acres of existing coastal marsh from degradation. The project proposes to construct a 1,000-foot-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 Watershed. The proposed siphon would transport freshwater from north of the GIWW to the south, and benefit more than 29,000 acres of coastal wetlands.
Sub Region:	6	
HUC 10 Region:	6	

Project Extents:	6,000 LF Breakwater; 150 acres of marsh
Estimated Construction Costs TOTAL:	$ 4,581,194
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Due to the unrelated provisions of this project (in terms of project type) award of multiple contracts would be preferable
	Plans and Technical Specifications	Y		Restrictions to reduce presence of brackish water
	Tentative project scheduling	Y		Coordination between multiple contractors will be beneficial to project success (more efficient use of time, resources, etc.)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though no conflicts are explicitly stated, caution and notice should be pursued, regardless
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to consider the health of fish wildlife and monitor leaks while transporting freshwater (salinity concerns); dredge material should be tested as well
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent seasonality conflicts. However, it should be taken into consideration if evidence to the contrary should arise (nesting periods in the marshes, etc.)
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	Community outreach would prove to be extraneous in the context of this project
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Concurrent contracting for the two separate tasks called for by this project (siphon as well as marsh creation) would be preferable; more efficient use of time and contractor resources available

Project No.:	35	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	McFaddin National Wildlife Refuge Shoreline Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: Project Subtype:	Gulf Dune	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** 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. The project would also provide restoration of eroding Gulf-facing shoreline, dunes, and associated wetlands. Nourishing this beach will provide less-costly removal of abandoned oil wells.
Project Extents:	105,600 LF beach nourishment (Gulf facing); 105,00 LF Dune Restoration
Estimated Construction Costs TOTAL:	$ 129,474,326
Estimated Construction Duration:	>5 years
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Stringent bonding requirements will be necessary; owner should considering issuing this job as several separate solicitations
	Bid Schedule, Options, Pay Items	Y		Pay items must be developed in order to process progress payments (due to the size and scale of this job); consideration should be given to breaking this contract into several smaller contracts with pre-determined convergence points
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Extensive planning and scheduling must be undertaken if it is determined that multiple awards will be issued to complete this project
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though there are no apparent issues, the sheer size of this project presents a strong case for increased caution and scrutiny
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Material used for the construction of the beach should be considered; water quality (salinity, etc.) of marshes designated for protection and emergent restoration should also be taken into consideration
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Seasonality should be taken into consideration despite the fact there are no apparent causes for concern (tourism could be an issue)
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Host an opening of the replenished beach section and highlight the benefits? Generation of positive PR is always beneficial
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Need to closely monitor beach erosion rates to gauge the need for future projects; Consider the award of multiple contracts to complete this project; more effective utilization of contractor resources and could have potential material effect on project duration

Project No.:	41	Developed by:	J Simmons Group DG
Project Name:	Texas Chenier Plain Refuge Complex	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region:	1	**Project Description:** The Texas Chenier Plain Refuges Complex supports a collection of National Wildlife Refuges, including Anahuac, McFaddin, Texas Point, and Moody. The project will involve conservation of 65,000 acres of additional riverine, subtidal, freshwater and marine/estuarine wetlands, beach/dune and upland habitats.
Sub Region:	11	
HUC 10 Region:	11	

Project Extents:	65,000 acres Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Acquisition project, no construction required

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	44	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Trinity - San Jacinto Estuary Fresh Water Inflows	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Freshwater Inflow N/A	Date:	February 8, 2017

Region: 1 **Sub Region:** 16 **HUC 10 Region:** 16	**Project Description:** The goal of the project is to acquire and convert some existing water rights from willing sellers for the purpose of freshwater inflow protection. Drought-reliable water rights that are not being fully utilized are potentially available for purchase on a voluntary basis. This project would be designed to provide an additional 100,000 acre-feet/year of drought-secure inflows to Galveston Bay from the Trinity River basin as compared to future conditions without the project.
Project Extents:	1 EA Freshwater Inflow
Estimated Construction Costs TOTAL:	$ 6,330,000
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	Expedience with which drought-reliable water rights can be attained will determine schedule
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: From the information available in the project description, there are no construction activities. The project description simply states Fresh Water Inflow; what actions are included in this description?

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	45	Developed by:	J Simmons Group DG
Project Name:	Galveston Bay Debris Removal	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Abandoned Oil/ and or Gas Well	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project aims to remove marine debris from navigable waters and habitat areas of Galveston Bay, and its sub-bays and tributaries. Hundreds of derelict exploration and production structures and vessels lie abandoned in waterways and wetlands within Galveston, Harris, Chambers and Brazoria counties. Removal of these vessels allows safer access to and navigation of open-water areas for boaters and anglers; improved water quality by increasing water flow and circulation; enhanced marsh and open-water habitats for fisheries production; and improves the bay's appearance for all users of the bay.
Project Extents:	1 Abandoned Oil/ and or Gas Well
Estimated Construction Costs TOTAL:	$ 1,899
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		Showing where items to be removed are located
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		Identify pipelines before removal of structures
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		Contractor equipment staging
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	51		Developed by:	J. Simmons Group, Inc.-SS	
Project Name:	Boggy Cut GIWW Protection		Checked by:	J. Simmons Group, Inc.-TAN	
Project Type: **Project Subtype:**	Breakwater Marsh, Acquistions		Date:	February 8, 2017	
Region: 2 **Sub Region:** 2 **HUC 10 Region:** 24	**Project Description:** This project will protect the GIWW from erosion cause by wind, current, and ship wakes. Solutions may include breakwaters along the GIWW and restoration of marshes adjacent to the GIWW. The project may also include acquisition of private property adjacent to the GIWW. These efforts would improve wind and current hazards to navigation and mainland erosion.				
Project Extents:	10,500 LF Breakwater; 20 acres of marsh, 20 acres Acquisitions				
Estimated Construction Costs TOTAL:	$ 4,840,791				
Estimated Construction Duration:	<1 year				
Longevity and Useful Life (yrs)	15+ years (25+ years for Acq.)				

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Breakwater awarded prior to negotiated land acquisition? Or will land acquisition precede any additional work for solicitation? Regardless, this project calls for the award of multiple contracts
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Will mash creation work move concurrently with breakwater creation? Doing so would save a great deal of time (and potentially money)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Need to designate any utilities present on acquired land
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic studies will likely be required; additionally, the quality of the material being used for the marshes (as well as the quality of the water within the designated marsh areas)
	Project schedule constraints	Y		Expediency with which land acquisition efforts progress will have a large impact on project scheduling
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No seasonality issues are apparent from project description proved above; however, such conflicts should be addressed quickly should evidence to the contrary arise
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	The only factor which could promote the need for community outreach would be the purchase of lands
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Need to verify the budgeted figure for land acquisition; concurrent award of contracts would be preferable for more efficient use of contractor resources and in pursuit of the minimization of project duration				

Project No.:	52	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Restoration of Chester's Island	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The project aims to slow the erosion on the island and add 30 acres of land. Potential solutions include sand filled 300-foot long geotubes or other breakwater structures, invasive species control, and other shoreline stabilization techniques. There is a need to study the hydrology of the area to reduce erosion and currents/tides in the area.
Project Extents:	3,000 LF Wave Break; 30 acres of Rookery Island Restoration
Estimated Construction Costs TOTAL:	$ 3,092,358
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Specify breakwater structure composition; Rookery Island shoreline restoration should be represented by a separate solicitation
	Plans and Technical Specifications	Y		In using the geotubes, what material has been designated as the fill material?
	Tentative project scheduling	Y		Coordination of multiple contractors will be required for the efficient completion of this project; progress payments will also be necessary
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		No apparent conflicts from information provided. However, if any evidence to the contrary should arise, this provision would need to be amended
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		The material being used to fill the GeoTubes will be subject to added scrutiny due to its displacement into an exposed, open air environment; however, the breakwater structure of choice is not yet certain
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to consider nesting periods for avian life on rookery islands; cannot risk disturbing the balance of the rookery island ecosystem
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Community outreach efforts seems extraneous; always subject to change pending the desires of the project owner
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Issuance of multiple, concurrent contracts would be the preferable course of action; need to determine the preferred breakwater structure to attain a more accurate grasp of project costs and duration

Project No.:	56	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 2 **Sub Region:** 16 **HUC 10 Region:** 38	**Project Description:** This project will acquire 3,440 acres of property located next to the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge on the north shoreline of Powderhorn Lake. In addition, there will be an estimated 500 to 600 acres of freshwater wetland/moist soil unit habitat created in the abandoned farmland. Water quality will be improved by constructing substantial amounts of wetland units in the abandoned farmland. This will reduce nutrient loading from cattle grazing.
Project Extents:	3,440 acres Acquisitions; 1 EA Wetland/Forested Wetlands (500-600 acres)
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years (25+ years for Acq.)

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Land acquisition to be considered separately from any potential construction; the contractual requirement needed to convert abandoned farmland are still somewhat vague
	Bid Schedule, Options, Pay Items	Y		Bid schedule should be developed in order to establish milestones and project goals
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be useful in consideration of pending land purchases, etc.
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Utilities on the abandoned farmland need to be taken into consideration when issuing this solicitation
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Solicitation and NTP dependent on the successful purchase of abandoned farmland and sponsor to do so
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No seasonality issues are apparent from the project description listed above; subject to change pending the receipt of additional information
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	Though the response is listed as 'N', consideration should be given to hosting a ceremony to highlight the potential uses of abandoned farmland, etc.
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Need to confirm both the sponsor to pursue land acquisition; Furthermore (as a point of clarification) is the abandoned farmland included in the proposed acquisition or is this a separate plot of land?

Project No.:	62	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Welder Flats Wildlife Management Area	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 2 **Sub Region:** 17 **HUC 10 Region:** 39	**Project 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.
Project Extents:	12,000 LF Breakwater; 1 EA Wetlands/Forested Wetlands
Estimated Construction Costs TOTAL:	$ 6,456,600
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Breakwater must be scheduled first to prevent ongoing damage to wetland creation; the option has been proposed for the creation of a living shoreline either as a replacement or a supplement to the breakwater structure; further info regarding the pursuit of this task must be given
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		If additional task order are pursued (i.e. the living shoreline) effective coordination must be pursued in order to facilitate an efficient project; additionally, progress payments and milestones will be required
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Proximity to the GIWW presents valid concern in regards to the presence of utilities and pipelines; extra scrutiny must be used when designing this project
	Traffic Control, Coordination, and Site access[2]	Y		Due to proximity to the GIWW, ship traffic management will be paramount to project success; interference from traffic will extend project duration and adversely affect cost implications
	Environmental feasibility with construction options	Y		Operations must not tamper with existing wildlife populations
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to carefully plan around the Whooping Crane nesting season
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Potential PR benefit from revival of Whooping Crane population; should generate marketing materials
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Need to effectively source rock for breakwater construction (transportation concerns); additionally, the decision regarding the construction of the living shoreline would be required before the project could advance

Project No.:	70	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Goose Island State Park Habitat Restoration and Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater N/A	Date:	February 8, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** The project involves shoreline and habitat protection of the critical intertidal estuarine marsh habitat that makes up 25 acres of Goose Island State Park.
Project Extents:	4,000 LF Breakwater
Estimated Construction Costs TOTAL:	$ 1,730,200
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		A single bid solicitation should suffice; scale and scope of the contract does not seem conducive to heightened contracting scrutiny; pay items and a bid schedule are still helpful to prevent cost overruns due to lack of direction
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Progress payments will be utilized during the course of this project; a predetermined schedule will assist with financial planning
II	**Buildability**			
	Right of Way	Y		Possible disruption of attendees at Goose Island State Park
	Utility / pipeline conflicts identified and addressed	Y		Though no conflicts are apparent, proximity to a state park should raise extra suspicion; any signs of conflicts need to be identified and included in the scope of the project
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	There are no apparent external factors which would imply schedule constraints are imminent; however, if any information arises to the contrary, this provision is subject to change
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to consider the local fauna in Goose Island State Park; any potential conflicts need to be mitigated to preclude the intervention of conservationist organizations
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Make signage or presentation dedicated to portraying the benefits of the breakwater structure
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Sourcing of sufficient barrier rocks and methodology of transmission to project site must be considered; if environmental footprint of operations to the nearby state park is minimal, constructability should not be an issue				

Project No.:	72	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Long Reef Shoreline Stabilization and Habitat Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: Project Subtype:	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** 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 Extents:	2,000 LF Misc. Wave Break; 14 acres Rookery Islands
Estimated Construction Costs TOTAL:	$ 1,702,426
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Include options for additional breakwater structures; however, if stone construction is deemed and expensive and the dual use of dredged material is pivotal to the design of this project, the use of GeoTubes should not be an issue.
	Plans and Technical Specifications	Y		Ensure dike dimensions are conducive to long-term sustainability
	Tentative project scheduling	Y		Though not essential for project success, scheduling is always useful in order to establish project milestones, structure progress payments, etc.; allows for a greater degree of project management control
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though no conflicts are apparent from the project description given, it is important to note the risk dredging poses to submerged utilities; contract should remain aware of potential risks
	Traffic Control, Coordination, and Site access[2]	Y		Need to manage and coordinate ship traffic with the use of the dredge
	Environmental feasibility with construction options	Y		Dredged material must be tested for environmental usability; using too fine of material poses a risk to the long-term sustainability of this contract
	Project schedule constraints	Y		Availability of dredging contractors in relation to other ongoing projects; furthermore availability of material suitable for use in the breakwater geotubes
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Though no conflicts are apparent from the project description provided, seasonality conflicts in regards to nesting, etc. should be

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

				considered
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Industry-wide common practices should be adopted for USACE material use dike construction; though the project description calls for GeoTubes, could be productive to be open to creative alternatives (if they prove more efficient and cost effective)

Project No.:	75	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Nueces River Delta Shoreline Stabilization	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater N/A	Date:	February 8, 2017

Region: **Sub Region:** **HUC 10 Region:**	3 10 49	**Project Description:** The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy causing emergent intertidal wetland losses.
Project Extents:		10,560 LF Breakwater
Estimated Construction Costs TOTAL:		$ 4,567,728
Estimated Construction Duration:		**<1 year**
Longevity and Useful Life (yrs)		**15+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Though it would be possible for a single contractor to accomplish the tasks called for by this contract; separating the bid into two solicitations could prove more efficient in terms of utilizing available contractor resources.
	Bid Schedule, Options, Pay Items	Y		Establish of pay items would be helpful for progress payments and the creation of milestones; the option should be explored as to if the owner would consider breaking the project into pieces, allowing concurrent construction
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Need to establish milestones and project progress payment infrastructure; additionally, allowing concurrent construction would require additional planning (if the option is pursued)(
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	Though there are no apparent conflicts indicated in the project description above, caution would be advised; if any evidence to the contrary becomes available, this provision of the methodology would be amended accordingly
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Must account for impact upon marine life during construction (emissions, water noise pollution)
	Project schedule constraints		N	There are no apparent constraints due to external factors included in the project description; subject to change given additional information
	Adequate construction staging area(s)	Y		As with many breakwater projects,

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

				contractor must ensure that proper measures are taken to stage construction rock
	Season Options - nesting periods, etc.	Y		
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Constructability could be positively affected by the inclusion of an additional contractor to perform concurrent operations; possible positive net effect due to more efficient use of available contractor resources and cost implications due to more timely completion

Project No.:	86	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Mustang Island State Park Acquisition	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region:	3	**Project Description:** The project involves the acquisition of parts of Mustang Island and the protection of tidal marsh, emergent estuarine wetlands, and coastal prairie dune and beachfront habitats. This includes the Mustang Island State Park Conservation Initiative, which will create a contiguous 5,100+ acre conservation area along the barrier island that will enhance the net biological value of the island.
Sub Region:	11	
HUC 10 Region:	50	

Project Extents:	750 acres Acquisitions
Estimated Construction Costs TOTAL:	TBD
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	Method of protection not yet specified; flexibility in regards to approach?
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	Contingent on award of land purchase rights
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	Net biological value of the island; assessment to be included in initial scope of work or in separate solicitation?
	Project schedule constraints		N	Project delayed until land purchase completed
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Following the purchase of lands, suggested that some marketing material be presented to improve public perception of land usage
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Due to pending cost due to acquisition, many of the variables at play in this project are suspended; Must assess accurate acquisition cost before alternatives can be developed due to budgetary constraints; No

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

construction is included in the project

Project No.:	91	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Coastal Bend Conservation Easements	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Conservation Easements Coastal Prairies	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The project aims to establish an endowment to purchase approximately 150,000 acres of conservation easements and to fund habitat restoration and maintenance in the Coastal Bend area. Additionally, the funds would provide for restoration and maintenance on South Texas coastal prairies and marshes.
Project Extents:	150,000 acre Conservation Easement
Estimated Construction Costs TOTAL:	$ TBD
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	No work designated
	Bid Schedule, Options, Pay Items		N	Acquisition only; no construction designated
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	Need clarification for further projects following land acquisition
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	Large area, must remain aware of migratory birds and their nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		The purchased area will more than likely become a preservation; can schedule a commissioning ceremony
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Extremely large scale acquisition project; No construction designated to this point in time

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

sProject No.:	96	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Laguna Atascosa NWR- Bahia Grande- Intertidal Wetlands Hydrologic Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Freshwater Inflow	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** In 2005, a pilot channel was constructed that connected the Brownsville Ship Channel to the Bahia Grande and began refilling the main basin. In 2007, two interior channels were cut that reconnected the larger basin to two smaller interior basins – the Laguna Larga and the Little Laguna Madre - ensuring natural tidal flow and exchange throughout the whole system. The next major step is to widen and deepen the original pilot channel to improve tidal flow into the basins and thereby fully restore the natural biological functions of the wetlands.
Project Extents:	1 EA Freshwater Inflow
Estimated Construction Costs TOTAL:	$6,330,000
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Potentially high value contract; bonding will be required
	Bid Schedule, Options, Pay Items	Y		Pay Items, etc. needed to create progress payment infrastructure; if necessary
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Dredge production required for progress payments and planning
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Laying of dredging pipes and dredge operations in general pose a conflict to the utilities and pipelines in surround areas
	Traffic Control, Coordination, and Site access[2]	Y		Need to monitor ship traffic in the channel in which dredging operation are occurring
	Environmental feasibility with construction options	Y		Need to assess environmental feasibility of disposal of dredge material
	Project schedule constraints	Y		Ship traffic, etc. my constrain schedule
	Adequate construction staging area(s)	Y		Need to determine use of dredged material
	Season Options - nesting periods, etc.		N	No for now, but need to remain aware of whether or not operations pose a threat
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: No details given in regards to use of the dredged material; need to develop a beneficial use profile for the material (if deemed environmentally feasible)

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	112	Developed by:	J Simmons Group DG
Project Name:	Treasure Island Nourishment Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** The project focuses on developing alternatives for a beach nourishment project in the vicinity of the revetment and fishing pier area to widen the beach and provide a buffer to reduce storm impacts to the existing shoreline.
Project Extents:	2,800 LF Gulf (Beach Nourishment)
Estimated Construction Costs TOTAL:	$ 2,968,770
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Construction depends on which alternatives would be utilized. This appears to be more of a study project.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	136	Developed by:	J Simmons Group DG
Project Name:	Dune/Beach Restoration from Sargent Beach to the Colorado River	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Dune Gulf	Date:	February 8, 2017

Region: 2 **Sub Region:** 1 **HUC 10 Region:** 23	**Project Description:** The project involves approximately 30.8 miles of beach nourishment and dune restoration along the Gulf shoreline from Sargent Beach to the Colorado River.
Project Extents:	170,000 LF Gulf (beach nourishment; 170,000 LF Dune
Estimated Construction Costs TOTAL:	$ 206,395,980
Estimated Construction Duration:	**>5 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		If public access is needed
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Beach/dune monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	138	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Bay Shoreline from Magnolia Beach to Port O'Connor	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Jetty	Date:	February 8, 2017

Region: 2 **Sub Region:** 16 **HUC 10 Region:** 38	**Project Description:** The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.
Project Extents:	2 EA Groin; 52,800 LF Revetment; 1 EA Wetlands/Forested Wetlands
Estimated Construction Costs TOTAL:	$ 20,883,085
Estimated Construction Duration:	**3-5 years**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; progress payments and milestones must be established for a project this size; concurrent issuance of contracts could prove more efficient and cost effective; a multi-stage, multi-year approach would be required otherwise (potential for cost overruns from such an approach)
	Bid Schedule, Options, Pay Items	Y		Bid solicitation should be split into three separate, distinct projects; issuing a single contract with options for each section of work would only prolong the project duration and prove more costly (furthermore, concurrent operations could decrease estimated construction duration)
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Must present project scheduling when dealing with large, environmentally invasive projects
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Projects covering such a large area are likely to interfere with some form of utilities or pipelines; need to remain aware of such instances when developing this project further
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic studies will likely need to be conducted to study the effect of the groins and breakwater structures on the erosion rates of the adjacent shorelines
	Project schedule constraints		N	There are no apparent external factors presenting material project scheduling constraints; if any evidence to the contrary should arise, this methodology parameter will be amended

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Restoration of marsh – may need to look into nesting season
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	No ceremony necessary to present new structures; marketing material at best
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Need to issue at least three separate contracts with concurrent operations in order to complete this contract in an efficient and cost effective manner; contractor resource utilization would be hindered if the contract is sourced to a single contractor				

Project No.:	142	Developed by:	J Simmons Group DG
Project Name:	Mustang Island Bay Shoreline Protection and Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project includes shoreline protection for approximately 8.25 miles of eroding shoreline and up to 215 acres of marsh land restoration.
Project Extents:	43,600 LF Breakwater; 215 acre Marsh
Estimated Construction Costs TOTAL:	$ 21,670,764
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting period
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor shoreline protection
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	145	Developed by:	
Project Name:	Town of South Padre Island Gulf Shoreline	Checked by:	
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** This project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline.
Project Extents:	43,000 LF Gulf; 43,000 LF Dune
Estimated Construction Costs TOTAL:	$ 52,206,042
Estimated Construction Duration:	**3-5 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements; progress payments
	Bid Schedule, Options, Pay Items	Y		Contractor can view the site easily but milestones must be put in place in order; consideration should be given to issuing multiple contracts in order to maximize utilization and minimize project costs
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Large magnitude; will require scheduling in regards to beach activities and coordination of contractors should the decision be made to divide the work between multiple firms
II	**Buildability**			
	Right of Way	Y		Will need to attain the right of way in order to create an efficient project site free from tourist interaction
	Utility / pipeline conflicts identified and addressed	Y		Though no utilities are immediately in harm's way, a note should be made to avoid any potential conflicts
	Traffic Control, Coordination, and Site access[2]	Y		Contractor Only zones must be set up to avoid tourism from hindering operations
	Environmental feasibility with construction options	Y		Existing beach conditions must be monitored prior to place of new materials; erosion resistant properties of dune structures should be tested if possible; evidence gathered from such testing could provide guidance for future project
	Project schedule constraints	Y		Tourism; scheduling project during peak tourism months would be met with public unrest from vendors, etc.
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Summer will be difficult; Spring as well; try to schedule during Autumn/Winter; However, seasonality does not pose a significant threat. Any and all issues from heightened tourism would likely be avoidable given the proper authority and signage

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Optional; Grand Opening of new beach a secondary PR objective
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Scheduling around active tourist seasons is essential to mitigating local unrest due to business interruptions; The benefits of the newly nourished beach (both from a resiliency and aesthetic perspective) can be stressed to the public as well; consider issuing multiple contracts in order to cut down on estimated project duration				

Project No.:	180	Developed by:	J Simmons Group DG
Project Name:	Deer Island and Jigsaw Island Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will continue the expansion of the restoration of North and South Deer Islands and Jigsaw Island through BUDM opportunities. Island restoration will promote reestablishment of sea grass habitat. The project will also continue to develop alternative analyses and engineering designs on these islands in order to prepare them for future BUDM opportunities. The islands may need shoreline protection measures as part of the restoration.
Project Extents:	5,000 LF breakwater; 250 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 18,971,741
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitoring of the islands
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	232	Developed by:	J Simmons Group DG
Project Name:	Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project involves purchasing a conservation easement for approximately 3,200 acres of coastal prairie and estuarine marsh habitats adjacent to Green's Lake, near Hitchcock. The easement won't allow public access and Scenic Galveston will manage the property and restore the prairie.
Project Extents:	3,200 acre Conservation Easement
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction required

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	240	Developed by:	
Project Name:	Coastal Heritage Preserve – Phase 4	Checked by:	
Project Type: Project Subtype:	Acquisitions	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The Settegast Coastal Heritage Preserve project is envisioned as a conservation area on West Galveston Island adjacent to West Bay, which is part of the Galveston Bay system, an estuary of national significance. The next phase of the initiative involves acquisition of 635 acres from one owner and 205 acres from an adjacent owner. This would bring the total preserve area to 1,200 acres.
Project Extents:	840 acres Acquisition
Estimated Construction Costs TOTAL:	$ TBD
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	Source of funds for land purchase and definitive amount required for further consideration
	Bid Schedule, Options, Pay Items		N	No work/solicitation described for this job
	Plans and Technical Specifications		N	None needed in regards to current work explanation
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Should schedule a site opening to highlight the significance of the land purchase
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Only acquisition noted to this point; any additional work will shift the paradigm used for constructability consideration (i.e. no construction necessary)

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	241	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Sweetwater Preserve Expansion	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project involves the purchase of 275 acres of land situated immediately west of Galveston Bay Foundation's Sweetwater Preserve and adjacent to Sweetwater Lake, West Galveston Bay, and 8 mile road. Key attributes of the subject property include coastal grasslands, brackish and estuarine wetlands, frontage along West Galveston Bay and Sweetwater Lake, and extensive salt barrens and sand flats. Preservation of Galveston Island's marshes, wetlands, and associated habitats promotes clean water and healthy fisheries and preserves the scenic beauty of the area.
Project Extents:	275 acres Acquisitions
Estimated Construction Costs TOTAL:	$ TBD
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	Source of funds required; details as to how the acquisition would be executed is yet to be determined
	Bid Schedule, Options, Pay Items		N	No work designated; no schedules are required at this juncture
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	Need to determine rights of way after land purchase
	Utility / pipeline conflicts identified and addressed		N	Agency making land acquisition should be aware of any potential land
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Hold ceremony to highlight newly preserved areas
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No new construction is designated in current description; further details will be necessary to apply additional constructability aspects

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	252	Developed by:	J. Simmons Group, Inc.- SS
Project Name:	Bolivar Beach and Dune Restoration	Checked by:	J. Simmons Group, Inc.- TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region:	1	**Project Description:** 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.
Sub Region:	1	
HUC 10 Region:	1	

Project Extents:	52,800 LF Gulf; 52,800 LF Dunes (Beach nourishment)
Estimated Construction Costs TOTAL:	$ 64,104,163
Estimated Construction Duration:	**3-5 years**
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		Large scale project; will require progress payments; possibly consider awarding multiple contracts with provisions for concurrent construction
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Liquidated damages will be utilized; thus project schedule/timeframe is required; the possible coordination of multiple contractors should be considered
II	**Buildability**			
	Right of Way	Y		Rights of way will need to be impeded in order to nourish a public beach area
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Project will likely require an environmental impact assessment prior to beginning work
	Project schedule constraints	Y		Need to be wary of high volume tourism seasons
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to remain aware of the nesting periods of local fauna; though there is no material evidence to support this claim included in the project description, contractor and owner need to remain aware of the possibilities
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	A grand opening ceremony could be utilized. However, it is still uncertain
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Attempt to schedule project when not in conflict with high tourism season (Summer/Spring); Consideration should be given as to whether or not the project is broken into a series of smaller projects in order to better utilize available contractor resources				

Project No.:	261	Developed by:	J Simmons Group DG
Project Name:	East End Lagoon Nature Park & Preserve	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will preserve 684 acres of the East End Lagoon on the east end of Galveston Island
Project Extents:	680 acre Conservation Easement
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: No construction required				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	309	Developed by:	J Simmons Group DG
Project Name:	Dune Restoration and Beach Nourishment, Surfside to Brazos River	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would restore approximately 1.9 miles of shoreline extending eastward from the Freeport East Jetty. The area protected by the shoreline is the City of Surfside.
Project Extents:	10,000 LF Dune (Shoreline)
Estimated Construction Costs TOTAL:	$ 12,140,940
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	10+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Shoreline monitoring

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	310	Developed by:	J Simmons Group DG
Project Name:	Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would restore approximately 6.3 miles of shoreline. The area protected by this shoreline includes two popular recreation areas at Quintana and Bryan Beaches and several industrial facilities and placement areas.
Project Extents:	33,000 LF Dune (Shoreline)
Estimated Construction Costs TOTAL:	$ 40,429,330
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		Right of way to business and public areas
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Try to avoid peak tourists season
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor health of repaired area
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	315	Developed by:	
Project Name:	Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel	Checked by:	
Project Type: **Project Subtype:**	Groin Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** 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 Extents:	2 EA Groins; 74,000 LF Gulf (Beach Nourishment)
Estimated Construction Costs TOTAL:	$ 79,974,233
Estimated Construction Duration:	**>5 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements as well as progress payment system must be put in place; owner should consider breaking this solicitation down into several smaller solicitation in order to better utilize available contractor resources and diminish estimated construction duration
	Bid Schedule, Options, Pay Items	Y		Solicitation will call for extensive milestones and progress payments as work is expected to span multiple year; definitively, there will need to be separate contracts for the beach nourishment and groin
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Large scale projects will require estimated timeframes to completion and coordination of multiple contractors
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Considering the project area spans more than 14 miles, it can be assumed that utility and pipeline conflicts may arise; need to remain cautious while designing the project
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic studies will be required following the construction of the groins to gauge the impact of the altered tidal flow on shoreline erosion rates
	Project schedule constraints		N	No external factors which would adversely affect project scheduling are apparent from the details included in the project description
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent conflicts due to seasonality are apparent from the project description
III	**Project Close Out**			

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: The buildability aspect of this project requires significant consideration; the owner should give strong consideration to the idea of breaking up this contract into several smaller solicitations. Instead of listing individual comments in the 'More Info" sections, this comment acts to address all 'Y' responses; significant activities to limit liability on the side of the owner will be required when dealing with a solicitation of this size

Project No.:	318	Developed by:	J Simmons Group DG
Project Name:	Groin at State Highway 332	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Groin Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** This measure would construct a groin extending into the Gulf at State Highway 332, in conjunction with the placement of beach nourishment, to keep the sediment in the system near eroding portions of Surfside Beach. This measure would only be implemented in conjunction with Project 309, "Dune Restoration and Beach Nourishment, Surfside to Brazos River" in order to retain the sediment placed as part of those efforts.
Project Extents:	10,000 LF Gulf / Dune (Beach Nourishment) /Contingent on Project 309
Estimated Construction Costs TOTAL:	$ 2,453,381
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the benefits
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	320	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	GIWW Barrier Island Restoration, Old River and Hickory Coves	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Barrier islands Breakwater	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** 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 Extents:	50 acres Barrier Islands; 10,000 LF Breakwater
Estimated Construction Costs TOTAL:	$ 9,442,569
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Need to issue multiple contracts concurrently to achieve the goals set forth by this contract in a time efficient manner
	Bid Schedule, Options, Pay Items	Y		Extensive project; will require project milestones and progress payments; Furthermore, it would be beneficial to issue multiple contracts with planning to facilitate concurrent work
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Estimated date of completion required in order to establish liquidated damages, etc.
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Need to coordinate ship traffic within the GIWW
	Environmental feasibility with construction options	Y		Environmental study should be conducted to assess impact on wildlife inhabiting barrier islands
	Project schedule constraints	Y		Work in or near GIWW creates constraints
	Adequate construction staging area(s)	Y		Be cautious of wildlife when using barrier islands for staging
	Season Options - nesting periods, etc.	Y		Avian life inhabiting barrier islands
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Be cautious of ship traffic for projects within or near the GIWW; Concurrent contracts to minimize time and mitigate cost implications				

Project No.:	322	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	GIWW Barrier Island Restoration, North Pleasure Island	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Barrier islands Breakwater	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** This measure would restore an island that once protected the GIWW at the northern end of Sabine Lake at Pleasure Island. Some island remnants exist.
Project Extents:	15 acre Barrier Island; 2,000 LF Breakwater
Estimated Construction Costs TOTAL:	$ 3,060,672
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements will be in place
	Bid Schedule, Options, Pay Items	Y		In light of the effort it would require to access the site (mostly in terms of convenience), bid item schedule should be developed
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Need to constrain potential overruns
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Ensure environmentally usable material is used to construct/restore the island
	Project schedule constraints		N	No obvious constraints to the project; contractor must remain aware of GIWW traffic, however
	Adequate construction staging area(s)	Y		Diminished island could act as staging area
	Season Options - nesting periods, etc.		N	Only factors in if the island is inhabited by various fauna
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	No public outreach ceremony is required
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: The source of the clay material must be identified. Will it come from dredging work? Or a different source?

Project No.:	337	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Marsh Restoration, Old River Cove	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** 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 Extents:	1,210 acre Marsh
Estimated Construction Costs TOTAL:	$ 15,247,794
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Options for separate sections of the marsh could be considered; the sourcing of the material could be an option (dredge?)
	Plans and Technical Specifications	Y		Quality of material, source of material, etc. need to be included in the specs
	Tentative project scheduling	Y		Long lead, costly project; requires attention on duration to prevent cost overruns
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Large project area; need to remain aware of utilities
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to perform a study to ensure the usability of the material being utilized for marsh construction
	Project schedule constraints	Y		If dredging is utilized, numerous scheduling conflicts can arise; needs to be addressed
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Various fauna located within the marsh areas; thereby the contractor must take certain precautions
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Possibly consider; not completely necessary
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: In pursuing restoration of marshes, it is important to preserve its well-being while also communicating the benefits of the work performed to the general public; sources for material must designated; award to multiple contractors could be the most preferable course of action (necessary to prevent project overruns)

Project No.:	341	Developed by:	
Project Name:	Marsh Restoration, Long Point Marsh, Galveston County	Checked by:	
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** The project will restore 1,661 acres of emergent marsh with a containment dike of 13.2 miles and 9.6 miles of shoreline protection.
Project Extents:	1,660 acre Marsh; 50,700 LF Misc. Wave Break
Estimated Construction Costs TOTAL:	$ 34,777,482
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding necessary; large scale project
	Bid Schedule, Options, Pay Items	Y		Containment dike and misc. wave break could be two separate solicitations or one solicitation with an the different objectives optioned
	Plans and Technical Specifications	Y		Dredging project; coordination will be required between multiple contractors to attain success
	Tentative project scheduling	Y		Extensive coordination required for project success
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Use of dredged material will require some degree of environment stewardship during the construction process
	Project schedule constraints	Y		Constraints in this project dependent upon material availability (from dredge contractor)
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Restoration of Marsh – may need to consider nesting season.
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: It would be advantageous to separate the solicitation into several separate, smaller contracts; the project framework calls for multiple contractor disciplines

Project No.:	344	Developed by:	J. Simmons Group, Inc.- SS
Project Name:	Marsh Restoration, Pierce Marsh, Galveston County	Checked by:	J. Simmons Group, Inc.- TAN
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** 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 Extents:	2,080 acre Marsh; 8,500 LF Misc. Wave Break
Estimated Construction Costs TOTAL:	$ 29,780,157
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Need to issue separate bid solicitations to accomplish the project framework established in the project description
	Bid Schedule, Options, Pay Items	Y		Multiple contracts will need to be issued; preferably, the contracts will be issued to several independent contractors who can work concurrently to achieve a timely completion of project goals
	Plans and Technical Specifications	Y		Strict adhesion to plans and specs required to prevent unexpected failure of protection systems and long term sustainability
	Tentative project scheduling	Y		Used for progress payments
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Use of dredging calls for pipelines, etc.; need to ensure operations do not endanger existing utilities
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		When considering the use of dredged material (as is the case with this project), environmental impact of excavation and insertion should be considered
	Project schedule constraints	Y		Contingent on coordination of contracts (dredging firm, earthwork firm, etc.)(
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Restoration of marsh – may need to consider nesting season.
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		General rule considered that contractor will monitor sites for significant deficiencies

COMMENTS: Similar in scope to Project No. 341; constructability methodology can be applied with similar logic to both projects; material sourcing (dredge material availability) is a differing factor

Project No.:	346	Developed by:	J. Simmons Group, Inc.- SS
Project Name:	Marsh Restoration, IH-45 Causeway, Galveston County	Checked by:	J. Simmons Group, Inc.- TAN
Project Type: **Project Subtype:**	Levees Marsh, Misc. Wave Break	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed 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 Extents:	630 acre Marsh; 8,500 LF Misc. Wave Break
Estimated Construction Costs TOTAL:	$ 11,021,592
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; solicitation of this magnitude must be carefully structured
	Bid Schedule, Options, Pay Items	Y		Site access should not be an issue but bid items and schedule of options should be developed
	Plans and Technical Specifications	Y		Strict adherence to accepted industry practices required to ensure long term sustainability
	Tentative project scheduling	Y		Required
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Must be taken into consideration when using dredge material
	Project schedule constraints	Y		Project constraints derived from the work of additional contractors involved in the project
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No signs of conflicts from local fauna, etc.
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Similar in scope to Project No. 341, 344, and 346; Methodology can be relatively applies across all three projects; availability of material and the composition of said material will play a key role in constructability

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	360	Developed by:	J Simmons Group DG
Project Name:	West Bay Water Quality Protection Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easements Acquisition	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The purpose of this project is to protect the water quality of West Galveston Bay through an initiative to conserve farm and ranchlands as well as native coastal habitats in watersheds that drain into West Galveston Bay. The initiative will use conservation easements, purchase of development rights and fee title purchases to conserve properties held by willing land owners.
Project Extents:	70 acre Conservation Easement
Estimated Construction Costs TOTAL:	$ 664,650
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Acquisition project, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	380	Developed by:	J. Simmons Group, Inc.- SS
Project Name:	Gordy Marsh Restoration & Shoreline Protection - Phase 1	Checked by:	J. Simmons Group, Inc.- TAN
Project Type: **Project Subtype:**	Marsh, Misc. Wave Break	Date:	February 8, 2017

Region: 1 **Sub Region:** 10 **HUC 10 Region:** 10	**Project Description:** This project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1,700 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 Extents:	3,000 LF Misc. Wave Break; 1,700 acres Marsh
Estimated Construction Costs TOTAL:	$ 21,401,413
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirement; need to determine if solicitation will be made of separate contracts or turnkey
	Bid Schedule, Options, Pay Items	Y		Development of project schedule required to be used with tentative scheduling for priority project (see note for Tentative Scheduling); Concurrent contractor work could expedite completion of the task framework established by the project description
	Plans and Technical Specifications	Y		Determine the definitive apparatus to be used from wave break (Geotubes?)
	Tentative project scheduling	Y		In consideration of this being designated as a priority project, strict constraints must be used in regards to project timeline
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to ensure measures are taken to mitigate environmental impact considering the high priority nature of this project
	Project schedule constraints	Y		Fill source likely to come from dredging; need to coordinate with all contractors involved to prevent delays
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to consider nesting season
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony	Y		High priority; need to stage ceremony to highlight progress
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Considering the scrutiny and pressure preceding this project, strict adherence to methodology is required; dredged material composition subject to review for increased likelihood of constructability success				

Project No.:	414	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Galveston County Oyster Reef Creation	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project will create 100 acres of oyster reef throughout Galveston County.
Project Extents:	100 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 10,286,250
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	10+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding
	Bid Schedule, Options, Pay Items	Y		Need to develop schedule to process progress payments
	Plans and Technical Specifications	Y		Alternative options for oyster reef substrates can be explored; recycled concrete will suffice if no favorable alternative discovered
	Tentative project scheduling	Y		Schedule required to gauge success and progress of reef creation
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	Negative response for this line item; caution is advised, however
	Traffic Control, Coordination, and Site access[2]	Y		Need to coordinate with boaters to restrict access to the reef mitigation site
	Environmental feasibility with construction options	Y		Need to ensure the water quality is conducive to oyster life prior to beginning this project
	Project schedule constraints	Y		Want to coincide with spat set peak.
	Adequate construction staging area(s)	Y		Will likely need a barge if reef is offshore; should make a note of such in the specifications
	Season Options - nesting periods, etc.	Y		Should be scheduled in such a way that the work is performed when larvae counts are high
III	**Project Close Out**			
	Contractor maintenance period required	Y		Need to closely monitor the progress of the reefs
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Monitoring Success - 1 year monitoring of marsh, etc.	Y		As stated above, monitoring of the oyster reef creation is essential moving forward
COMMENTS: The most pivotal pieces for the constructability of this project is the monitoring of the substrate adhesion process and the prevention of premature harvesting (or over harvesting)				

Project No.:	417	Developed by:	J Simmons Group DG
Project Name:	GIWW Island Restoration, Orange County	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Barrier Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** The project involves the creation of 131 acres of new barrier island habitat along the GIWW in Orange County that would include both wetland and vegetated shallows.
Project Extents:	131 acre Barrier Island
Estimated Construction Costs TOTAL:	$ 19,339,230
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Habitat monitoring

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	418	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Sargent Beach Dune/Beach Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Gulf Dune	Date:	February 8, 2017

Region: 2 **Sub Region:** 1 **HUC 10 Region:** 23	**Project Description:** The project involves approximately 8 miles of beach and dune restoration in Sargent Beach.
Project Extents:	45,000 LF Gulf; 45,000 LF Dune
Estimated Construction Costs TOTAL:	$ 54,634,230
Estimated Construction Duration:	**3-5 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Need bonding and additional provisions for a contract of this magnitude
	Bid Schedule, Options, Pay Items	Y		Schedule and bid items must be developed; large scale project such as this will require progress billings per determine pay items; consider concurrent contractor award and NTP strategy in order to minimize project duration and cost implications
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Need to establish schedules for completion to prevent costly overruns; concurrent scheduling would also require additional efforts on the part of the owner and contractors to synchronize efforts
II	**Buildability**			
	Right of Way	Y		Public beach; need to sort rights of way for construction
	Utility / pipeline conflicts identified and addressed		N	Though none are apparent, existence of utilities must be accounted for
	Traffic Control, Coordination, and Site access[2]	Y		Restricted access to beach during construction
	Environmental feasibility with construction options	Y		Need to ensure that material used for beach and dune restoration is environmentally sound
	Project schedule constraints	Y		Tourist activity; need to schedule and advertise project effectively to prevent conflicts
	Adequate construction staging area(s)	Y		Plenty of area for staging of equipment
	Season Options - nesting periods, etc.		N	Nothing should prevent construction, but informing local population of project is crucial
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Could have a positive PR benefit from
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Expensive project which should be constructible; due to proximity to local residents this project should take priority over beach/dune restorations in more remote areas				

Project No.:	423	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Matagorda Bay System Hydrologic Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 2 **Sub Region:** 6 **HUC 10 Region:** 28	**Project Description:** The proposed project includes hydrologic restoration of the Matagorda Bay System. This would result in the preservation of aquatic habitat and marshes in Matagorda, East Matagorda, Tres Palacios, Carancuhua and Lavaca Bays.
Project Extents:	100 acre Marsh
Estimated Construction Costs TOTAL:	$ 1,346,054
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements
	Bid Schedule, Options, Pay Items	Y		Smaller scale project than many other Tier 1 projects; scrutiny in designing solicitation to accept progress payments is less severe
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		If solicitation is designed for progress payments, tentative scheduling will be required
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Involves excavation therefore utilities must be accounted for
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		In the case of hydrologic restoration extensive testing must be done in relation to salinity levels, etc.
	Project schedule constraints		N	No schedule conflicts are initially inherent
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No obvious conflicts but need to account for fauna in existing marsh area
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: Constructability is not so much an issue as priority

Project No.:	430	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Redfish Lake on Carancahua Bay Shoreline Stabilization	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The proposed project includes 3 miles of breakwaters. The restoration of the protective barrier, oyster reefs, marsh, and sea grasses would preserve special aquatic sites such as wetlands and vegetated shallows.
Project Extents:	15,900 LF Breakwater; 100 acre Marsh
Estimated Construction Costs TOTAL:	$ 8,223,599
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; need several separate solicitations for final bid
	Bid Schedule, Options, Pay Items	Y		If all objectives included in project description are meant to be achieved solicitation will need to be broken down to address all areas of concern
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Expensive; need to exert control on project timelines to reduce costs
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		When dealing with oyster reef restoration, hydrologic studies must conducted at minimum
	Project schedule constraints	Y		Want to coincide with spat set peak – oyster reef
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	Be aware of
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

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[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: Though project description called for oyster reef restoration, project quantities did not specify any material to be used for such a project. Is the restoration implied to come from the construction of the breakwater?

Project No.:	437	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Fulton Beach Road Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** 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 Extents:	18,500 LF Breakwater, 50 acre Marsh
Estimated Construction Costs TOTAL:	$ 8,700,172
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding, provisions for progress payments, etc.
	Bid Schedule, Options, Pay Items	Y		Separate options for the construction of the breakwater and the establishment of a living shoreline; same solicitation with options for either portion of work or separate solicitations? (separate solicitations will more than likely be the preferred option
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be required to effectively coordinate efforts for establishment of living shoreline; construction of breakwater should precede work on marsh and shoreline restoration
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though no utilities are apparently in harm's way from info. available, precaution should be taken regardless
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic study to gauge effectiveness of marsh restoration
	Project schedule constraints		N	Few outside factors that could impact scheduling of this project once solicited
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		Substantial projects such as this one (and numerous other projects in Tier 1) require extra effort to limit liability on the part of the

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

				owner
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Need to remain vigilant in monitoring the success of the marsh creation
COMMENTS: Need to confirm the length of the proposed breakwater structure; One mile represents a large difference in price and, subsequently, feasibility; constructability should not be an issue				

Project No.:	443	Developed by:	J Simmons Group DG
Project Name:	Nueces County Hydrologic Restoration Study	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Studies	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The project involves hydrologic restoration in Nueces, Corpus Christi, Aransas, and Copano Bays to restore special aquatic sites such as wetlands, mudflats, and vegetated shallows recognized as nationally significant by the Clean Water Act.
Project Extents:	Studies
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: This is a study, no construction is required

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	452	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Bird and Heron Islands Restoration, Cameron County	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The project includes construction of 0.8 miles of breakwaters to protect and restoration for Bird and Heron Rookery Islands. These improvements would increase critical habitat for the wintering piping plover, recognized as a threatened species in Cameron County. A feasibility study has been funded to determine the most effective methods to protect these islands from further erosion.
Project Extents:	4,250 LF Breakwater, 15 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 3,122,523
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Solicitation should be optioned to allow separate bidding on the construction of the breakwater structure and the fill of the rookery island (dredge?)
	Plans and Technical Specifications	Y		Due to the sensitive nature of the issue being addressed, plans and specs need to reviewed at regular intervals to ensure that the contractor action plan is not antithetical to the desired objective
	Tentative project scheduling	Y		Will be required for coordination of contractors
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though no conflicts are inherent, precautions should be followed
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to closely monitor the material going into the site in order to promote settlement of piping plover species
	Project schedule constraints	Y		Pending feasibility study in order to determine method to ensure future sustainability of the island (per project description)
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		But be aware and cognizant of the nesting period for the threatened bird species, whole basis of the project is to protect them
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Project of significance for Cameron County and the wildlife preservation community; should at least generate marketing material to showcase the additional conservation efforts the coastal resiliency master plan can offer
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Need to monitor the influx/outflow of wintering piping plover

COMMENTS: Results of feasibility study could ultimately guide the methodology implemented for this project

Project No.:	457	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	GIWW Island Restoration, Jefferson County	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** The proposed project aims to restore 42 acres of island habitat in Jefferson County. The new island habitat would contain special aquatic sites such as wetlands and vegetated shallows.
Project Extents:	40 acre Marsh
Estimated Construction Costs TOTAL:	$ 795,206
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required though less stringent procurement and contracting requirements due to smaller size (relative to other Tier 1 Projects)
	Bid Schedule, Options, Pay Items	Y		Will solicitation be awarded to two contractors (dredging and dike construction)?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Likely to include progress payments; need to scheduling to facilitate such an action
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Requires attention
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to test quality of material going into the site as well as the quality of water and materials flowing out
	Project schedule constraints		N	There not many apparent exterior factors that could impact scheduling
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	Makes no mention of important species which need to be preserved; however, caution should be taken
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	The added cost of staging such a ceremony would be unnecessary

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Need to monitor the life and success of the marsh moving forward

COMMENTS: Constructability is not an issue; simply need to properly designate and coordinate dredge material sources to facilitate marsh fill and dike construction

Project No.:	458	Developed by:	J. Simmons Group, Inc.- SS
Project Name:	Marsh Restoration, Jefferson County	Checked by:	J. Simmons Group, Inc.- TAN
Project Type: Project Subtype:	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** The project would involve restoration of 9,304 acres of marsh habitat. Doing so would preserve special aquatic sites such as wetlands and vegetated shallows recognized as nationally significant by the Clean Water Act (33 USC 1344) and would preserve exceptionally scarce and declining estuarine intertidal and emergent marsh as determined by the latest USFWS/NOAA status and trends report.
Project Extents:	9,300 acre Marsh
Estimated Construction Costs TOTAL:	$ 118,621, 167
Estimated Construction Duration:	**>5 years**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Large scale project; strict bid requirements and structuring of the contract to include methods for progress payments will be required
	Bid Schedule, Options, Pay Items	Y		Consider breaking this contract into a series of small contracts; constructability will be hindered by the magnitude of the project as a single contractor will struggle to meet production needs consistently; need to establish pay items to facilitate progress payments; need to utilize concurrent contracting in order to prevent cost overruns from time mismanagement and resource under utilization
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		If concurrent task scheduling is considered, extensive scheduling will be required to coordinate the efforts of the various contractors involved
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Area spanning nearly 15 square miles; utilities need to be addressed
	Traffic Control, Coordination, and Site access[2]	Y		Site access will likely be restricted in pursuing an undertaking so large
	Environmental feasibility with construction options	Y		Appears to be a critical project per the synopsis given in the project description; additional scrutiny must be placed on environmental testing when there is increased federal pressure and oversight surrounding the project
	Project schedule constraints	Y		No outside factors identifiable per project description; a project of this size should anticipate delays due to scheduling of contractors, contract issuance and compliance, labor resource availability, etc.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Large areas with abundant fauna; need to address seasonality issues as to not encounter further scrutiny
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Large scale project with a high price tag should include
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Need to assess material availability and quality in order to approve constructability; arrange for concurrent contracting; strong potential to shrink the current estimated project duration below 5 years				

Project No.:	600	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Half Moon Reef Restoration in Matagorda Bay - Phase III	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Reef Habitat	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The proposed project would restore 30 acres of reef habitat in Matagorda Bay. This particular restoration design approach will greatly enhance the biodiversity and productivity of critically important Essential Fish Habitat and contribute to the overall fisheries resources in the nearby bay and offshore waters through marine species recruitment. Improved water quality, increased recreational fishing opportunities, enhanced marine biodiversity and other ecosystem benefits are anticipated with a completed project.
Project Extents:	30 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 3,085,875
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**10+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements; contractor will also be required to monitor the progress of oyster larvae settlement on designated substrate
	Bid Schedule, Options, Pay Items	Y		Need to determine pay items for progress billings; allow contractor to propose items used for substrate (creative solutions)?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Will be required in order to coordinate with fisherman, etc. with a vested interest in harvesting aquatic life from the designated areas
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic restoration (or studies at the very least) must be considered when pursuing this project; need to create an ecosystem conducive to sustaining life on a large scale
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Though it is unlikely to interfere with the solicitation of this project; seasonality of harvesting must be considered
III	**Project Close Out**			
	Contractor maintenance period required	Y		Must monitor the progress of oyster substrate adhesion following material placement
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony	Y		Project of significance for the various parties involved (business, conservationists, etc.); some marketing material should be generated to highlight project successes (whether or not reef mitigation contractor will be responsible for this is subject to debate)
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Allow for creative options in regards to oyster reef mitigation?

Project No.:	605	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Guadalupe Delta Estuary Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater	Date:	February 8, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** The 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 Extents:	8,800 LF Breakwater
Estimated Construction Costs TOTAL:	$ 3,806,440
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Is creation of a living shoreline to be included with the solicitation for river diversion? Or will the solicitations be separated?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Will require progress payments; tentative scheduling will be required to do so
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		In diverting river flow, impacts on utilities need to monitored despite the fact there does not appear to be any obvious conflicts
	Traffic Control, Coordination, and Site access[2]	Y		Any potential water-borne vehicle traffic must be made aware of the changes
	Environmental feasibility with construction options	Y		Extensive hydrologic studies must be performed both before and after the project
	Project schedule constraints		N	No apparent conflicts from project description; subject to change as project progresses
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	Nothing apparent; should be monitored, however
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS: Initial project descriptions and costs do not include a provision for creation of a living shoreline; the additional cost implications from this undertaking must be considered

Project No.:	607	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Moses Lake Wetlands Restoration & Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The third phase of the Moses Lake Wetlands Restoration and Protection project seeks funding for construction of the preferred alternatives developed in the engineering, design, and permitting phase. The alternatives include construction of nearshore segmented breakwater structures in Moses Lake and placement of materials to restore elevations suitable to support emergent vegetation and upland coastal species.
Project Extents:	4,000 LF Breakwater; 30 acres marsh
Estimated Construction Costs TOTAL:	$ 2,163,883
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Will alternatives be bid as separate solicitations or as options under one contract?
	Bid Schedule, Options, Pay Items	Y		See comments above (issuing to separate solicitations will likely be the most mutually beneficially course of action)
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling and coordination will be required if the two alternatives are approached separately
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Additional environmental testing may be necessary; however, many of these requirements may have been addressed in the engineering, design, and permitting phase listed in the project description
	Project schedule constraints	Y		Pending receipt of funding pursuant to an ongoing effort for this area
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No such issues are inherent; subject to change
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Monitoring Success - 1 year monitoring of marsh, etc.	Y			

COMMENTS: Ultimate funding for this job appears tied to existing Moses Lakes Restoration and Protection project

Project No.:	616		Developed by:	J Simmons Group DG
Project Name:	Alligator Point Island Restoration		Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands		Date:	February 8, 2017
Region: 1 **Sub Region:** 19 **HUC 10 Region:** 19	**Project Description:** To support colonial water bird populations, this project seeks to enhance the existing island to a sustainable elevation and increase its size. The island as currently designed will be similar to its configuration is 1990 of approximately 10 acres in size and at approximately 4 ft. elevation mean tide. The island will be protected by the placement of approximately 4,000 ft. of breakwater and will be planted with desirable plant species that will support platform and ground nesting species.			
Project Extents:	4,000 LF Breakwater; 10 acre Rookery Island			
Estimated Construction Costs TOTAL:	$ 2,641,022			
Estimated Construction Duration:	<1 year			
Longevity and Useful Life (yrs)	15+ years			

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	618	Developed by:	J Simmons Group DG
Project Name:	Jig Saw Island Restoration	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project will aim to restore Jigsaw Island to support and sustain the multiple bare ground nesting bird species that inhabit the island. The project will include 2,900 linear feet of reef structures to mitigate erosive wave action and 3.4 acres of restored island habitat, 1.26 acres of which would support ground nesting birds (elevation above 2 feet MTL).
Project Extents:	2,900 LF Misc. Wave Break; 3 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 1,060,332
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting period
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	637	Developed by:	J Simmons Group DG
Project Name:	Port Freeport Regional Sediment Management-Habitat Restoration Initiative	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Sediment Management	Date:	February 8, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** Port Freeport (PF) will develop a Regional Sediment Management Plan and Restoration Initiative with the dredge material (DM) that is coming from the present and future expansion, associated with the deepening and widening of the Port navigation channel and creation of new infrastructure. PF has a commitment dedicating the entire DM from its expansion exclusively to restoration.
Project Extents:	Plans
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: Management program, no construction required				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	641	Developed by:	J Simmons Group DG
Project Name:	Oyster Reef Restoration in Upper Galveston Bay	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region:	1	**Project Description:** This project seeks to restore 150 acres of degraded Galveston Bay oyster reefs using a landscape approach to create a network of spatially separated oyster populations. A network of high vertical relief source and sink oyster reefs will be created in Upper Galveston Bay. This will allow for increased oyster population sustainability and oyster habitat resiliency.
Sub Region:	16	
HUC 10 Region:	16	

Project Extents:	150 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 15,429,375
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor oyster growth

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	645	Developed by:	J Simmons Group DG
Project Name:	Long-Term Recovery of Gulf Shorebirds and Waterbirds	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The project will create and maintain seasonal freshwater wetland habitat for multiple important shorebird species. The project will also aim to increase the regional breeding populations by improved management of critical nesting and stopover habitats along the Gulf Coast.
Project Extents:	1,000 LF Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Wetland monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	658	Developed by:	J Simmons Group DG
Project Name:	Bahia Grande Living Shoreline and Public Access Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater	Date:	February 8, 2017

Region:	4	**Project Description:** This project would beneficially use the dredged material from the ongoing Bahia Grande Restoration Project. The material would be used to construct a platform for a parking area providing public access to area, as well as to stabilize a peninsula near the parking lot within Bahia Grande with 1,000 feet of living shoreline feature to create additional habitat and stabilize the existing 2.5 acres of habitat.
Sub Region:	8	
HUC 10 Region:	67	
Project Extents:		1,000 LF Breakwater; 3 acre Marsh
Estimated Construction Costs TOTAL:		$ 483,516
Estimated Construction Duration:		<1 year
Longevity and Useful Life (yrs)		15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Studies must be done on the dredged material to make sure that it would be suitable for a parking area.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	678	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Indian Point Shoreline Protection – Phase II	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** Phase I of this project included the construction of approximately 1,040 linear feet of limestone revetment and offshore breakwaters. Phase II of the 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 Extents:	1,040 LF Breakwater
Estimated Construction Costs TOTAL:	$ 880,977
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirement; two separate bid solicitation cycles?
	Bid Schedule, Options, Pay Items	Y		A bid schedule (inclusive of pay items) will have to be developed; however, the project description seems to relay that there will be two bidding cycles (unless phase II is presented as an option for phase I)
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Must present a schedule that completes the project in the linear method desired (unless this approach is subject to change)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		No conflicts are apparent but contractor must be cautious working near a population center
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Hydrologic study necessary considering the alteration this project would cause to natural tidal flow patterns
	Project schedule constraints	Y		
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	Does not appear to be any conflict in regards to seasonal nesting periods
III	**Project Close Out**			
	Contractor maintenance period required	Y		Given a 'Y' designation because it always beneficial to develop the items listed in order to limit liability on both sides
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	No ceremony or public outreach efforts are

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

				necessary
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Must monitor the success of the protected habitats.
COMMENTS: Constructability seems plausible; decisions need to be made about the timeline and method for bidding this as a two Phase Project				

Project No.:	680	Developed by:	J Simmons Group DG
Project Name:	Nueces Delta Marsh Plan and Restoration Project – Phase II	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region:	3	**Project Description:** This project will continue management and restoration of approximately 4,700 acres of vital habitat within the Nueces River Delta and conserve diverse estuarine marsh and prairie habitat. Numerous aquatic species and endangered or threatened avian species utilize the areas within the delta as breeding and nursery grounds. This project will develop and implement a comprehensive management plan for the area to allow for protection and restoration of the terrestrial and estuarine habitats.
Sub Region:	10	
HUC 10 Region:	49	

Project Extents:	1 EA Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	696	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Shamrock Island Restoration – Phase II	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Breakwater Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** This project involves 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 breakwaters will protect 2,045 linear feet of prime beach nesting habitat, 11.5 acres of saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat from erosion. Improvements to the 150-acre rookery island will enhance the habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, and the American Oystercatcher.
Project Extents:	900 LF Breakwater; 150 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 10,734,907
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Several different contracts included within this project; all will require bonding
	Bid Schedule, Options, Pay Items	Y		Will require attention in regards to the division of options when issuing bid solicitations; optimal order of operations must also be determined in order to effectively schedule bidding process; concurrent contracting will be required to achieve reasonable project completion timelines
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Project scheduling must be provided; the only way to effectively manage project number 696 is through effective planning
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Routine and water testing should be pursued to ensure the survivability of the habitats this project wishes to restore
	Project schedule constraints	Y		External factors which could constrain this project are minimal. However, since there are three distinct tasks included in this project (rookery island, marsh breach restoration, breakwater), task planning must be carefully monitored
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		One of the auxiliary goals of this project is to facilitate the influx of three threatened species of birds; need to remain cognizant of their nesting patterns in order to prevent work from further disturbing their habitat

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		No formal ceremony should necessarily be staged; however, for projects with
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Effective planning and contractor/contract management is more than likely the most important component of this project				

Project No.:	705	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Packery Channel Nature Park Enhancement and Wildlife Rehabilitation Center	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The Packery Channel Nature Preserve property has been identified as a preferred location for a wildlife rescue and rehabilitation center. One project goal is the creation and restoration of ecologically important oak motte woodland habitat, which is critical to migratory and resident birds, insects, reptiles, and mammals in this area.
Project Extents:	1 EA Wetlands/ Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		Environmentally sensitive project; essential to maintain a dialogue with contractor to ensure specifications for proposed woodland habitat are followed
	Tentative project scheduling	Y		Though less intensive than other Tier 1 projects, a project schedule should still be developed
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Environmentally sensitive project; need to assure that local fauna are not disturbed in a salient manner; though project description is mildly vague as to what construction items will be included
	Project schedule constraints	Y		Can encounter conflicts due to daily operation of the nature preserve however there is no immediate evidence of such a thing occurring; response listed as 'Y' but is subject to change from additional data
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Interaction between contractors and fauna is paramount to the success of this project; if possible, the nesting habits of the animals the GLO hopes to introduce to the new woodland habitat must be considered
III	**Project Close Out**			
	Contractor maintenance period required	Y		Subject to change; any critical failures in the contractors work should be covered under a warranty

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Could hold ceremony to commemorate the newly created woodland habitat to generate positive relations with conservationists, etc.
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Debatable as to whether the contractor will be held responsible for the success in populating the newly created habitat; more than likely they will not; however, their work should be monitored for any potential failures
COMMENTS: Environmental projects such as these with positive connotations such as these are extremely beneficial from a public relations stand point; however, in analyzing this project under the paradigm of 'Coastal Resiliency', its importance is difficulty to justify (though not to dismiss its mission which is pivotal to ensuring the sustainability of the coastal ecosystem)				

Project No.:	713	Developed by:	J Simmons Group DG
Project Name:	Middleton Wetlands Creation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 9 **HUC 10 Region:** 9	**Project Description:** The project aims to construct 300 acres of freshwater wetlands in abandoned rice farmland on the Middleton unit of the Anahuac NWR. Included in this project is the creation of a 70 acre reservoir/moist soil unit that will provide water to the wetland units. The improvements will provide wetland habitat to migratory and resident wildlife, including significant numbers of ducks, geese, shorebirds and wading birds.
Project Extents:	1 EA Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor marsh
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	716	Developed by:	J Simmons Group DG
Project Name:	Galveston Bay Bird Nesting Islands Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 10 **HUC 10 Region:** 10	**Project Description:** The objective of the project is to restore various rookery islands' footprints to historical size and increase elevations that will better support colonial water birds over the long term. Dredged material will be strategically added to the Vingt-Et-Un Islands to increase elevation and prevent over wash of ground nesting birds. Shrubs and other vegetative plantings will be added to stabilize sediment and provide nesting sites for shrub-nesting colonial water birds. A structure to reduce wave action/intensity will likely be needed.
Project Extents:	2,000 LF Misc. Wave Break; 100 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 7,561,939
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting season
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor vegetation and structure
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	717	Developed by:	J Simmons Group DG
Project Name:	South Deer Island Acquisition and Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions Rookery Islands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project involves the acquisition and restoration of South Deer Island to ensure that the site is properly managed and to protect the important ecological site to directly benefit the various species that use the island for nesting.
Project Extents:	100 acre Acquisition; 100 acre Rookery Islands
Estimated Construction Costs TOTAL:	$ 8,948,996
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting period
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: The construction duration will depend on what construction will be needed to restore the island. Who will be doing the management of the site after the restoration is completed?

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	764	Developed by:	J Simmons Group DG
Project Name:	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Acquisitions	Date:	February 8, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** This project involves the acquisition of 1,700 acres of non-tidal, fresh water marsh adjacent to the J.D. Murphree WMA. The property supports a variety of wetland plants and provides habitat for species of concern, such as mottled ducks and pig frogs. Acquisition of this property would increase opportunities to conserve and manage valuable coastal habitat and would increase public access and public recreation opportunities.
Project Extents:	1,000 LF Acquisition, 20 acre Marsh
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Acquisition project, no construction required

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	769	Developed by:	J Simmons Group DG
Project Name:	San Jacinto North Shore Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 14 **HUC 10 Region:** 14	**Project Description:** San Jacinto Battleground State Historic Site preserves 1100 acres of the battleground where Texas won independence from Mexico. This area has experienced the loss of roughly 200 acres of land, including riparian forests and wetlands, fringing wetlands, wet meadows, and marshes due to subsidence and erosion from ship wakes. The North Shore Restoration Project proposes to restore approximately 20 acres of uplands and tidally influenced wetlands using a combination of rock breakwaters, backfilling, marsh restoration, and planting. These efforts would also assist in the recovery of valuable parkland for public access, recreation, and interpretation.
Project Extents:	1,000 LF Breakwater; 20 acre Marsh
Estimated Construction Costs TOTAL:	$ 731,566
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Keep public out during construction
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting period
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Community outreach since it is in a historic area
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	777	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions Marsh	Date:	February 8, 2017

Region: 2 **Sub Region:** 15 **HUC 10 Region:** 37	**Project Description:** This project would protect and restore whooping crane habitat along the Texas coast by working with water users to maintain environmental flows. Funds would be used to purchase water rights or pay for water use reductions in order to capture or retain excess water for environmental flows. Funding for this project would also be used to purchase and restore riparian areas in the basins utilized by whooping cranes from willing sellers where an acquisition is strategically feasible and advantageous.
Project Extents:	10,000 acres Acquisitions; 10,000 acre Marsh
Estimated Construction Costs TOTAL:	$ 123,754,459
Estimated Construction Duration:	>5 years
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		Though the project description lists a lump sum of marsh creation, the most effective path would be to issue separate solicitations as water rights are attained; an alternative route would be to contract a single contractor and list options for the subsequent work as it comes available; concurrent contracting would be the preferred course of action in order to minimize project duration and control cost implications
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Project scheduling is important as progress payments will be necessary; however, any work on this project is contingent on the participation of 'willing sellers'
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Attaining water rights may coincide with utilities being in proximity to purchased areas; simply need to remain aware of the possibility
	Traffic Control, Coordination, and Site access[2]	Y		This provision would come into play once the construction of marshes actually begins
	Environmental feasibility with construction options	Y		Testing in regards to material used in marsh creation must be undertaken; seeking to protect the habitats of a threatened species is the main objective
	Project schedule constraints	Y		Contingent on the 'willingness' of water rights sellers; any and all undertakings coming afterwards (retention of excess water flows, riparian restoration) are contingent on purchasing these rights
	Adequate construction staging area(s)	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Season Options - nesting periods, etc.	Y		Protection of whooping crane habitats are one of the primary objectives of this project; therefore the nesting and migratory habits of these birds must be accounted for
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	No special ceremony can be held; simply need to advertise the benefits of the work undertaken as a result of the water rights purchase
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Much of this project's success is contingent on the participation of outside actors; though perfectly constructible, the front end efforts cannot be downplayed; need to award multiple contracts to multiple contracts in order to effectively utilize available contractor resources and reduce projected duration as much as possible				

Project No.:	779	Developed by:	J Simmons Group DG
Project Name:	Copano Bay Oyster Reef Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 3 **Sub Region:** 7 **HUC 10 Region:** 46	**Project Description:** The primary goals for the project are to design and construct a segmented reef structure that enhances the recruitment and productivity of native oysters, provides a biologically rich and diverse collection of reef-dependent estuarine organisms, and builds resiliency into the Copano Bay estuarine ecosystem. The project also includes a monitoring program to assess project performance over 3 to 5 years post-construction.
Project Extents:	50 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 5,143,125
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitoring of oyster growth

COMMENTS: Who will be doing the monitoring program?

1 Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
2 Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	793	Developed by:	J Simmons Group DG
Project Name:	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed initiative includes a number of measures to rehabilitate several high profile properties owned by the GBF with the purpose of increasing the potential wildlife habitat value. These include creation of 14 acres of ephemeral freshwater wetlands and construction of 2,000 linear feet of erosion control structures along the shorelines of Sweetwater Preserve and Frost-Deen tract. The plan also proposes implementation of best management practices including brush management and prescribed fire in an effort to promote native plant diversity on coastal prairies located in Chambers and Galveston Counties.
Project Extents:	2,000 LF Breakwater; 1 EA Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 2,131,100
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Wetland monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	794	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Galveston Bay Oyster Reef Restoration and Enhancement	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 11 **HUC 10 Region:** 11	**Project Description:** This project would result in the restoration of 400 acres of oyster reef within three areas of Galveston Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
Project Extents:	400 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 41,145,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding would be required; important to include the stipulations regarding the success monitoring process
	Bid Schedule, Options, Pay Items	Y		Need to include pay items for oyster monitoring; would the same contractor be responsible for this? Or would this provision be a separate contract?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be required to process progress payments
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	Issued a 'N' response due to the fact that no apparent utilities conflicts are present from project description; subject to change if conflicts are identified
	Traffic Control, Coordination, and Site access[2]	Y		Need to control and monitor ship traffic
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	Issued a 'N' response due to the lack of inherent evidence that issues could arise regarding to seasonality; subject to change if new evidence arises
III	**Project Close Out**			
	Contractor maintenance period required	Y		Need to schedule extensive monitoring of the oyster reefs to ensure successful adhesion to substrate
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Creative, alternative options for oyster reef creation can be considered; the project description states that three areas have been designated for oyster reef mitigation; this could be issued as three separate contracts				

Project No.:	797	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Restore Colonial Water Bird Rookery Habitat in Dickinson Bay	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The objective of this project is to restore two 5 to 7 acre colonial water bird rookery island in Dickinson Bay, which will be Phases II and III of the original Dickinson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approximately 5 acres of nesting space for colonial water birds and 2-acres of oyster reef. Approximately 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 and around Dickinson Bay. Partial funding is in place for these phases.
Project Extents:	2 acre Oyster Reef; 5 acre Rookery Islands
Estimated Construction Costs TOTAL:	$ 1,143,016
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Need to issue two separate bid solicitations; one for the rookery island and one for the oyster reef mitigation
	Bid Schedule, Options, Pay Items	Y		Contractor will likely be unable to handle the requirements for both the rookery island and the oyster reef; could issue a single contract with an option for either the rookery island or the oyster reef but it would not be preferred; will the contractor be required to pay any of the cost of the cultch?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Considering the project is being broken into distinct phases, scheduling will be required in order to effectively schedule the remaining pieces of the project
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	Issued a 'N' response due lack of sufficient evidence to respond 'Y'; however, due to the need for dredging, pipeline issues will need to addressed
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Colonial water bird life is a pivotal factor in this project. As such, the material being dredged into the rookery island must be tested for usability; the hydrologic properties of the water need to be tested as well
	Project schedule constraints	Y		Want to coincide with spat set peak. – oyster reef
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods for colonial birds must be taken into account; scheduling of work must prevent disturbing the already fragile bird habitat

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

III	**Project Close Out**			
	Contractor maintenance period required	Y		Need to follow up on the survivability of the oyster reef to ensure the substrate is working
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Some marketing material should be generated to show the benefits of the rookery island
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: For further clarification; stipulate what work will be included in Phase II and Phase III (i.e. what work is individually included in each)				

Project No.:	801	Developed by:	J Simmons Group DG
Project Name:	West Galveston Bay Marsh Restoration – Chocolate Bay	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 18 **HUC 10 Region:** 19	**Project Description:** The project involves restoration of approximately 1,600 acres of intermediate marsh on the north side of West Galveston Bay between Halls and Chocolate Bayou's. The project will also include the placement of two large water control structures to drain the marsh and stabilize the project area with rock and other similar materials. This will allow the marsh to function as it did historically by restoring the hydrology to pre-GIWW conditions.
Project Extents:	1,600 acre Marsh
Estimated Construction Costs TOTAL:	$ 21,536,863
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring
COMMENTS: Who will monitor and maintain the water control structures?				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	806	Developed by:	J Simmons Group DG
Project Name:	Restoration of Rookery Islands in Upper Laguna Madre	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Rookery Islands	Date:	February 8, 2017

Region:	3	**Project Description:** The objectives of this project will be to determine the appropriate size and location for the creation of a new rookery island and to obtain preliminary feasibility analysis, engineering, and cost estimates.
Sub Region:	14	
HUC 10 Region:	53	

Project Extents:	5 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 2,830,048
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: This is a study, no construction is required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	809	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Barrier Island Habitat Conservation - Coastal Bend	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project aims to purchase land, purchase development rights, and donate conservation easements to protect essential habitat on Mustang and North Padre Islands.
Project Extents:	100 acre Acquisitions
Estimated Construction Costs TOTAL:	**TBD**
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Ceremony to hand over newly purchased land could be planned
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Project does not mention any actual construction activities. All responses are 'N' for the time being pending additional information; Constructability does not pose an issue

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	811	Developed by:	J Simmons Group DG
Project Name:	Zarate Tract - Laguna Atascosa National Wildlife Refuge	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The 914 acre Zarate Tract is located on the north side of the Bahia Grande unit of Laguna Atascosa National Wildlife Refuge, about 12 miles west of Port Isabel, Texas. The USFWS aims to acquire this land to better manage these coastal wetlands and improve wildlife access to existing and future/restored wildlife corridors.
Project Extents:	915 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	822	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Wetlands of Paso Corvinas at the Bahia Grande Unit of Laguna Atascosa - Phase II	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The goal of the project is to restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar and thereby restoring connectivity between Paso Corvinas and the Bahia Grande. To do this, first a hydrological study will need to be performed to be followed by design and construction of the hydrologic restoration alternative. An improved low water crossing is needed on the northeastern side.
Project Extents:	1 EA Wetlands/Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding will be required
	Bid Schedule, Options, Pay Items	Y		There are many stages of construction needed to complete this project; the manner in which the project description is presented, it appears as though there will be several different bid solicitations issued at various intervals; is the removal of the sandbar distinctive from the hydrologic restoration alternative?
	Plans and Technical Specifications	Y		Will a contractor be involved in the design of the hydrologic alternative as a result of their study or will it solely be state/federal design?
	Tentative project scheduling	Y		At least 3 projects are included in the project description above; need to establish a more concrete timeline (both from owner and contractor perspective)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Extensive hydrologic testing required; additional testing required
	Project schedule constraints	Y		Though not from external factors, project could experience constraints stemming from delay when awaiting testing results, issuance of plans and specs (hydrologic restoration alternative), etc.
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent conflicts arising from seasonality
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: There seems to be many pending pieces regarding this project; additional constructability consideration will be issued once alternatives become more concrete				

Project No.:	827	Developed by:	J Simmons Group DG
Project Name:	South Padre Island American Land Conservancy Tract	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region:	4	**Project Description:** The project involves acquisition of 186 acres of land currently owned by the American Land Conservancy. The goal is to acquire this property for the Laguna Atascosa National Wildlife Refuge as a part of the Laguna Atascosa National Wildlife Refuge Comprehensive Conservation Plan.
Sub Region:	8	
HUC 10 Region:	67	

Project Extents:	185 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	829	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Oyster Reef Restoration in Nueces and Corpus Christi Bays	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** 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.
Project Extents:	5 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 514,313
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Need to include additional provisions for monitoring; bonding, etc.
	Bid Schedule, Options, Pay Items	Y		Will the bid solicitation be issued under a single contract with options for the five locations or will there be separate contracts?
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Project scheduling for progress payments; due to size and scope; would owner like to issue a lump sum payment?
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Need to be aware of any potential pipelines, etc.; no inherent conflicts, however
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to ensure the sites designated for oyster reef can sustain healthy oyster habitation (salinity levels, etc.)
	Project schedule constraints	Y		Want to coincide with spat set peak – oyster reef
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Seasonality of oyster habitation must be considered
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Need to monitor oyster habitation

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS:

Project No.:	834	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Salt Bayou Siphons	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Hydrologic Restoration	Date:	February 8, 2017

Region: **Sub Region:** **HUC 10 Region:**	1 6 6	**Project Description:** The project involves the placement of siphons at two locations in the Salt Bayou system in southern Jefferson County. These locations are on the J.D. Murphree WMA and the McFaddin NWR. These siphons will restore a hydrologic connection between the freshwater marsh systems north of the Gulf Intracoastal Waterway (GIWW) and degraded marshes south of the GIWW. Hydrologic modeling indicates benefits to at least 4,300 acres of marsh from a siphon set in J.D. Murphree WMA, and up to 22,500 acres of marsh from a siphon set in McFaddin NWR, and up to 43,000 acres of marsh if both siphon sets are installed.
Project Extents:		1 EA Hydrologic Restoration
Estimated Construction Costs TOTAL:		$ 12,660,000
Estimated Construction Duration:		<1 year
Longevity and Useful Life (yrs)		15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		From the verbiage of the project description, the two siphons will represent options (if funding allows one siphon or the other will be constructed
	Plans and Technical Specifications	Y		In changing the hydrologic composition of a specific hydrologic region, the specifications surrounding such an action must be monitored carefully through the plans and specs.
	Tentative project scheduling	Y		If the event the two siphons are pursued by separate contractors, a tentative schedule should be established to coordinate the efforts
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Construction of the siphons will more than likely require the re-routing or, at the very least, identification to prevent damage or conflicts
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to perform salinity and water quality testing before and after the hydrologic restoration activities; additionally, environmental impact studies need to be conducted to gauge the impact operations would have on local flora and fauna (in addition to all testing designated to be included in the scope of work)
	Project schedule constraints		N	Pending receipt of funding (as is the case with most Tier 1 projects due to massive scale), there do not appear to be any external factors which could constrict the schedule
	Adequate construction staging area(s)	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Season Options - nesting periods, etc.		N	Though the specific purpose of this project is to restore marshlands, the possibility that threatened species could pose conflicts within the project area cannot be discounted; listed as 'N' at this juncture but will be subject to change following receipt of additional information.
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		A project so large will likely contain clauses pertaining to retention pending completion of salient milestones
	Community Outreach - Special Opening Ceremony		N	Subject to change pending the input from the solicitor of the project; there do not appear to be any opportunities for community outreach events
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Clarification would be required as to whether both siphons would be constructed; furthermore, what are the cost implications of each siphon individually; stressing the environmental impact of pursuing only one of the siphons needs to be address as well (cost-benefit analysis of only partially pursuing the project); no issues are apparent when solely considering constructability				

Project No.:	842	Developed by:	J Simmons Group DG
Project Name:	West Bay Estuarine Habitat Restoration and Protection Project	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region:	1	**Project Description:** The proposed project will restore and protect estuarine marsh habitats including intertidal fringe marsh, salt flat marsh, sand flats, shallow water, and seagrass at 7 locations; Gang's Bayou, Starvation Cove, Dana/Carancahua Coves, Jumbile Cove, Bird Island Cove, and McAllis Point, in West Galveston Bay. The project will use dredged material to expand marsh areas, and will install and repair approximately 38,900 linear feet breakwaters to protect and enhance estuarine marsh and seagrass habitats.
Sub Region:	17	
HUC 10 Region:	17	

Project Extents:	10,000 Breakwater, 12 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 26,971,111
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Inform communities
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	844	Developed by:	J Simmons Group DG
Project Name:	Rookery Island Creation in Coastal Bend	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Revetment Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 11 **HUC 10 Region:** 50	**Project Description:** The project involves the creation of 3 rookery islands, each approximately 4 acres in size, lined with erosion control material such as limestone rock. The islands will be placed in San Antonio Bay, Nueces Bay, and the Upper Laguna Madre. These rookery islands would allow for consistent nesting grounds for a declining waterbird population. Specific locations are to be determined.
Project Extents:	10,000 LF Revetment; 12 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 4,490,458
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		To determine best locations
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the bird nesting

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	853	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Texas Mid-Coast Oyster Restoration and Enhancement	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** This project would result in the restoration of 450 acres of oyster reef within the four major bay systems along the middle Texas coast: Matagorda/Lavaca Bay, San Antonio Bay, Aransas Bay and Copano Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.
Project Extents:	450 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 46,288,125
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; will need to contain provisions for the contractor to reassess recruitment levels even after the placement of substrate has ceased (unless the study of oyster recruitment is issued as a separate contract and any issues identified by the aforementioned separate contractor are required to be addressed under a warranty of the original reef constructor)
	Bid Schedule, Options, Pay Items	Y		The four regions will likely be split into four separate bid solicitations; doing so would allow additional resources (i.e. more contractors) to address the issue; issuing a single large contract with options runs the risk of alienating contractors with limited access to fund and capital
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Schedule will need to be established; both to streamline primary operations as well as establish a timeline for post construction activities (monitoring, etc.)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No conflicts are inherent; however the response to this question is subject to change following additional study
	Traffic Control, Coordination, and Site access[2]	Y		Access to reef mitigation sites will need to be restricted
	Environmental feasibility with construction options	Y		Hydrologic studies will be required to assess the quality of the water in which the substrates are being deposited (affects recruitment levels)
	Project schedule constraints	Y		Want to coincide with spat set peak.- oyster reef.
	Adequate construction staging area(s)	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Season Options - nesting periods, etc.	Y		Though seasonality may not materially affect oyster recruitment in generally warm climates experienced in the Gulf area, it is still worth taking into consideration empirical evidence to direct the optimal period of reef mitigation
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: The Project Close Out section was left blank under "more info" due to the fact that most factor into the same parameter called for by the project description; a system must be put in place to monitor the recruitment of the oysters and the success of the designated substrate; these requirements will need to be contractual and addressing these issues are ultimately essential to the constructability and survivability of this project				

Project No.:	855	Developed by:	J Simmons Group DG
Project Name:	Sabine Lake Oyster Reef Restoration and Enhancement	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 2 **HUC 10 Region:** 2	**Project Description:** This project will restore oyster reef habitats along the western shore of Sabine Lake. The project area will encompass a total of 40 acres. By placing 1,800 mounded, highly dense reef patches throughout the project area, the structurally complex character of the nearby unfished oyster reefs will be replicated.
Project Extents:	40 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 4,114,500
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Public promotion
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitoring of oyster growth
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	865	Developed by:	J Simmons Group DG
Project Name:	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** TPWD is currently partnering with Golden Pass LNG Terminal (GPLNG) to restore marsh in the Salt Bayou unit of the J.D. Murphree Wildlife Management Area with dredged material from the shipping berth at the GPLNG terminal. For the current dredging cycle, TPWD has funding from National Marine Fisheries Service to pay for marsh surveys, environmental monitors, and site planting. Additional funding will be needed to retain monitors and to plant the site.
Project Extents:	1,500 acre Marsh
Estimated Construction Costs TOTAL:	$ 20,250,119
Estimated Construction Duration:	3-5 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	869	Developed by:	J Simmons Group DG
Project Name:	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The objective of this project will be to enhance 1,875 acres of freshwater wetlands along the Texas coast. These wetlands will be designed to function as feeding, resting, and breeding habitat for mottled ducks.
Project Extents:	1,800 acre Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Wetlands monitoring

COMMENTS: Construction duration will be dependent on how the wetlands will be constructed.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	873	Developed by:	J Simmons Group DG
Project Name:	Anahuac National Wildlife Refuge Wetlands Creation	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands/Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 9 **HUC 10 Region:** 9	**Project Description:** The project involves the construction of 550 acres of wetland/moist soil units and the restoration of 100 to 150 acres of native prairie in previously converted farmland of the Anahuac NWR. The constructed wetland/moist soil units will be valuable to waterfowl, shorebirds, grassland birds and wading birds.
Project Extents:	1 EA Wetlands / Forested Wetlands; 125 acre Conservation Easement
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access to site
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the growth of the wetlands
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	922	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Oliver Point and Chinquapin Oyster Reef Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: Project Subtype:	Oyster Reef	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29	**Project Description:** The project involves oyster reef restoration on legacy reefs in Matagorda Bay and along the GIWW.
Project Extents:	25 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 2,571,563
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; potentially allow for submission of alternative plans of oyster reef mitigation if a creative proven alternative can be established
	Bid Schedule, Options, Pay Items	Y		Though the description does not describe any provisions that would constitute the need for options
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling on the part of the contractor is helpful; both for progress payments and for the advertising of this project to prospective fisherman, boaters, etc.
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No conflicts are inherent; however, this provision is subject to change following the receipt of additional information
	Traffic Control, Coordination, and Site access[2]	Y		Need to monitor and control ship traffic both in the immediate and approximate proximity of the work locations due to the adverse effects ship wake has on oyster recruitment
	Environmental feasibility with construction options	Y		Need to test the hydrologic properties of the purposed nesting areas (salinity most importantly)
	Project schedule constraints	Y		Want to coincide with spat set peak-oyster reef.
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		The optimal periods of oyster recruitment should be considered; if it is not possible to solicit this contract

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

				during such times, the effect should not be material in nature
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: As stated for Project No. 853, contractual monitoring of the oyster reef mitigation sites is essential to the long term success of the project				

Project No.:	1187	Developed by:			J. Simmons Group, Inc.-SS
Project Name:	Regional Sediment Management Plan	Checked by:			J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Plan	Date:			February 8, 2017
Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Develop a regional Sediment Management Plan for the entire Texas coast to allow for coastwide coordination in sediment resources. Efforts would include developing geologic and geomorphologic analyses of the coast, determining regional impacts on sediment accretions and losses, cataloging available dredging and BUDM data, and analyzing available circulation studies. The final report would include regional maps, tables, and descriptions of potential sediment sources, RSM priorities, and potential scenarios for RSM applications.				
Project Extents:	1 EA Plans				
Estimated Construction Costs TOTAL:	**TBD**				
Estimated Construction Duration:	**N/A**				
Longevity and Useful Life (yrs)	25+ years				

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No components of this project number pertain to construction.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	2311	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Statewide Beach Monitoring and Maintenance Program	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Program	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** GLO's Beach Monitoring and Maintenance Program - Ongoing monitoring and maintenance of CEPRA beach nourishment and restoration sites along the Texas coast to maintain post-storm FEMA eligibility.
Project Extents:	1 EA Program
Estimated Construction Costs TOTAL:	**TBD**
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No components of this project number pertain to construction activities.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9001	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** 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 Extents:	6,000 LF Misc. Wave Break; 50 acre Marsh
Estimated Construction Costs TOTAL:	$ 2,173,676
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding will be required
	Bid Schedule, Options, Pay Items	Y		For projects of a certain magnitude, it is always effective to establish bid schedules to monitor contractor progress and to allow for the processing of progress payment; concurrent construction will be required in order to achieve the desired project schedule
	Plans and Technical Specifications	Y		Designated flora need to be conducive and acceptable for the new area in which they are being inserted (i.e. do not introduce invasive species of flora)
	Tentative project scheduling	Y		Helpful to require project scheduling for a multitude of reasons (effective monitoring, cost controls, etc.)
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though it does not appear that any immediate conflicts exist, the contractor needs to remain aware
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to test the water quality both before (to establish a baseline) and after (to measure effectiveness) the completion of the living shoreline
	Project schedule constraints		N	No external factors which could constrain the schedule appear to exist; any information to the contrary would cause a 'Y' response
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Though seasonality is not expected to materially affect the project, the current dynamics of the ecosystem (prior to living shoreline creation) need to be addressed
III	**Project Close Out**			

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Possible; not wholly necessary
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Smaller in scale than other Tier 1 projects; constructability does not appear to be any issue

Project No.:	9002	Developed by:	J Simmons Group DG
Project Name:	Lower Nueces River Freshwater Inflows	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** The proposed study would determine the impacts of limited or regulated freshwater inflow on the water quality of the Lower Nueces River below the saltwater barrier and Nueces Bay. There is a need of long-term monitoring of these systems across the Texas coast to capture these effects on the water quality and habitat and to understand all types of freshwater inflows for improved water and system-wide nutrient budgets.
Project Extents:	Studies
Estimated Construction Costs TOTAL:	$ 6,583,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Study project, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9003	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Coastal Prairie Estuarine Wetland and Mima Mound Complex Habitat Protection at Shell Point Ranch	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 3 **Sub Region:** 4 **HUC 10 Region:** 43	**Project Description:** The project proposes the acquisition of approximately 400 acres of coastal habitats that support coastal prairie, freshwater, and estuary wetlands and the southernmost extents of Mima mounds at Shell Point Ranch in Texas. This mosaic of habitats supports Mottled Duck and whooping cranes, in addition to other wildlife.
Project Extents:	400 acre Acquisition
Estimated Construction Costs TOTAL:	TBD
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Creation of a wildlife preserve could generate positive PR
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: This project number does not pertain to any construction activities. Simply establish a new wildlife preserve and buffer zone

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9004	Developed by:	J Simmons Group DG
Project Name:	Lamar Beach Road Protection	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: **Sub Region:** **HUC 10 Region:**	3 3 42	**Project Description:** 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 along with marsh planting to establish a living shoreline system. Lamar Beach Road was recently damaged in 2015/2016 with high winds and above-average tides. The current shoreline hardening is non-engineered rubble and concrete riprap, which is deteriorating and threatens the road infrastructure and access for public and private users. This road provides water access for St. Charles Bay and popular kayak launching for the public. The living shoreline solution would also address extensive marsh / estuarine habitat loss along this shoreline.
Project Extents:		5,280 LF Breakwater
Estimated Construction Costs TOTAL:		$ 2,283,864
Estimated Construction Duration:		1-3 years
Longevity and Useful Life (yrs)		15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		Access to kayak launching area
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the growth of the marsh
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9006	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Dagger Island Shoreline Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 5 **HUC 10 Region:** 44	**Project Description:** 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 reefs, emergent marsh, mangrove marsh, mangroves, tidal flats, benthic life and associated uplands important for the health of the entire bay ecosystem. In addition, this project will create low and high marsh habitats and enhance seagrass beds.
Project Extents:	3,700 LF Misc. Wave Break; 50 acres Marsh
Estimated Construction Costs TOTAL:	$ 1,607,999
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		Bid solicitation should contain options for both the establishment of breakwater structures in addition to the maintenance of diminished marshes; may be most beneficial to issue two separate contracts one the scope and expertise required in each is drastically different
	Plans and Technical Specifications	Y		Based on the project description, this appears to be a critical project (potential elimination of coastal erosion in any region is highly beneficial); adherence to plans and specifications will be essential to prevent reoccurrence of shoreline damage in the near term
	Tentative project scheduling	Y		Helpful for coordination purposes if two separate contractors are involved on a single project
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No conflicts are inherent; however, caution must be taken at all times
	Traffic Control, Coordination, and Site access[2]	Y		Restriction of both human traffic (both by land and by water) will be required
	Environmental feasibility with construction options	Y		The material used for marsh fill must be tested for environmental usability
	Project schedule constraints	Y		Judging from the project description, there is a high degree of human interference which has resulted in shoreline erosion; need to account for the project schedule constraints this activity could potentially pose
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to make sure the construction does not affect the nesting season.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Project's constructability is contingent on material availability (both for breakwater creation and marsh fill); otherwise, no immediate issues are apparent				

Project No.:	9008	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Flour Bluff / Laguna Shores Road Living Shoreline	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	February 8, 2017

Region: 3 **Sub Region:** 14 **HUC 10 Region:** 53	**Project Description:** 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 Extents:	7,920 LF Misc. Wave Break; 50 acre Marsh
Estimated Construction Costs TOTAL:	$ 2,645,894
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements; progress payments will be beneficial progress can easily be tracked with distance or area metrics
	Bid Schedule, Options, Pay Items	Y		It does not appear any options will be required; however, a bid schedule should be established to allow for progress payment
	Plans and Technical Specifications	Y		Though a set of standard plans and specifications probably exist, it is important to stress that the flora utilized must provide a mutualistic rather than invasive relationship to the ecosystem
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No conflicts are inherent; should be monitored however
	Traffic Control, Coordination, and Site access[2]	Y		Pedestrian and vehicle access will need to be restricted during construction
	Environmental feasibility with construction options	Y		Water quality both before (to establish a baseline) and after (to gauge progress) the establishment of the living shoreline will be required to test the effectiveness of operations (cost-benefit analysis variable)
	Project schedule constraints		N	Apart from occasional pedestrian interference, no project schedule constraints are apparent; if any information arises to the contrary, this provision of the methodology will be revised
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent issues due to seasonality
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	Can be considered; however, added cost maybe unnecessary
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Little to no comment to be made regarding the constructability of the project; all factors of the methodology appear okay				

Project No.:	9010	Developed by:	J Simmons Group DG
Project Name:	Tidal Datums and Inundation Frequency Markers	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Understanding and visualizing tidal datums is difficult along the Texas coast. Non-tidal forcings are very important in Texas and existing tidal datums are not practical for beach management. There is a need for practical datums such as Frequency of Inundation as well as a way to visualize these vertical levels on local landmarks. One way of implementing this program would be to install new Inundation Frequency Markers.
Project Extents:	Study
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		Are permits needed for the monitors?
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		Showing locations of the proposed monitors
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Access to the proposed locations of the monitors
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		To make sure the monitors are working properly

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS:

Project No.:	9011	Developed by:	J Simmons Group DG
Project Name:	Hydrologic Study of the Freshwater Inflows to the Upper Laguna Madre	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 14 **HUC 10 Region:** 53	**Project Description:** The proposed study would evaluate changes in freshwater inflows to the Upper Laguna Madre. The Laguna Madre is one of the world's few hypersaline lagoons; it is suggested that the salinity is increasing and it's unclear what impacts this might have to the ecosystems it houses. Anecdotal evidence indicates that groundwater discharge - the lagoon's main source of freshwater - has been decreasing, thereby increasing the lagoon's salinity.
Project Extents:	1 Study; 1 Freshwater Inflow
Estimated Construction Costs TOTAL:	$ 6,583,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: Study project, no construction required				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9013	Developed by:	J Simmons Group DG
Project Name:	Nueces Bay Productivity Enhancement through Wastewater Delivery	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Fresh Water Inflow	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** In this river basin there is very limited potential for transactions to purchase water upstream to provide increased freshwater inflows to the estuary. Accordingly, this project proposes to pipe treated wastewater for delivery to the bay at an advantageous location. A demonstration project that ended in 2003 has already illustrated the ecological benefits of this approach. This project would provide infrastructure to deliver between 5 to 8 MGD (5 to 9 thousand acre-ft./yr.) of freshwater and beneficial nutrients from treated wastewater from a somewhat distant treatment plant to a key portion of the Nueces Delta each year.
Project Extents:	1 Freshwater Inflow
Estimated Construction Costs TOTAL:	$ 6,330,000
Estimated Construction Duration:	1-3 years depending on length of pipe
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		Depending on pipeline route
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access to pipeline route
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the effectiveness of the project

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9014	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Causeway Island Rookery Habitat Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Rookery Islands	Date:	February 8, 2017

Region: 3 **Sub Region:** 10 **HUC 10 Region:** 49	**Project Description:** This project will address actions needed to protect important rookery island habitat at Causeway Island. The island supports approximately 3,070 pairs of breeding colonial waterbirds per year and harbors numerous threatened and priority avian species. The erosion of the island's shoreline is causing the on-going loss of critical rookery island habitat; the primary benefit from this project is the protection of the rookery island from wind and wave erosion.
Project Extents:	600 LF Misc. Wave Break; 10 acre Rookery Island
Estimated Construction Costs TOTAL:	$ 1,058,390
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding will be required; project will receive priority treatment due to the threatened status of the species this project seeks to benefit
	Bid Schedule, Options, Pay Items	Y		The solicitor must determine if the contract is bid as two separate contracts or as a single contract with an option; two distinct tasks so it will likely be more advantageous to issue two separate contracts
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Coordination of two or more contractors will more than likely be required; effective scheduling will be paramount to project success
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No apparent conflicts to utilities or pipelines. However, if any conflicts arise they must be promptly addressed
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Close monitoring of the material being dredged into the rookery island must be required; the goal of this project is to protect numerous avian species so their health and well-being is paramount
	Project schedule constraints		N	No apparent external factors which could present project schedule constraints; if any additional information arises to the contrary, this provision of the methodology would change
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		The seasonality of threatened bird species nesting must be accounted for in consideration of the mission of this specific project

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Some kind of marketing material should considered considering the conservationist nature of this project (positive PR from the protection of threatened species)
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: The protection of the threatened species is essential to the success of this project; material sourcing is the only question surrounding constructability				

Project No.:	9015	Developed by:	J Simmons Group DG
Project Name:	Coastal Zoning and Flood Study	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** A cost-effective way to improve coastal resiliency is to avoid building in areas that are prone to flooding and hence reduce National Flood Insurance Program liabilities. This is particularly important as our coastal cities will continue to grow for the foreseeable future. This study will review the recent flood maps, the zoning and the overall zoning process for the Texas Gulf Coast based on updated tidal datums and latest ADCIRC modeling.
Project Extents:	Study
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction is required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9016	Developed by:	J Simmons Group DG
Project Name:	Swan Lake Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The project proposes the beneficial use of dredged material for restoring salt marshes and associated channels in Swan Lake in lower Galveston Bay.
Project Extents:	5 acre Marsh
Estimated Construction Costs TOTAL:	$ 169,112
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Aim for peak growing season for marsh grass
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor marsh growth

COMMENTS:

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9018	Developed by:	J Simmons Group DG
Project Name:	Hydrologic Restoration of Upper Cow Bayou	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands /Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 4 **HUC 10 Region:** 4	**Project Description:** The goal of the proposed project is to return Upper Cow Bayou, a tributary to Sabine River, to its natural hydrologic state by restoring meanders and reducing saltwater intrusion. This will in turn protect the existing Cypress-Tupelo habitat. A study may be required to determine the best methodology to restore the hydrology and protect the wetlands.
Project Extents:	1 EA Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Construction duration and constructability will depend on what methodology is used to achieve the desired goals.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9019	Developed by:	J Simmons Group DG
Project Name:	Rose City Marsh Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands / Forested Wetlands	Date:	February 8, 2017

Region: 1 **Sub Region:** 5 **HUC 10 Region:** 5	**Project Description:** The project involves the beneficial use of dredged material to restore substrate for marsh and forested wetlands in former Cypress-Tupelo swamp.
Project Extents:	1 Wetlands / Forested Wetlands
Estimated Construction Costs TOTAL:	$ 1,266,000
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9020	Developed by:	J Simmons Group DG
Project Name:	Alternative Solutions for Beach Erosion	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** The project aims to promote alternative solutions to beach and dune restoration and armoring, such as raising of structures, hardening of utilities, and managed retreat.
Project Extents:	Study
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: Study project, no construction is required.				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9022	Developed by:	J Simmons Group DG
Project Name:	Jones Bay Oyster Restoration	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Oyster Reef	Date:	February 8, 2017

Region: 1 **Sub Region:** 17 **HUC 10 Region:** 17	**Project Description:** The proposed project would restore and/or create oyster reef habitat within the Jones Bay system. Included in the project is a study of the Bay to determine locations with favorable conditions for oyster reef habitat.
Project Extents:	200 acre Oyster Reef
Estimated Construction Costs TOTAL:	$ 20,572,500
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	10+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Proximity of a boat ramp
	Environmental feasibility with construction options	Y		Best location
	Project schedule constraints	Y		Want to coincide with spat set peak
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitoring of oyster growth

COMMENTS: How will the oyster growth and health of the reef be monitored?

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9024	Developed by:	J Simmons Group DG
Project Name:	Maintain Freshwater Inflows to Trinity River Delta	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Fresh Water Inflow	Date:	February 8, 2017

Region: 1 **Sub Region:** 12 **HUC 10 Region:** 12	**Project Description:** The project proposes to maintain freshwater inflows and sediment transport to the Trinity River Delta, thereby maintaining habitat for Vallisneria and brackish water clams. A study may be required to determine the best methods for maintaining freshwater inflows.
Project Extents:	Freshwater Inflow
Estimated Construction Costs TOTAL:	$ 6,330,000
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: The construction depends on how the inflows will be maintained.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9025	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Bessie Heights Marsh Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Marsh	Date:	February 8, 2017

Region:	1	**Project Description:** The proposed project would restore a historical marsh complex at Bessie Heights Marsh in the Lower Neches WMA that has been lost to subsidence. The marsh restoration methodology will be BUDM cells with sacrificial containment berms.
Sub Region:	5	
HUC 10 Region:	5	

Project Extents:	1,000 acre Marsh
Estimated Construction Costs TOTAL:	$ 13,779,932
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Stringent bonding will be required for a project of this magnitude; list of available contractors will be smaller due to the size of this contract
	Bid Schedule, Options, Pay Items	Y		Need to determine if the marsh creation and the sacrificial dike creation are part of the same contract as options or if the two tasks are issued under two separate contracts
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Need to coordinate two or more contractors (if the decision is made to issue separate solicitations); progress payments must be made
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No apparent conflicts; however, the situation must be monitored in order to prevent any potential issues
	Traffic Control, Coordination, and Site access[2]	Y		Though civilian access to the site will be restricted, site safety requirements must be addressed due to relative remoteness
	Environmental feasibility with construction options	Y		Water quality must be closely monitored; the use of dredged material is always subject to further scrutiny
	Project schedule constraints		N	No apparent conflicts. If any further information arises to the contrary, it must be considered
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent seasonality issues
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Historically significant site; should consider an outreach event
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Constructability will be determined by materially availability; extra scrutiny will be placed upon this project due to historical site significance

Project No.:	9026	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Gulf	Date:	February 8, 2017

Region: 1 **Sub Region:** 1 **HUC 10 Region:** 1	**Project Description:** The project proposes to provide shoreline stabilization along the Gulf beach of Galveston's West End and the creation of a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road through natural transport.
Project Extents:	5,000 LF Misc. Wave Break; 5000 LF Gulf
Estimated Construction Costs TOTAL:	$ 6,531,108
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required; materially availability will be a crucial component of success (large amounts of stone)
	Bid Schedule, Options, Pay Items	Y		Progress payments will be utilized; possible creation of options between the breakwater structure and the beach nourishment; two separate contracts would be the best alternative
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Tentative scheduling will be required; especially in consideration of the work occurring on a high population density area such as Galveston
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Close proximity to a population center; need to remain aware of potential utility conflicts
	Traffic Control, Coordination, and Site access[2]	Y		High potential for pedestrian interference (land and water); need to effectively separate the work site from pedestrians for numerous reasons (safety being the most important)
	Environmental feasibility with construction options	Y		Hydrologic testing should be considered due to the redirection of natural water flows from the creation of a breakwater structure
	Project schedule constraints	Y		High population area (Galveston); Need to remain aware of potential conflicts (though none are innately inherent from project description)
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Though seasonality should not materially affect the ability to execute this project, tourist season, etc. needs to be taken into consideration
III	**Project Close Out**			

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Efforts need to made to communicate the benefit of the project being undertaken
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS: Community outreach will be important to project success; prevention of complaints due to noise pollution and general mess can be mitigated				

Project No.:	9027	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	San Antonio Bay Rookery Island Restoration	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Rookery Islands	Date:	February 8, 2017

Region: 2 **Sub Region:** 17 **HUC 10 Region:** 39	**Project Description:** San Antonio Bay bird rookery islands have significantly declined due to erosion. An inventory of rookery islands within San Antonio Bay shows only two marginally functioning islands where there had been 10. The loss of suitable nesting habitat has led to a decline in herons, egrets, black skimmers and brown pelicans. An initial site assessment of San Antonio Bay identified five locations of previously functioning islands that are suitable for reconstruction. This project proposes restoration of a historical rookery island utilizing one or more of these locations. BUDM would be used from the adjacent channels, if possible.
Project Extents:	50 acre Rookery Islands
Estimated Construction Costs TOTAL:	$ 11,044,285
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	**Y**		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		This undertaking will more than likely be separate bid solicitations; if the contract is bid as a single contract with options; the solicitor risks alienating potential contractors due to the size of the contract
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Need to promote scheduling due to the possibility there may be multiple contractors addressing the same project; progress payments required
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though none are apparent from project description, the issue must be addressed immediately if necessary
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to monitor and test the quality of material going into the creation of the rookery islands (both for usability and sustainability reasons)
	Project schedule constraints		N	No apparent external factors which could cause project constraints
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to take the seasonality of bird nesting into account considering the mission of this project (to attract bird species back to the diminished rookery islands)
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Historically significant area; should schedule a ceremony to highlight project successes
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: In using beneficial use dredge material, the quality and usability of such material must be carefully monitored; this is the greatest threat to constructability

Project No.:	9028	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Schicke Point Living Shoreline and Marsh Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	February 8, 2017

Region: 2 **Sub Region:** 7 **HUC 10 Region:** 29		**Project Description:** The project proposes shoreline protection to prevent further recedence of intertidal marsh from Schicke Point on the Matagorda Bay shoreline to the east. Potential protection method includes construction of a living shoreline combined with sediment addition.
Project Extents:		12,000 LF Misc. Wave Break; 100 acre Marsh
Estimated Construction Costs TOTAL:		$ 4,297,412
Estimated Construction Duration:		**<1 year**
Longevity and Useful Life (yrs)		**15+ years**

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirement; issuance of multiple contracts will likely be required
	Bid Schedule, Options, Pay Items	Y		Issuance of a single contract with options could be pursued; however, separate contracts may be preferred
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Tentative scheduling will likely be required to issue progress payments and coordinate between contractors
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	No conflicts are apparent. However, the contractor must remain aware of any potential conflicts if evidence of warnings arise
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Water quality testing as well as the material testing will be required in creating the living shoreline as well as the marsh restoration work
	Project schedule constraints		N	No apparent external factors which could materially constrain the project schedule
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Need to consider the seasonality of local fauna within the marsh area designated for restoration
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

COMMENTS: Material availability will be an important factor for constructability

Project No.:	9030	Developed by:	J Simmons Group DG
Project Name:	Matagorda Peninsula and East Matagorda Bay State Scientific Area	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 2 **Sub Region:** 2 **HUC 10 Region:** 24	**Project Description:** The project proposes the acquisitions of the East Matagorda Peninsula Barrier Island (from bay shoreline to Gulf dunes) and the Matagorda Peninsula to establish a state scientific area. The adjacent bays are a refuge for sea turtles, critical fish habitat, and support oyster and sea grass habitats. The recent establishment of a Texas Parks and Wildlife Department Ecosystem Resources Program Habitat Team provides staff for monitoring and ecosystem studies.
Project Extents:	4,000 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition, no construction needed.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9031	Developed by:	J Simmons Group DG
Project Name:	Traylor Cut (Mission Lake - Guadalupe River)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** In the 1930s, the Guadalupe River was partially rerouted into Mission Lake through Traylor's Cut. Today, the Guadalupe Delta is eroding and sinking, at least in some measure due to lack of sediment despostion. Closing Traylor's Cut and reestablishing flows in the lower river could increase over banking onto the delta. A study is proposed to determine possible effects of closing the cut.
Project Extents:	Studies
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: Project is a study only.				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9032	Developed by:	J Simmons Group DG
Project Name:	Aransas NWR San Antonio Bay Shoreline Protection	Checked by:	J Simmons Group TAN
Project Type: Project Subtype:	Misc. Wave Break	Date:	February 8, 2017

Region: 3 **Sub Region:** 2 **HUC 10 Region:** 41	**Project Description:** The Ingleside Barrier Island strandplain upland is eroding and large live oaks are falling into San Antonio Bay. A wave-break of some type could prevent or slow down loss of this important habitat.
Project Extents:	1,000 LF Misc. Wave Break
Estimated Construction Costs TOTAL:	$ 245,947
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor stability and effectiveness of wave-break
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9036	Developed by:	J Simmons Group DG
Project Name:	Laguna Madre Land Acquisition Endowment Initiative	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easement	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The proposed project will protect and manage coastal prairie and tidal flats totaling approximately 80,000 acres for aplomado falcons and associated species, and thornscrub totaling approximately 20,000 acres for ocelot and associated species. Protection would be accomplished by easement or fee-simple acquisition from willing sellers. An endowment would be established to perpetually fund management. Properties targeted for protection include Zarate, Davis, Holly Beach, and Hardic. Protected sites targeted for management include Laguna Atascosa and Bahia Grande NWRs.
Project Extents:	100,000 Conservation Easement
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition project, no construction needed.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9038	Developed by:	J Simmons Group DG
Project Name:	Cameron County Land Acquisition Program	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Program	Date:	February 8, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** A land acquisition program is needed to help proactively prepare for a stricter building setback line in Cameron County. While this would be initially expensive, implementation of such a program would help avoid future lawsuits in structure/debris removal and offset the costs of beach nourishment, dune restoration, and shoreline stabilization over an indefinite amount of time on a severely eroding stretch of beach. Such a program could potentially reduce TWIA & NFIP expenditures and would preserve dunes, beach, and public beach access.
Project Extents:	Program
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition project, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9041	Developed by:	J Simmons Group DG
Project Name:	Harlingen Ship Channel Living Shoreline	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Breakwater Marsh	Date:	February 8, 2017

Region: 4 **Sub Region:** 5 **HUC 10 Region:** 64	**Project Description:** There is a need for shoreline protection on the north side of the Harlingen Ship Channel (Arroyo Colorado), across from Adolph Thomae Jr. County Park. Construction of a living shoreline or breakwater infrastructure would be ideal to prevent erosion in this area.
Project Extents:	8,200 lf Breakwater, 2 acre Marsh
Estimated Construction Costs TOTAL:	$ 4,892,964
Estimated Construction Duration:	1-3 years
Longevity and Useful Life (yrs)	15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		Contractor access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required	Y		Living shoreline
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Monitor the growth of the living shoreline
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9042	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Bahia Grande Living Shoreline	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh	Date:	February 8, 2017

Region:	4	**Project Description:** The project includes creation of a living shoreline through replacement of foreign-sourced riprap material with naturally-based, native materials. Additional proposed actions include creation of controlled access points for the public, bank / shoreline restoration using beneficial use dredged material, and installation of culverts or other structures under State Highway 48.
Sub Region:	8	
HUC 10 Region:	67	

Project Extents:	5,000 LF Misc. Wave Break; 100 acre Marsh
Estimated Construction Costs TOTAL:	$ 2,575,787
Estimated Construction Duration:	**<1 year**
Longevity and Useful Life (yrs)	**15+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding required
	Bid Schedule, Options, Pay Items	Y		Several options are inherent in the project description above; is it to be understood that these alternatives will all be pursued? Or should they be considered mutually exclusive? Issuance of multiple contracts will likely be the best method to achieve the requirements of this contract
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be beneficial; especially in consideration of the numerous tasks this contract calls for
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		Though the project description does not explicitly state any utility conflicts, the proximity to population centers should raise concerns that the projects could encounter conflicts
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		Need to test water quality both before and after the establishment of a living shoreline to gauge effectiveness; dredged materially should be tested for usability as well
	Project schedule constraints		N	No apparent schedule constraints; if any new info to the contrary arises, the provision will be amended
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent seasonality conflicts
III	**Project Close Out**			
	Contractor maintenance period required	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS:				

Project No.:	9045	Developed by:	J Simmons Group DG
Project Name:	Packery Channel Nature Park Habitat Restoration - Phase II	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Misc. Wave Break Marsh / Walkovers	Date:	February 8, 2017

Region: **Sub Region:** **HUC 10 Region:**	3 11 50	**Project Description:** Portions of the original project narrative have been completed under a CIAP grant. The remaining work to be completed that still needs funding is an additional 2 acres of habitat restoration, additional elevated boardwalk for public access, and a living shoreline stabilization along the parks boundary on Packery Channel, which has been extremely erosive since the channel was opened. The habitat in this area is critical to neotropical migratory birds for food and cover as well as resident bird populations, and a key element of the project is to have funding to collect data on how the bird populations are responding to the restored habitat. A portion of the habitat restoration work also involves continued control and removal of invasive grasses and trees, such as Brazilian Pepper Trees.
Project Extents:		400 LF Misc. Wave Break; 2 acre Marsh
Estimated Construction Costs TOTAL:		$ 140,572
Estimated Construction Duration:		<1 year
Longevity and Useful Life (yrs)		15+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Bird migration
III	**Project Close Out**			
	Contractor maintenance period required	Y		Living shoreline
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Marsh monitoring

COMMENTS: Who will perform the continued control and removal of the invasive grasses and trees?

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9046	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Follets Island Conservation Initiative	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 1 **Sub Region:** 20 **HUC 10 Region:** 20	**Project Description:** The Follets Island Conservation Initiative is a partnership effort to acquire and protect an additional 1,300 acres on the island and transfer title to the Texas Parks and Wildlife Department. Critically important wildlife habitats on the island include tall grass prairies, salt and fresh water marshes, sea grass meadows, oyster reefs, mud flats, sand dunes, and Gulf beaches. The island is important for Kemp's Ridley sea turtles, piping plovers, waterfowl, wading birds and shorebirds. Follets Island helps protect the entire estuary system, including Drum and Christmas Bays, from degradation from storms and allows the natural movement and restoration of habitats after storm events.
Project Extents:	1,300 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Need to plan an opening ceremony of some type; positive PR effect from conservation efforts
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction included in this project. Therefore methodology does not fully apply

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9047	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Sabine Ranch Habitat Protection	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 1 **Sub Region:** 6 **HUC 10 Region:** 6	**Project Description:** Sabine Ranch is a critical, 12,100-acre component of the largest remaining contiguous coastal freshwater marsh system in Texas. Protection of the Sabine Ranch, almost entirely within the McFaddin NWR boundary, is the U.S. Fish and Wildlife Service's (USFWS) top conservation priority for the upper Texas coast. Sabine Ranch's central position within 100,000+ acres of federal and state protected beach and marshland make the permanent protection of this coastal habitat critical to the entire complex. Conserving and restoring these lands will avert further losses of marshland and biological diversity. Sabine Ranch's coastal marshes, prairies and woodlots provide important habitat for 35 of the 48 avian species that are USFWS Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.
Project Extents:	12,100 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Could hold a ceremony for the opening of a new preserve; positive PR effect
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction included in this project

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[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9048	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Baer Ranch Addition to San Bernard NWR	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 2 **Sub Region:** 3 **HUC 10 Region:** 27	**Project Description:** The Baer Ranch proposed addition to San Bernard National Wildlife Refuge consists of approximately 10,000 acres and is adjacent to East Matagorda Bay. It has several miles of frontage on the bay and contains tidal bayous and marshes, transitional habitats, bottomland habitats, coastal prairies and pothole wetlands. East Matagorda Bay is one of the most intact Texas bay systems remaining, and there is at present an opportunity to preserve much of the associated shoreline and watershed to ensure the health of the bay for fish, wildlife and future generations.
Project Extents:	10,000 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Positive PR effect from conservation efforts; should generate some marketing material to highlight benefits
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction included in this project

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9049	Developed by:	J Simmons Group DG
Project Name:	Lake Austin Shoreline Addition to Big Boggy NWR	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisition	Date:	February 8, 2017

Region:	2	**Project Description:** This is a proposed addition to Big Boggy National Wildlife Refuge of 757 acres of prime wetlands and salty prairie, which encompasses approximately 1/4 of the shoreline of Lake Austin. The addition will provide important habitat for a diverse bird population including large numbers of waterfowl, wading birds and shorebirds. The conservation of this land will improve resilience by: preventing further development in a floodplain subject to Gulf storms, allowing the natural movement and restoration of habitats after storms, and providing protection to the inland fields and wildlife habitat adjacent to the lake. The addition will allow the U.S. Fish and Wildlife Service to expand public use programs on the refuge, including waterfowl hunting, fishing, canoe and kayak access and environmental education.
Sub Region:	4	
HUC 10 Region:	26	
Project Extents:		757 acre Acquisition
Estimated Construction Costs TOTAL:		N/A
Estimated Construction Duration:		N/A
Longevity and Useful Life (yrs)		25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition project, no construction required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9050	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Sargent Ranch Addition to San Bernard NWR	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 2 **Sub Region:** 2 **HUC 10 Region:** 24	**Project Description:** Sargent Ranch consists of approximately 8,000 acres of habitat surrounded by the San Bernard National Wildlife Refuge. The U.S. Fish and Wildlife Service would like to purchase the ranch. The ranch stretches from the Gulf inland and includes beaches, dunes, prairies, extensive salt and fresh water wetlands, and Columbia Bottomland forests dominated by large old live oaks. The acquisition of the ranch would connect large portions of the refuge and make it possible to protect important coastal dune and beach habitat for nesting sea turtles, piping plovers and a great diversity of waterfowl and water birds. The protection of the beach dunes would also improve the resiliency of this portion of the coast to storms and sea level rise and allow the natural migration of marshes and wetlands and other habitats over time.
Project Extents:	8,000 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**TBD**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Positive PR effect from conservation efforts; should generate marketing material to highlight acquisition benefits
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction included in this project

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9051	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: Project Subtype:	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 4 **HUC 10 Region:** 63	**Project Description:** The project involves protection of 10,000 acres of beach and dune habitats on South Padre Island through acquisition of parcels from willing landowners. The protection of these habitats would benefit nesting sea turtles and migratory and resident shorebirds.
Project Extents:	10,000 Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	**N/A**
Longevity and Useful Life (yrs)	**25+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony	Y		Positive PR effect from conservation efforts; should generate marketing material to highlight benefits of land acquisition
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: No construction included in this project

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9053	Developed by:	J Simmons Group DG
Project Name:	Protect Fresh Water Resacas and Watershed to Lake Laguna Atascosa (Dulaney/Waters Acquisition)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitons	Date:	February 8, 2017

Region: 4 **Sub Region:** 7 **HUC 10 Region:** 66	**Project Description:** Two parcels located in Cameron County, adjacent to the Laguna Atascosa National Wildlife Refuge and comprising approximately 4,100 acres, will be protected through this project: the Waters Tract and Dulaney Farms. The Waters Tract is 797 acres located just south of Laguna Atascosa NWR and, when restored, could provide almost 90 acres of critical freshwater wetland habitat in an old river oxbow system. The Dulaney Farms (3,368 acres) is surrounded on three sides by the Laguna Atascosa NWR and includes over 400 acres of fresh water wetlands which, when restored, could provide valuable fresh water habitat. Fresh water habitats located on these properties are a critical resource for large concentrations of wintering redhead ducks using the Laguna Madre, as well as wading birds, shorebirds and other waterfowl. These properties are also located in the heart of one of the last remaining breeding populations of ocelots in the United States, and restoration will be critical to the recovery of the ocelot population.
Project Extents:	1,400 acre Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition, no construction required

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9053	Developed by:	J Simmons Group DG
Project Name:	Protect Bahia Grande and Vadia Ancha Shorelines (Laguna Heights Acquisition)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Acquisitions	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** The proposed project would protect wetland, coastal prairie and thornscrub habitat adjacent to the Bahia Grande unit of the Laguna Atascosa National Wildlife Refuge through acquisition of the 1,400-acre Laguna Heights parcel. The protection of this parcel will protect the shoreline of the Bahia Grande wetland complex and will assist in the maintenance of the functional values of the Bahia Grande wetland system, much of which has recently been restored.
Project Extents:	1,400 Acquisition
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	
COMMENTS: **Land acquisition project, no construction required.**				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9054	Developed by:	J Simmons Group DG
Project Name:	Habitat Protection in the Laguna Atascosa NWR (Shrimp Farm and Holly Beach)	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Conservation Easement	Date:	February 8, 2017

Region: 4 **Sub Region:** 8 **HUC 10 Region:** 67	**Project Description:** This project proposes to acquire and permanently protect with conservation easements two parcels within the Bahia Grande Coastal Corridor: Shrimp Farm and Holly Beach. Together, these parcels comprise over 2,000 acres of coastal wetland, prairie and thornscrub. The Shrimp Farm property (325 acres) is located between the recently protected Boswell-Jenkins tract and the Laguna Atascosa NWR and produces shrimp and game fish; portions are known ocelot habitat. Holly Beach (1,718 acres) provides important foraging habitat for nearby rookeries that support some of the largest populations of gull-billed terns, black skimmers, reddish egrets and brown pelicans in the Gulf of Mexico. These tracts are part of the Laguna Madre/Bahia Grande wetlands system, which hosts 85 percent of the world population of redhead ducks, one-third of the Great Plains population of endangered piping plover for nine months of the year, and hundreds of threatened peregrine falcons during migration.
Project Extents:	2,000 acre Conservation Easement
Estimated Construction Costs TOTAL:	N/A
Estimated Construction Duration:	N/A
Longevity and Useful Life (yrs)	25+ years

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements		N	
	Procurement and Contract Requirements[1]		N	
	Bid Schedule, Options, Pay Items		N	
	Plans and Technical Specifications		N	
	Tentative project scheduling		N	
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]		N	
	Environmental feasibility with construction options		N	
	Project schedule constraints		N	
	Adequate construction staging area(s)		N	
	Season Options - nesting periods, etc.		N	
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through		N	
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule		N	
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.		N	

COMMENTS: Land acquisition project, no construction work should be required.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9057	Developed by:	J Simmons Group DG
Project Name:	Wetland Restoration, Water Quality Improvement, and Flood Risk Reduction	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Wetlands /Forested Wetlands	Date:	February 8, 2017

Region:	0	**Project Description:** Traditional methods of channelization to reduce flood risk have resulted in a loss of wetlands, recreational opportunities and water quality in Texas coastal counties. Opportunities exist to develop approaches that restore wetlands, improve water quality and reduce flood risk by working with coastal drainage and flood control districts, interested private landowners, public land managers and natural resource agencies. These opportunities may include creation/restoration of wetland basins, in-channel wetlands, and restoration of historic flow patterns. These approaches require a multi-disciplinary analyses and assessments. Results would improve conditions for fish and wildlife, improve water quality and create/restore natural resource based recreational opportunities.
Sub Region:	0	
HUC 10 Region:	0	
Project Extents:		1 Wetlands /Forested Wetlands
Estimated Construction Costs TOTAL:		$ 1,266,000
Estimated Construction Duration:		<1 year
Longevity and Useful Life (yrs)		15+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way		N	
	Utility / pipeline conflicts identified and addressed	Y		
	Traffic Control, Coordination, and Site access[2]	Y		Contractor site access
	Environmental feasibility with construction options	Y		
	Project schedule constraints		N	
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		Community outreach would be beneficial
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		
COMMENTS:				

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9058	Developed by:	J Simmons Group DG
Project Name:	Dune and Wetland Protection and Public Access	Checked by:	J Simmons Group TAN
Project Type: **Project Subtype:**	Studies	Date:	February 8, 2017

Region: 0 **Sub Region:** 0 **HUC 10 Region:** 0	**Project Description:** Observations and review of aerial imagery show a distinct increase in off-road vehicle impacts to sensitive natural resources along the coast. The resources at risk include wetlands, salt flats, dunes, nesting and roosting birds, and sea turtles. In order to protect sensitive resource areas from damage while maintaining public access, a concerted effort and public investment are required. Approaches may include increased law enforcement, bollards and cables, signage, education and outreach. Some example locations include Bryan Beach, San Luis Pass, and Mitchell's Cut.
Project Extents:	Studies
Estimated Construction Costs TOTAL:	$ 253,200
Estimated Construction Duration:	<1 year
Longevity and Useful Life (yrs)	25+ years

Section	**Description**	**Yes**	**No**	**More Info**
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		
	Bid Schedule, Options, Pay Items	Y		
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed		N	
	Traffic Control, Coordination, and Site access[2]	Y		
	Environmental feasibility with construction options	Y		
	Project schedule constraints	Y		Depends on peak public times
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.	Y		Nesting periods
III	**Project Close Out**			
	Contractor maintenance period required		N	
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through		N	
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony	Y		
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		Needed to monitor success of project

COMMENTS: Construction depends on conclusions from study.

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered
[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

Project No.:	9060	Developed by:	J. Simmons Group, Inc.-SS
Project Name:	Beach Re-Nourishment at Padre Island National Seashore	Checked by:	J. Simmons Group, Inc.-TAN
Project Type: **Project Subtype:**	Gulf	Date:	February 8, 2017

Region: 4 **Sub Region:** 1 **HUC 10 Region:** 60	**Project Description:** This project proposes to place dredged sediment from the Mansfield Channel and transferred sand from the south side of the jetties onto the Padre Island National Seashore from Mansfield Channel to 15 miles north of the channel. The beach on these 15 miles of seashore is currently eroding into the primary dune line and cutting off public access because sediment flow is blocked by the jetties. This area amounts to one fifth of the park's Gulf beach and is the most heavily used beach for nesting by the endangered Kemp's Ridley sea turtle. Further erosion will result in inlets forming in old wash overs that are currently snowy plover nesting habitat. USACE had previously dredged the channel every 2 to 3 years, which was sufficient to maintain the beach; however, due to budget cuts, the channel has not been dredged since 2011.
Project Extents:	37,000 LF Gulf (Beach Restoration)
Estimated Construction Costs TOTAL:	$ 39,230,175
Estimated Construction Duration:	**1-3 years**
Longevity and Useful Life (yrs)	**10+ years**

Section	Description	Yes	No	More Info
I	**Bidability**			
	Permit Requirements	Y		
	Procurement and Contract Requirements[1]	Y		Bonding requirements
	Bid Schedule, Options, Pay Items	Y		Need to establish options on the contract in the instance that the contract cannot handle the entirety of the project
	Plans and Technical Specifications	Y		
	Tentative project scheduling	Y		Scheduling will be helpful for monitoring and directing ship traffic
II	**Buildability**			
	Right of Way	Y		
	Utility / pipeline conflicts identified and addressed	Y		In dredging such a large area, conflicts with utilities will likely arise
	Traffic Control, Coordination, and Site access[2]	Y		Ship and channel traffic management will play a large part in the success of this contract
	Environmental feasibility with construction options	Y		Material testing for dredged material should be included in the solicitation
	Project schedule constraints		N	No apparent external schedule constraints are apparent
	Adequate construction staging area(s)	Y		
	Season Options - nesting periods, etc.		N	No apparent conflicts due to seasonality
III	**Project Close Out**			
	Contractor maintenance period required	Y		
	Substantial completion punch list and walk through	Y		
	Warrantee period punch list and walk through	Y		
	Contractor retention and release schedule	Y		
	Community Outreach - Special Opening Ceremony		N	
	Monitoring Success - 1 year monitoring of marsh, etc.	Y		

[1] Special performance, bonds, contract payments, average contractor progress, special provisions, and contractor resources and availability should be considered

[2] Contractor and public access agreements, buffer zones (no work zones), traffic control, site safety and security

COMMENTS:

Appendix G. Project Environmental Assessments

Environmental Assessment Results

Following the methodology presented in Section 7 of the Report, each project in Tier 1 and 2 was evaluated based on environmental features, location and overall benefit to surrounding species and habitats. As shown in the evaluation tables, each project was rated on a scale of 1 to 4 and a brief description of potential environmental impacts was provided. The majority of Tier 1 projects scored between 3 and 4, while Tier 2 included other projects with less significant environmental benefits.

Environmental Assessment Summary Tables

Project Identification No. *	Project Name	Description	ENV Rating 1 - 4	ENV Comments
2	Derelict Structure and Vessel Removal	This project will identify, prioritize, remove, and properly dispose of derelict and abandoned structures and vessels in every county on the Texas coast.	3.5	Removal of structures that may be leaking toxic substances and potentially impacting water quality is of vital importance to the effectiveness of restoration and overall postivie impact on conservation activities. However, in some cases that include large submerged vessels and structures that may provide an ecological benefit for oysters or other aquatic species which rely on hard substrates, removal may have a small negative impact.
4	Brazos River to Cedar Lake Creek Shoreline Protection	Shoreline erosion along GIWW creates shoaling and erosion of adjacent marshes. The length of the GIWW included in the project area is approximately 20 miles per shoreline. The project proposes breakwaters or a living shoreline along the GIWW and restoration of marshes adjacent to the GIWW.	4	Living shoreline would help absorb any petroleum products from ships and barges; project in valuable estuary
9	Brazoria National Wildlife Refuge Shoreline Protection	The narrow stretch of land separating the Brazoria National Wildlife Refuge GIWW Shoreline from Christmas Bay has been breached by erosion. The project strategies include reinforcing the banks on the Bay side to prevent further erosion, and creating emergent marsh habitat. Dredge material could be used to raise the elevation to the appropriate level for marsh creation. Closer monitoring of erosion along the shoreline, particularly at critical locations such as the narrow sections between the GIWW and Christmas Bay, Drum Bay, and Long Pond, is also recommended.	3	Separation likely to reoccur due to proximity of large open water (Christmas Bay). Project will help protect wildlife refuge and enable ship traffic to continue, and monitoring is strongly reinforced.
11	Follets Island Marshes	The project proposes marsh habitat restoration on Follet's Island, on the west side of Christmas Bay, to protect critical habitat including estuarine and freshwater marshes and tidal flats.	4	Project creates habitat, increasing land through sedimentation and marsh creation; no negative factors in immediate vicinity
19	East Galveston Bay Ecosystem Oyster Reefs	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.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Galveston Bay. Minimal negative effects in proximity. Will increase potential food source for higher food chain species.
21	Galveston Bay Ecosystem Rookery Islands	The project will aim to restore elevation and provide shoreline protection for Jigsaw Islands, Vingt-une Islands, Rollover Bay Islands, Chocolate Point Island, West Bay Bird Island, Smith Point Island, North and South Deer Islands, and other rookery islands in the area. The proposed project will create additional acres of potential nesting habitat by reestablishing intertidal marsh and will promote shoreline stabilization.	4	Improves habitat and potential food sources for T&E species, including Texas Diamondback Terrapin.
24	San Jacinto Battlefield Marsh Restoration	The project would involve restoration of marsh at the San Jacinto Monument as well as shoreline stabilization and beach nourishment through Beneficial Use of Dredged Material. Control of invasive species would also help enhance the habitat.	2.5	Shoreline stabilization through beneficial use of dredge materials is efficient, however low quality habitat will not be greatly improved.
25	Burnet Bay Marsh Restoration	This project seeks to restore approximately 500 acres of marshes through use of BUDM. Strategies for marsh restoration include the construction of levees for shoreline protection, raising the site elevation with dredge material, and planting marsh vegetation.	3	Increasing marshes and wetlands in this river delta may increase water quality, thereby benefitting multiple protected species and migratory birds downstream.
28	East Bay and GIWW Marsh Restoration and Protection	The East Bay and GIWW Marsh Restoration and Protection project would create an estimated 47,100 linear feet of offshore rock breakwaters along the prioritized project areas to: reduce the wave energy impacting approximately 678 acres of saline marsh and promote shoreline stabilization; protect over 10,000 acres of fresh, intermediate, and brackish marshes and upland prairie from additional saltwater intrusion and habitat conversion.	3	Short term benefit of reducing wave action on naturally transient peninsula may increase quality of beaches for protected species and migratory birds. However, hardened structures inhibit the ability of a sand bar and related land forms from natural migration and movement over time.
29	Marshes Along the GIWW (Anahuac NWR to McFaddin NWR)	This project aims to restore marsh habitat along the GIWW using a living shoreline construction. The proposed project area is located along segments of shoreline adjacent to the Anahuac NWR. Of the targeted 9 miles of shoreline, an estimated 12,400 feet faces East Bay and 34,700 feet lies east of Oyster Bayou on the GIWW.	3.5	Improves habitat for migrating birds at first point of land contact

Project Identification No. *	Project Name	Description	ENV Rating 1 - 4	ENV Comments
30	McFaddin National Wildlife Refuge at Willow Lake	The project proposes to construct approximately 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 acres of emergent marsh habitat and protect 3,600 acres of existing coastal marsh from degradation. The project proposes to construct a 1,000-foot-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 Watershed. The proposed siphon would transport freshwater from north of the GIWW to the south, and benefit more than 29,000 acres of coastal wetlands.	4	Improves habitat for migrating birds and estuarine species. Increases effectiveness of wildlife management area and its ability to provide quality habitat for protected species.
35	McFaddin National Wildlife Refuge Shoreline Protection	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. The project would also provide restoration of eroding Gulf-facing shoreline, dunes, and associated wetlands. Nourishing this beach will provide less-costly removal of abandoned oil wells.	3.5	Improves beach habitat for migrating birds, will increase availability of brackish marshes to thrive; abandoned oil and gas wells nearby.
41	Texas Chenier Plain Refuge Complex	The Texas Chenier Plain Refuges Complex supports a collection of National Wildlife Refuges, including Anahuac, McFaddin, Texas Point, and Moody. The project will involve conservation of 65,000 acres of additional riverine, subtidal, freshwater and marine/estuarine wetlands, beach/dune and upland habitats.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation.
44	Trinity - San Jacinto Estuary Fresh Water Inflows	The goal of the project is to acquire and convert some existing water rights from willing sellers for the purpose of freshwater inflow protection. Drought-reliable water rights that are not being fully utilized are potentially available for purchase on a voluntary basis. This project would be designed to provide an additional 100,000 acre-feet/year of drought-secure inflows to Galveston Bay from the Trinity River basin as compared to future conditions without the project.	3	Project depends upon future purchase of water rights. Continuing inflows will reduce burden on protected species that depend upon the marshes and estuaries that the Trinity River feeds.
45	Galveston Bay Debris Removal	This project aims to remove marine debris from navigable waters and habitat areas of Galveston Bay, and its sub-bays and tributaries. Hundreds of derelict exploration and production structures and vessels lie abandoned in waterways and wetlands within Galveston, Harris, Chambers and Brazoria counties. Removal of these vessels allows safer access to and navigation of open-water areas for boaters and anglers; improved water quality by increasing water flow and circulation; enhanced marsh and open-water habitats for fisheries production; and improves the bay's appearance for all users of the bay.	3	Removal of debris will prevent contamination from debris containing various chemicals as well as allow other conservation and restoration projects to succeed.
51	Boggy Cut GIWW Protection	This project will protect the GIWW from erosion cause by wind, current, and ship wakes. Solutions may include breakwaters along the GIWW and restoration of marshes adjacent to the GIWW. The project may also include acquisition of private property adjacent to the GIWW. These efforts would improve wind and current hazards to navigation and mainland erosion.	3	Project may prevent protected species from migrating to areas needed for nesting or foraging from a solid surface breakwater. However, a separation of the GIWW from the surrounding marsh and bay system may help prevent sludge and oil residue from entering these ecosystems.
52	Restoration of Chester’s Island	The project aims to slow the erosion on the island and add 30 acres of land. Potential solutions include sand filled 300-foot long geotubes or other breakwater structures, invasive species control, and other shoreline stabilization techniques. There is a need to study the hydrology of the area to reduce erosion and currents/tides in the area.	3	May provide additional habitat for migrating birds and rookery areas for young turtles. Hydrology should be considered to create a low turbulence area that will be most beneficial to species utilizing rookery ad sea grass beds.
56	Myrtle Foester Whitmire Unit and Powderhorn Lake Acquisition	This project will acquire 3,440 acres of property located next to the Myrtle Foester Whitmire Unit of the Aransas National Wildlife Refuge on the north shoreline of Powderhorn Lake. In addition, there will be an estimated 500 to 600 acres of freshwater wetland/moist soil unit habitat created in the abandoned farmland. Water quality will be improved by constructing substantial amounts of wetland units in the abandoned farmland. This will reduce nutrient loading from cattle grazing.	4	Project will improve habitat for three protected species, as well as encourage strong hunting and foraging habitat for migrating birds.
62	Welder Flats Wildlife Management Area	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.	4	Living shoreline would help protect marshes and other nearby areas from potential spills, thereby creating preventative mitigation for potential impacts to protected species. The project may also keep adverse impacts created by barges and other large ships travelling the GIWW from disturbing protected species present within the Wildlife Refuge.

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70	Goose Island State Park Habitat Restoration and Protection	The project involves shoreline and habitat protection of the critical intertidal estuarine marsh habitat that makes up 25 acres of Goose Island State Park.	4	Shoreline protection provides a buffer for marshes against degeneration and subsidence.
72	Long Reef Shoreline Stabilization and Habitat Protection	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.	4	Improvement of established rookery area and potential establishment of migrating bird habitat as beneficial use of human-use dredge material.
75	Nueces River Delta Shoreline Stabilization	The project will include the construction of breakwaters along 2 miles of the Nueces River Delta to dissipate wave energy causing emergent intertidal wetland losses.	4	Wetlands and marshes behind project area host several protected species and will benefit from shoreline protection.
86	Mustang Island State Park Acquisition	The project involves the acquisition of parts of Mustang Island and the protection of tidal marsh, emergent estuarine wetlands, and coastal prairie dune and beachfront habitats. This includes the Mustang Island State Park Conservation Initiative, which will create a contiguous 5,100+ acre conservation area along the barrier island that will enhance the net biological value of the island.	4	Numerous protected species and wetlands will benefit from this project, while conservation and preservation of barrier island ecology protects other species within the Corpus Christi Bay area from heavy saline environments and tidal action.
91	Coastal Bend Conservation Easements	The project aims to establish an endowment to purchase approximately 150,000 acres of conservation easements and to fund habitat restoration and maintenance in the Coastal Bend area. Additionally, the funds would provide for restoration and maintenance on South Texas coastal prairies and marshes.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Rehabilitating endangered species rely on vast undeveloped open spaces; conservation and restoration would positively impact these species and their marsh habitats.
96	Laguna Atascosa NWR- Bahia Grande-Intertidal Wetlands Hydrologic Restoration	In 2005, a pilot channel was constructed that connected the Brownsville Ship Channel to the Bahia Grande and began refilling the main basin. In 2007, two interior channels were cut that reconnected the larger basin to two smaller interior basins – the Laguna Larga and the Little Laguna Madre - ensuring natural tidal flow and exchange throughout the whole system. The next major step is to widen and deepen the original pilot channel to improve tidal flow into the basins and thereby fully restore the natural biological functions of the wetlands.	4	Project allows for full restoration of vital estuaries for the South Texas coast. Will improve habitat for protected species including ocelot, and allows for stopover foraging for migrating birds.
112	Treasure Island Nourishment Project	The project focuses on developing alternatives for a beach nourishment project in the vicinity of the revetment and fishing pier area to widen the beach and provide a buffer to reduce storm impacts to the existing shoreline.	3.5	Beach nourishment provides a buffer to erosion and promotes habitat conservation for protected species, including migratory birds.
136	Dune/Beach Restoration from Sargent Beach to the Colorado River	The project involves approximately 30.8 miles of beach nourishment and dune restoration along the Gulf shoreline from Sargent Beach to the Colorado River.	3.5	Beach nourishment provides a buffer to erosion and promotes habitat conservation for protected species, including migratory birds.
138	Bay Shoreline from Magnolia Beach to Port O'Connor	The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.	3.5	Project improves wetland habitat but may degrade habitat in areas of jetties. Overall a positive impact for rookery potential and marsh restoration.
138	Bay Shoreline from Magnolia Beach to Port O'Connor	The proposed project includes shoreline protection by constructing a series of jetties and revetments approximately 10 miles in length. Additionally, the project will restore approximately 215 acres of wetland habitat.	3.5	Project improves wetland habitat but may degrade existing subtidal habitat in areas of jetties due to scouring and buildup behind jetties.
142	Mustang Island Bay Shoreline Protection and Marsh Restoration	The project includes shoreline protection for approximately 8.25 miles of eroding shoreline and up to 215 acres of marsh land restoration.	4	Shoreline protection through Beach nourishment provides a buffer to erosion and promotes habitat conservation for several protected species, including migratory birds.
145	Town of South Padre Island Gulf Shoreline	This project would provide approximately 8.15 miles of beach nourishment and dune restoration for the Town of South Padre Island's Gulf shoreline.	4	Beach nourishment is an excellent solution to degraded beaches due to overuse. This project should provide an excellent buffer for wave action; this is not a hard surface project which may affect the barrier island's natural migration.
180	Deer Island and Jigsaw Island Restoration	The project will continue the expansion of the restoration of North and South Deer Islands and Jigsaw Island through BUDM opportunities. Island restoration will promote reestablishment of sea grass habitat. The project will also continue to develop alternative analyses and engineering designs on these islands in order to prepare them for future BUDM opportunities. The islands may need shoreline protection measures as part of the restoration.	3.5	Wetland restoration through beneficial use of dredge materials is efficient, however low quality habitat will not be greatly improved and this project appears to depend upon subsequent projects.
232	Hitchcock Prairie/West Galveston Bay Conservation Corridor Habitat Preservation	The project involves purchasing a conservation easement for approximately 3,200 acres or coastal prairie and estuarine marsh habitats adjacent to Green's Lake, near Hitchcock. The easement won't allow public access and Scenic Galveston will manage the property and restore the prairie.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation.

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240	Coastal Heritage Preserve – Phase 4	The Settegast Coastal Heritage Preserve project is envisioned as a conservation area on West Galveston Island adjacent to West Bay, which is part of the Galveston Bay system, an estuary of national significance. The next phase of the initiative involves acquisition of 635 acres from one owner and 205 acres from an adjacent owner. This would bring the total preserve area to 1,200 acres.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Only two landowners are involved with this project phase, which makes it probably to be successful.
241	Sweetwater Preserve Expansion	The project involves the purchase of 275 acres of land situated immediately west of Galveston Bay Foundation's Sweetwater Preserve and adjacent to Sweetwater Lake, West Galveston Bay, and 8 mile road. Key attributes of the subject property include coastal grasslands, brackish and estuarine wetlands, frontage along West Galveston Bay and Sweetwater Lake, and extensive salt barrens and sand flats. Preservation of Galveston Island's marshes, wetlands, and associated habitats promotes clean water and healthy fisheries and preserves the scenic beauty of the area.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is adjacent to existing conservation easement, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
252	Bolivar Beach and Dune Restoration	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.	4	This area is highly eroded due to multiple storms and geomorphic position between two waterbodies, one with intensive wave action. Reconstruction and nourishment of existing beaches would provide additional habitat availability to migrating birds and protected species utilizing nearby wildlife refuges and open space.
261	East End Lagoon Nature Park & Preserve	The project will preserve 684 acres of the East End Lagoon on the east end of Galveston Island	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation.
309	Dune Restoration and Beach Nourishment, Surfside to Brazos River	This measure would restore approximately 1.9 miles of shoreline extending eastward from the Freeport East Jetty. The area protected by the shoreline is the City of Surfside.	3	Shoreline protection provides a buffer to erosion and promotes habitat conservation for several protected species, including migratory birds. However, due to the populated area, the benefits to migratory birds may not be as effective.
310	Dune Restoration and Beach Nourishment, Brazos River to Brazos River Diversion Channel	This measure would restore approximately 6.3 miles of shoreline. The area protected by this shoreline includes two popular recreation areas at Quintana and Bryan Beaches and several industrial facilities and placement areas.	3	Shoreline protection provides a buffer to coastline erosion and promotes habitat conservation for several protected species, including migratory birds. However, due to the populated area, the benefits to migratory birds may not be as effective.
315	Erosion Control Structures, San Luis Pass to Brazos River Diversion Channel	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.	3.5	Beach nourishment is excellent for protected species which utilize sand dunes and the backbay marshes that become infiltrated without the protection of the sand dunes and beaches. However, hardened structures on coastal dunes often prevent long term natural migration of sand dunes.
318	Groin at State Highway 332	This measure would construct a groin extending into the Gulf at State Highway 332, in conjunction with the placement of beach nourishment, to keep the sediment in the system near eroding portions of Surfside Beach. This measure would only be implemented in conjunction with Project 309, "Dune Restoration and Beach Nourishment, Surfside to Brazos River" in order to retain the sediment placed as part of those efforts.	3.5	Shoreline protection provides a buffer to coastline erosion for beaches highly prone to erosion; migratory birds may utilize longer expanses of beachfront, and coastal dunes may have less pressure to withstand erosive processes and provide high quality habitat. However, due to the populated area, the benefits to migratory birds at the shoreline may not be as effective.
320	GIWW Barrier Island Restoration, Old River and Hickory Coves	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.	3	Project will improve rookery potential with additional island area for sea grass growth.
322	GIWW Barrier Island Restoration, North Pleasure Island	This measure would restore an island that once protected the GIWW at the northern end of Sabine Lake at Pleasure Island. Some island remnants exist.	2.5	Project does not greatly improve existing rookeries or provide significant high quality habitat to protect species. However, protection of the GIWW may reduce the frequency of dredging activities, which disturb surrounding species and habitats.
337	Marsh Restoration, Old River Cove	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.	4	Significant wetland habitat improvement will increase viability for protected species and migrating birds. Large expanses of open space often allow for greater use of habitat and increase productivity for species utilizing the area.

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341	Marsh Restoration, Long Point Marsh, Galveston County	The project will restore 1,661 acres of emergent marsh with a containment dike of 13.2 miles and 9.6 miles of shoreline protection.	4	Large expanses of open space often allow for greater use of habitat and increase productivity for species utilizing the area. Significant wetland habitat conservation allows for long term viability for migrating birds and provides a safe rehabilitation area after long distances.
344	Marsh Restoration, Pierce Marsh, Galveston County	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.	3.5	Improvement of degraded marsh will increase viability for protected species and provide potential foraging for migrating birds. Project will build upon existing wetland restoration in the immediate vicinity, which increases chance for various species to fully utilize the area.
346	Marsh Restoration, IH-45 Causeway, Galveston County	The proposed 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.	3.5	Improvement of degraded marsh will increase viability for protected species and provide potential foraging for migrating birds. Project will build upon existing wetland restoration in the immediate vicinity, which increases chance for various species to fully utilize the area.
360	West Bay Water Quality Protection Project	The purpose of this project is to protect the water quality of West Galveston Bay through an initiative to conserve farm and ranchlands as well as native coastal habitats in watersheds that drain into West Galveston Bay. The initiative will use conservation easements, purchase of development rights and fee title purchases to conserve properties held by willing land owners.	3	Conservation of moderate quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation. Migratory birds occasionally utilize farmed wetlands and ranch areas to forage and nest, though monoculture agricultural land is not ideal for protected species.
380	Gordy Marsh Restoration & Shoreline Protection - Phase 1	This project will provide shoreline protection and marsh restoration on Gordy Marsh, a 1,700 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.	4	Large expanses of open space often allow for greater use of habitat and increase productivity for species utilizing the area. Significant wetland habitat conservation allows for long term viability for migrating birds and provides a safe rehabilitation area after long distances.
414	Galveston County Oyster Reef Creation	This project will create 100 acres of oyster reef throughout Galveston County.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Galveston Bay. Will increase potential food source for higher food chain species.
417	GIWW Island Restoration, Orange County	The project involves the creation of 131 acres of new barrier island habitat along the GIWW in Orange County that would include both wetland and vegetated shallows.	3	Project will improve rookery potential with additional island area for sea grass growth.
418	Sargent Beach Dune/Beach Restoration	The project involves approximately 8 miles of beach and dune restoration in Sargent Beach.	4	Beach nourishment is excellent for protected species which utilize sand dunes and the backbay marshes that become infiltrated without the protection of the sand dunes and beaches.
423	Matagorda Bay System Hydrologic Restoration	The proposed project includes hydrologic restoration of the Matagorda Bay System. This would result in the preservation of aquatic habitat and marshes in Matagorda, East Matagorda, Tres Palacios, Carancuhua and Lavaca Bays.	4	Restructuring canals will greatly increase the ability of the outlets to withstand the water flows and reduce beach erosion, thereby conserving coastal dune habitat utilized by migrating birds and protected species. Freshwater inflow to inland bays will also reduce risks of high salinity and restore balance to promote reestablishment of estuarine species.
430	Redfish Lake on Carancahua Bay Shoreline Stabilization	The proposed project includes 3 miles of breakwaters. The restoration of the protective barrier, oyster reefs, marsh, and sea grasses would preserve special aquatic sites such as wetlands and vegetated shallows.	4	Project includes comprehensive restoration of potentially high quality habitat for migrating birds and protected species.
437	Fulton Beach Road Protection	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.	3.5	Project will provide additional habitat options for potential migrating birds. Hardened structures may not support overall goal of living shoreline, unless erosion of sands create a potential for oyster colonies.
443	Nueces County Hydrologic Restoration Study	The project involves hydrologic restoration in Nueces, Corpus Christi, Aransas, and Copano Bays to restore special aquatic sites such as wetlands, mudflats, and vegetated shallows recognized as nationally significant by the Clean Water Act.	4	Restructuring streamflow to its native pattern will greatly increase the ability of the outlets to withstand the water flows and reduce shoreline erosion, thereby conserving coastal wetland habitat utilized by migrating birds and protected species. Freshwater inflow to inland bays will also reduce risks of high salinity and restore balance to promote reestablishment of estuarine species.
452	Bird and Heron Islands Restoration, Cameron County	The project includes construction of 0.8 miles of breakwaters to protect and restoration for Bird and Heron Rookery Islands. These improvements would increase critical habitat for the wintering piping plover, recognized as a threatened species in Cameron County. A feasibility study has been funded to determine the most effective methods to protect these islands from further erosion.	4	Establishment of rookery islands greatly increase viability of fish species utilizing area rookeries and may greatly increase number and quality of fish colonies. Rookery island may also add potential foraging habitat for migrating birds.
457	GIWW Island Restoration, Jefferson County	The proposed project aims to restore 42 acres of island habitat in Jefferson County. The new island habitat would contain special aquatic sites such as wetlands and vegetated shallows.	3.5	Establishment of rookery islands greatly increase viability of fish species utilizing area rookeries and may greatly increase number and quality of fish colonies. Proximity to GIWW may slightly affect rookery.

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458	Marsh Restoration, Jefferson County	The project would involve restoration of 9,304 acres of marsh habitat. Doing so would preserve special aquatic sites such as wetlands and vegetated shallows recognized as nationally significant by the Clean Water Act (33 USC 1344) and would preserve exceptionally scarce and declining estuarine intertidal and emergent marsh as determined by the latest USFWS/NOAA status and trends report.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near wildlife refuge, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
600	Half Moon Reef Restoration in Matagorda Bay - Phase III	The proposed project would restore 30 acres of reef habitat in Matagorda Bay. This particular restoration design approach will greatly enhance the biodiversity and productivity of critically important Essential Fish Habitat and contribute to the overall fisheries resources in the nearby bay and offshore waters through marine species recruitment. Improved water quality, increased recreational fishing opportunities, enhanced marine biodiversity and other ecosystem benefits are anticipated with a completed project.	4	Project will greatly increase water quality and potential habitat ranges for fish species and other species dependent upon healthy fish population.
605	Guadalupe Delta Estuary Restoration	The 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.	4	Restructuring river flows will greatly increase the ability of the outlets to withstand the water flows and reduce shoreline erosion, thereby conserving wetland habitat utilized by migrating birds and protected species. Freshwater inflow to inland bays will also reduce risks of high salinity and restore balance to promote reestablishment of estuarine species.
607	Moses Lake Wetlands Restoration & Protection	The third phase of the Moses Lake Wetlands Restoration and Protection project seeks funding for construction of the preferred alternatives developed in the engineering, design, and permitting phase. The alternatives include construction of nearshore segmented breakwater structures in Moses Lake and placement of materials to restore elevations suitable to support emergent vegetation and upland coastal species.	3	Placement of hardened structures may not prove to be beneficial for wetland species utilizing the prairie and estuarine environment for foraging. However, support of upland coastal prairie habitat may provide habitat for opportunistic species.
616	Alligator Point Island Restoration	To support colonial water bird populations, this project seeks to enhance the existing island to a sustainable elevation and increase its size. The island as currently designed will be similar to its configuration is 1990 of approximately 10 acres in size and at approximately 4 ft. elevation mean tide. The island will be protected by the placement of approximately 4,000 ft. of breakwater and will be planted with desirable plant species that will support platform and ground nesting species.	3.5	Wetland restoration through beneficial use of dredge materials is efficient for improving the quantity and quality of existing migratory bird habitat, however hard surface breakwaters used for shoreline stabilization may reduce the quality of wading bird foraging habitat. Larger acreage may increase potential area for existing rookery.
618	Jig Saw Island Restoration	The project will aim to restore Jigsaw Island to support and sustain the multiple bare ground nesting bird species that inhabit the island. The project will include 2,900 linear feet of reef structures to mitigate erosive wave action and 3.4 acres of restored island habitat, 1.26 acres of which would support ground nesting birds (elevation above 2 feet MTL).	4	Shoreline protection provides a buffer to erosion and promotes habitat conservation for several protected species, including migratory birds.
637	Port Freeport Regional Sediment Management-Habitat Restoration Initiative	Port Freeport (PF) will develop a Regional Sediment Management Plan and Restoration Initiative with the dredge material (DM) that is coming from the present and future expansion, associated with the deepening and widening of the Port navigation channel and creation of new infrastructure. PF has a commitment dedicating the entire DM from its expansion exclusively to restoration.	3	Prevention of sedimentation is an important part of the habitat protection effort; this project appears to have a general effect on protected species and wetlands.
641	Oyster Reef Restoration in Upper Galveston Bay	This project seeks to restore 150 acres of degraded Galveston Bay oyster reefs using a landscape approach to create a network of spatially separated oyster populations. A network of high vertical relief source and sink oyster reefs will be created in Upper Galveston Bay. This will allow for increased oyster population sustainability and oyster habitat resiliency.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Galveston Bay, and will increase potential food source for higher food chain species.
645	Long-Term Recovery of Gulf Shorebirds and Waterbirds	The project will create and maintain seasonal freshwater wetland habitat for multiple important shorebird species. The project will also aim to increase the regional breeding populations by improved management of critical nesting and stopover habitats along the Gulf Coast.	3	Project goals are beneficial to protected species and wetlands but too widespread and may be difficult to define impacts to migratory birds or protected species.

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658	Bahia Grande Living Shoreline and Public Access Project	This project would beneficially use the dredged material from the ongoing Bahia Grande Restoration Project. The material would be used to construct a platform for a parking area providing public access to area, as well as to stabilize a peninsula near the parking lot within Bahia Grande with 1,000 feet of living shoreline feature to create additional habitat and stabilize the existing 2.5 acres of habitat.	2.5	Beneficial use of dredged materials is an efficent way of establishing wetland substrate, though this project does not specifically benefit migratory birds or protected species. Wetland habitat may be improved or expanded, which may have a general effect.
678	Indian Point Shoreline Protection – Phase II	Phase I of this project included the construction of approximately 1,040 linear feet of limestone revetment and offshore breakwaters. Phase II of the 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.	3	Construction of hardened breakwaters may produce undesired effects and may not be suitable in long term viability. However, improvement of seagrasses and ideal conditions for seagrass growth provide excellent habitat for protected marine species and fish populations.
680	Nueces Delta Marsh Plan and Restoration Project – Phase II	This project will continue management and restoration of approximately 4,700 acres of vital habitat within the Nueces River Delta and conserve diverse estuarine marsh and prairie habitat. Numerous aquatic species and endangered or threatened avian species utilize the areas within the delta as breeding and nursery grounds. This project will develop and implement a comprehensive management plan for the area to allow for protection and restoration of the terrestrial and estuarine habitats.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation.
696	Shamrock Island Restoration – Phase II	This project involves 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 breakwaters will protect 2,045 linear feet of prime beach nesting habitat, 11.5 acres of saltmarsh, 13.6 acres of seagrass, and approximately 23 acres of upland nesting habitat from erosion. Improvements to the 150-acre rookery island will enhance the habitat of up to 21 bird species, including the state threatened Reddish Egret and White-faced Ibis, and the American Oystercatcher.	4	Restoration of native barrier formation keeps bay at estuarine state, allows for continued pristine habitat for protected species and migrating birds.
705	Packery Channel Nature Park Enhancement and Wildlife Rehabilitation Center	The Packery Channel Nature Preserve property has been identified as a preferred location for a wildlife rescue and rehabilitation center. One project goal is the creation and restoration of ecologically important oak motte woodland habitat, which is critical to migratory and resident birds, insects, reptiles, and mammals in this area.	4	Project attempts to provide high quality rehabilitation location with access to estuarine habitat as well as coastal prairie habitat. Project location is currently in high quality status for habitat and viability for protected species.
713	Middleton Wetlands Creation	The project aims to construct 300 acres of freshwater wetlands in abandoned rice farmland on the Middleton unit of the Anahuac NWR. Included in this project is the creation of a 70 acre reservoir/moist soil unit that will provide water to the wetland units. The improvements will provide wetland habitat to migratory and resident wildlife, including significant numbers of ducks, geese, shorebirds and wading birds.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation. Two protected plant species are located within the project area and may be greatly impacted by the effects of restoration and conservation in this area.
716	Galveston Bay Bird Nesting Islands Restoration	The objective of the project is to restore various rookery islands' footprints to historical size and increase elevations that will better support colonial water birds over the long term. Dredged material will be strategically added to the Vingt-Et-Un Islands to increase elevation and prevent over wash of ground nesting birds. Shrubs and other vegetative plantings will be added to stabilize sediment and provide nesting sites for shrub-nesting colonial water birds. A structure to reduce wave action/intensity will likely be needed.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation, and the utilization of shrubs and other soft-bodied structural material will help with shoreline stabilization while adding a separate habitat potential.
717	South Deer Island Acquisition and Restoration	The project involves the acquisition and restoration of South Deer Island to ensure that the site is properly managed and to protect the important ecological site to directly benefit the various species that use the island for nesting.	4	Conservation of high quality habitat and wetlands is one of the best ways to provide long term and sustainable opportunity for protected species resiliency and preservation.
764	Acquisition of Fresh Water Marsh Adjacent to J.D. Murphree WMA	This project involves the acquisition of 1,700 acres of non-tidal, fresh water marsh adjacent to the J.D. Murphree WMA. The property supports a variety of wetland plants and provides habitat for species of concern, such as mottled ducks and pig frogs. Acquisition of this property would increase opportunities to conserve and manage valuable coastal habitat and would increase public access and public recreation opportunities.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near wildlife refuge, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.

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769	San Jacinto North Shore Restoration	San Jacinto Battleground State Historic Site preserves 1100 acres of the battleground where Texas won independence from Mexico. This area has experienced the loss of roughly 200 acres of land, including riparian forests and wetlands, fringing wetlands, wet meadows, and marshes due to subsidence and erosion from ship wakes. The North Shore Restoration Project proposes to restore approximately 20 acres of uplands and tidally influenced wetlands using a combination of rock breakwaters, backfilling, marsh restoration, and planting. These efforts would also assist in the recovery of valuable parkland for public access, recreation, and interpretation.	2.5	Existing industrial activities and population density mitigate against the shoreline and wetland habitat; it is not likely that protected species or migratory birds will be greatly impacted by this project.
777	Whooping Crane Habitat Protection in the Guadalupe and San Antonio River Basins	This project would protect and restore whooping crane habitat along the Texas coast by working with water users to maintain environmental flows. Funds would be used to purchase water rights or pay for water use reductions in order to capture or retain excess water for environmental flows. Funding for this project would also be used to purchase and restore riparian areas in the basins utilized by whooping cranes from willing sellers where an acquisition is strategically feasible and advantageous.	3	Project depends upon willingness of public to sell their water rights. However, project intends to improve riparian areas to restore potential whooping crane habitat.
779	Copano Bay Oyster Reef Restoration	The primary goals for the project are to design and construct a segmented reef structure that enhances the recruitment and productivity of native oysters, provides a biologically rich and diverse collection of reef-dependent estuarine organisms, and builds resiliency into the Copano Bay estuarine ecosystem. The project also includes a monitoring program to assess project performance over 3 to 5 years post-construction.	3.5	Oyster reef construction or restoration will help restore water quality and reduce turbidity in Copano and Aransas Bays, and will increase potential food source for higher food chain species. However, monitoring and susquent restoration efforts may be required in new oyster reef projects which do not expand existing pyster colonies.
793	Management of Galveston Bay Conservation Properties for Enhanced Ecosystem Functions and Resilience	The proposed initiative includes a number of measures to rehabilitate several high profile properties owned by the GBF with the purpose of increasing the potential wildlife habitat value. These include creation of 14 acres of ephemeral freshwater wetlands and construction of 2,000 linear feet of erosion control structures along the shorelines of Sweetwater Preserve and Frost-Deen tract. The plan also proposes implementation of best management practices including brush management and prescribed fire in an effort to promote native plant diversity on coastal prairies located in Chambers and Galveston Counties.	4	Conservation and restoration of high quality habitat is an effective way of encouraging resiliency of protected species and their survival; hardened structures utilized for marsh creation allow for significant natural backfilling and increase amount of habitat for protected species and migratory birds. This area is designated as a high value "fallout" site for birds migrating across the Gulf of Mexico.
794	Galveston Bay Oyster Reef Restoration and Enhancement	This project would result in the restoration of 400 acres of oyster reef within three areas of Galveston Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Galveston Bay. Will increase potential food source for higher food chain species. Project is well-designed with controls, providing a strongly likelihood for successful establishment of thriving oyster colonies.
797	Restore Colonial Water Bird Rookery Habitat in Dickinson Bay	The objective of this project is to restore two 5 to 7 acre colonial water bird rookery island in Dickinson Bay, which will be Phases II and III of the original Dickinson Bay Island Marsh Restoration Project. The project will be constructed to provide multiple habitat functions, including approximately 5 acres of nesting space for colonial water birds and 2-acres of oyster reef. Approximately 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 and around Dickinson Bay. Partial funding is in place for these phases.	4	Restoration of colonial bird rookery island will greatly increase habitat suitability for migrating birds, while oyster bed restoration will provide water quality improvements as well as food chain benefits to migrating birds and other protected species.
801	West Galveston Bay Marsh Restoration – Chocolate Bay	The project involves restoration of approximately 1,600 acres of intermediate marsh on the north side of West Galveston Bay between Halls and Chocolate Bayou's. The project will also include the placement of two large water control structures to drain the marsh and stabilize the project area with rock and other similar materials. This will allow the marsh to function as it did historically by restoring the hydrology to pre-GIWW conditions.	3.5	Restoring the wetland hydrology of an area that has been impacted by subsidence and rising sea water is an effective way to restore lost wetlands, however caution should be utilized to ensure that dewatering activities follow natural pathways and are not linear in nature, thereby negating any positive effects.
806	Restoration of Rookery Islands in Upper Laguna Madre	The objectives of this project will be to determine the appropriate size and location for the creation of a new rookery island and to obtain preliminary feasibility analysis, engineering, and cost estimates.	3	Establishing additional rookery islands adjacent to existing rookeries is beneficical, however this project does not appear to have an action item affiliated.
809	Barrier Island Habitat Conservation - Coastal Bend	The project aims to purchase land, purchase development rights, and donate conservation easements to protect essential habitat on Mustang and North Padre Islands.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near open space and parks, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.

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811	Zarate Tract - Laguna Atascosa National Wildlife Refuge	The 914 acre Zarate Tract is located on the north side of the Bahia Grande unit of Laguna Atascosa National Wildlife Refuge, about 12 miles west of Port Isabel, Texas. The USFWS aims to acquire this land to better manage these coastal wetlands and improve wildlife access to existing and future/restored wildlife corridors.	4	Conservation and restoration of high quality habitat is an effective way of encouraging resiliency of protected species and their survival. Effective management designed for rehabilitation of protected species is vital to successful conservation.
822	Wetlands of Paso Corvinas at the Bahia Grande Unit of Laguna Atascosa - Phase II	The goal of the project is to restore the wetland area near Paso Corvinas to its previous tidally-influenced condition by removing the southwestern sand bar and thereby restoring connectivity between Paso Corvinas and the Bahia Grande. To do this, first a hydrological study will need to be performed to be followed by design and construction of the hydrologic restoration alternative. An improved low water crossing is needed on the northeastern side.	4	Increased hydrological function will greatly increase the estuary's viability for migrating birds and protected species, as well as balance the salinity to an appropriate level to support native estuarine species.
827	South Padre Island American Land Conservancy Tract	The project involves acquisition of 186 acres of land currently owned by the American Land Conservancy. The goal is to acquire this property for the Laguna Atascosa National Wildlife Refuge as a part of the Laguna Atascosa National Wildlife Refuge Comprehensive Conservation Plan.	4	Conservation and restoration of high quality habitat is an effective way of encouraging resiliency of protected species and their survival. Effective management designed for rehabilitation of documented protected species is vital to successful conservation.
829	Oyster Reef Restoration in Nueces and Corpus Christi Bays	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.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Galveston Bay. Will increase potential food source for higher food chain species. Vertical integration of potential habitat is good way to increase potential range of oyster colony.
834	Salt Bayou Siphons	The project involves the placement of siphons at two locations in the Salt Bayou system in southern Jefferson County. These locations are on the J.D. Murphree WMA and the McFaddin NWR. These siphons will restore a hydrologic connection between the freshwater marsh systems north of the Gulf Intracoastal Waterway (GIWW) and degraded marshes south of the GIWW. Hydrologic modeling indicates benefits to at least 4,300 acres of marsh from a siphon set in J.D. Murphree WMA, and up to 22,500 acres of marsh from a siphon set in McFaddin NWR, and up to 43,000 acres of marsh if both siphon sets are installed.	4	Restoring native hydrology will greatly increase the ability of the wetlands to provide healthy habitat opportunities to estuarine species and migrating birds. Freshwater inflow to wetlands no longer supported by natural streams will also reduce risks of high salinity and restore balance to promote reestablishment of estuarine species.
842	West Bay Estuarine Habitat Restoration and Protection Project	The proposed project will restore and protect estuarine marsh habitats including intertidal fringe marsh, salt flat marsh, sand flats, shallow water, and seagrass at 7 locations; Gang's Bayou, Starvation Cove, Dana/Carancahua Coves, Jumbile Cove, Bird Island Cove, and McAllis Point, in West Galveston Bay. The project will use dredged material to expand marsh areas, and will install and repair approximately 38,900 linear feet breakwaters to protect and enhance estuarine marsh and seagrass habitats.	4	Beneficial use of dredged materials is an efficent way of improving existing wetlands in high quality habitat areas and assists in developing new wetland habitat for protected species and migratory birds.
844	Rookery Island Creation in Coastal Bend	The project involves the creation of 3 rookery islands, each approximately 4 acres in size, lined with erosion control material such as limestone rock. The islands will be placed in San Antonio Bay, Nueces Bay, and the Upper Laguna Madre. These rookery islands would allow for consistent nesting grounds for a declining waterbird population. Specific locations are to be determined.	4	Wetland restoration through beneficial use of dredge materials is efficient for improving the quantity and quality of existing migratory bird habitat, however hard surface breakwaters used for shoreline stabilization may reduce the quality of wading bird foraging habitat, though it may provide potential oyster bed habitat. this project is located near established rookeries and occurrences of protected species.
853	Texas Mid-Coast Oyster Restoration and Enhancement	This project would result in the restoration of 450 acres of oyster reef within the four major bay systems along the middle Texas coast: Matagorda/Lavaca Bay, San Antonio Bay, Aransas Bay and Copano Bay. Restoration sites will be monitored for success criteria based on recruitment of oysters to restored sites compared to adjacent control sites.	4	Oyster reef restoration will help restore water quality and reduce turbidity in coastal bays. Will increase potential food source for higher food chain species. Project is well-designed with controls, providing a strongly likelihood for successful establishment of thriving oyster colonies.
855	Sabine Lake Oyster Reef Restoration and Enhancement	This project will restore oyster reef habitats along the western shore of Sabine Lake. The project area will encompass a total of 40 acres. By placing 1,800 mounded, highly dense reef patches throughout the project area, the structurally complex character of the nearby unfished oyster reefs will be replicated.	4	Oyster reef construction or restoration will help restore water quality and reduce turbidity in Sabine Lake, and will increase potential food source for higher food chain species.

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865	Beneficial Use of Dredged Material to Restore Marshes in Salt Bayou	TPWD is currently partnering with Golden Pass LNG Terminal (GPLNG) to restore marsh in the Salt Bayou unit of the J.D. Murphree Wildlife Management Area with dredged material from the shipping berth at the GPLNG terminal. For the current dredging cycle, TPWD has funding from National Marine Fisheries Service to pay for marsh surveys, environmental monitors, and site planting. Additional funding will be needed to retain monitors and to plant the site.	3.5	Beneficial use of dredged materials is an efficent way of improving existing wetlands in high quality habitat areas and assists in developing new wetland habitat for protected species and migratory birds. Monitoring of the final phases is vital to the success of new wetland establishment and prevents exotics and invasive species from dominating new soils.
869	Wetland Restoration in Support of Mottled Ducks and Other Wildlife	The objective of this project will be to enhance 1,875 acres of freshwater wetlands along the Texas coast. These wetlands will be designed to function as feeding, resting, and breeding habitat for mottled ducks.	3	Project location may be too far spread to be effective, though improving freshwater marshes and wetland are an important part of creating high quality habitat for protected species.
873	Anahuac National Wildlife Refuge Wetlands Creation	The project involves the construction of 550 acres of wetland/moist soil units and the restoration of 100 to 150 acres of native prairie in previously converted farmland of the Anahuac NWR. The constructed wetland/moist soil units will be valuable to waterfowl, shorebirds, grassland birds and wading birds.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near wildlife refuge, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
922	Oliver Point and Chinquapin Oyster Reef Restoration	The project involves oyster reef restoration on legacy reefs in Matagorda Bay and along the GIWW.	4	Oyster reef restoration will help restore water quality and reduce turbidity in Matagorda Bay. Will increase potential food source for higher food chain species. Project is well-designed with controls, providing a strongly likelihood for successful establishment of thriving oyster colonies.
1187	Regional Sediment Management Plan	Develop a regional Sediment Management Plan for the entire Texas coast to allow for coastwide coordination in sediment resources. Efforts would include developing geologic and geomorphologic analyses of the coast, determining regional impacts on sediment accretions and losses, cataloging available dredging and BUDM data, and analyzing available circulation studies. The final report would include regional maps, tables, and descriptions of potential sediment sources, RSM priorities, and potential scenarios for RSM applications.	4	In-depth study of coastal sediment resources is highly valuable, as many of the project depend upon a source of sediment that is suitable for Texas Gulf Coastal environments. This study may provide sources previously unknown and potentially sustainable.
2311	Statewide Beach Monitoring and Maintenance Program	GLO's Beach Monitoring and Maintenance Program - Ongoing monitoring and maintenance of CEPRA beach nourishment and restoration sites along the Texas coast to maintain post-storm FEMA eligibility.	4	Observation and maintenance is vital to a project's success. This program benefits all coastal species as beneficial programs depend upon monitoring to ensure success.
9001	Nueces Bay Living Shoreline and Marsh Enhancement, Southwest Portland	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.	4	Living shorelines prevent degraded water quality for ecosystems outside of the barrier; this project increases wetland acreage, thereby increasing potential habitat for wading birds and protecting inland habitat for migrating birds.
9003	Coastal Prairie Estuarine Wetland and Mima Mound Complex Habitat Protection at Shell Point Ranch	The project proposes the acquistion of approximately 400 acres of coastal habitats that support coastal prairie, freshwater, and estuary wetlands and the southernmost extents of Mima mounds at Shell Point Ranch in Texas. This mosaic of habitats supports Mottled Duck and whooping cranes, in addition to other wildlife.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project is within habitat range for documented observances of multiple protected species and is excellent habitat range for migrating birds.
9006	Dagger Island Shoreline Protection	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 reefs, emergent marsh, mangrove marsh, mangroves, tidal flats, benthic life and associated uplands important for the health of the entire bay ecosystem. In addition, this project will create low and high marsh habitats and enhance seagrass beds.	4	Project includes comprehensive restoration of high quality habitat for migrating birds and protected species, and may provide potential habitat for nearby rookeries.
9008	Flour Bluff / Laguna Shores Road Living Shoreline	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.	3.5	Living shorelines prevent degraded water quality for ecosystems outside of the barrier; this project increases wetland acreage, thereby increasing potential habitat for wading birds and protecting inland habitat for migrating birds. However, the proximity to human population may slightly decrease potential use of shoreline.

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9014	Causeway Island Rookery Habitat Protection	This project will address actions needed to protect important rookery island habitat at Causeway Island. The island supports approximately 3,070 pairs of breeding colonial waterbirds per year and harbors numerous threatened and priority avian species. The erosion of the island's shoreline is causing the on-going loss of critical rookery island habitat; the primary benefit from this project is the protection of the rookery island from wind and wave erosion.	4	Beneficial use of dredge material and installation of geotextile tubes has proven to be an effective method to increase land mass, thereby increasing potential wetland habitat. This project may increase wetlands near the causeway, and may increase rookery habitat protection due to the proximity to existing rookeries.
9025	Bessie Heights Marsh Restoration	The proposed project would restore a historical marsh complex at Bessie Heights Marsh in the Lower Neches WMA that has been lost to subsidence. The marsh restoration methodology will be BUDM cells with sacrificial containment berms.	4	Improvement of degraded marsh will increase viability for protected species and provide potential foraging habitat for migrating and wading birds. Project location is near existing wildlife management area, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
9026	Shorleine Stabilization from Galveston Seawall to 8 Mile Road	The project proposes to provide shoreline stabilization along the Gulf beach of Galveston's West End and the creation of a feeder beach to passively nourish the shoreline from the Galveston Seawall to 8 Mile Road through natural transport.	4	Restoration of native barrier formation keeps shoreline at reduced risk of erosion, which allows greater use of beaches for migrating birds and protected species. This project is wihtin documented sightings of protected plant life, which takes stable environments to flourish.
9027	San Antonio Bay Rookery Island Restoration	San Antonio Bay bird rookery islands have significantly declined due to erosion. An inventory of rookery islands within San Antonio Bay shows only two marginally functioning islands where there had been 10. The loss of suitable nesting habitat has led to a decline in herons, egrets, black skimmers and brown pelicans. An initial site assessment of San Antonio Bay identified five locations of previously functioning islands that are suitable for reconstruction. This project proposes restoration of a historical rookery island utilizing one or more of these locations. BUDM would be used from the adjacent channels, if possible.	4	Beneficial use of dredge material has proven to be an effective method to increase land mass, and use of local dredge material keeps soil microbes similar, thereby increasing potential wetland habitat. the increased land mass may also allow for increased rookery habitat.
9028	Schicke Point Living Shoreline and Marsh Protection	The project proposes shoreline protection to prevent further recedence of intertidal marsh from Schicke Point on the Matagorda Bay shoreline to the east. Potential protection method includes construction of a living shoreline combined with sediment addition.	4	Living shorelines prevent degraded water quality for ecosystems outside of the barrier; this project increases wetland acreage, thereby increasing potential habitat for wading birds and protecting inland habitat for migrating birds. If rocky substrate is utilized, nearby oyster beds may also expand to the new potential habitat created by this project.
9042	Bahia Grande Living Shoreline	The project includes creation of a living shoreline through replacement of foreign-sourced riprap material with naturally-based, native materials. Additional proposed actions include creation of controlled access points for the public, bank / shoreline restoration using beneficial use dredged material, and installation of culverts or other structures under State Highway 48.	4	Living shorelines prevent degraded water quality for ecosystems outside of the barrier; this project increases wetland acreage in a larger wetland complex, thereby increasing potential habitat for migrating birds and protected species. This area has a known occurrence of a protect plant species, which requires a stable environment to flourish.
9046	Follets Island Conservation Initiative	The Follets Island Conservation Initiative is a partnership effort to acquire and protect an additional 1,300 acres on the island and transfer title to the Texas Parks and Wildlife Department. Critically important wildlife habitats on the island include tall grass prairies, salt and fresh water marshes, sea grass meadows, oyster reefs, mud flats, sand dunes, and Gulf beaches. The island is important for Kemp's Ridley sea turtles, piping plovers, waterfowl, wading birds and shorebirds. Follets Island helps protect the entire estuary system, including Drum and Christmas Bays, from degradation from storms and allows the natural movement and restoration of habitats after storm events.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near protected open space, which makes a greater expanse of habitat for migrating birds, protected species and estuarine rare species.
9047	Sabine Ranch Habitat Protection	Sabine Ranch is a critical, 12,100-acre component of the largest remaining contiguous coastal freshwater marsh system in Texas. Protection of the Sabine Ranch, almost entirely within the McFaddin NWR boundary, is the U.S. Fish and Wildlife Service's (USFWS) top conservation priority for the upper Texas coast. Sabine Ranch's central position within 100,000+ acres of federal and state protected beach and marshland make the permanent protection of this coastal habitat critical to the entire complex. Conserving and restoring these lands will avert further losses of marshland and biological diversity. Sabine Ranch's coastal marshes, prairies and woodlots provide important habitat for 35 of the 48 avian species that are USFWS Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near open space and parks, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.

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9048	Baer Ranch Addition to San Bernard NWR	The Baer Ranch proposed addition to San Bernard National Wildlife Refuge consists of approximately 10,000 acres and is adjacent to East Matagorda Bay. It has several miles of frontage on the bay and contains tidal bayous and marshes, transitional habitats, bottomland habitats, coastal prairies and pothole wetlands. East Matagorda Bay is one of the most intact Texas bay systems remaining, and there is at present an opportunity to preserve much of the associated shoreline and watershed to ensure the health of the bay for fish, wildlife and future generations.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near open space and parks, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
9050	Sargent Ranch Addition to San Bernard NWR	Sargent Ranch consists of approximately 8,000 acres of habitat surrounded by the San Bernard National Wildlife Refuge. The U.S. Fish and Wildlife Service would like to purchase the ranch. The ranch stretches from the Gulf inland and includes beaches, dunes, prairies, extensive salt and fresh water wetlands, and Columbia Bottomland forests dominated by large old live oaks. The acquisition of the ranch would connect large portions of the refuge and make it possible to protect important coastal dune and beach habitat for nesting sea turtles, piping plovers and a great diversity of waterfowl and water birds. The protection of the beach dunes would also improve the resiliency of this portion of the coast to storms and sea level rise and allow the natural migration of marshes and wetlands and other habitats over time.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near unmolested sand dunes, and high quality open space, which makes a greater expanse of open space and habitat for migrating birds, protected species and estuarine rare species.
9051	Protect Shorebird and Turtle Nesting Habitat on South Padre Island	The project involves protection of 10,000 acres of beach and dune habitats on South Padre Island through acquisition of parcels from willing landowners. The protection of these habitats would benefit nesting sea turtles and migratory and resident shorebirds.	3.5	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. However, project depends upon willingness of multiple land owners to sell their real estate.
9053	Protect Bahia Grande and Vadia Ancha Shorelines (Laguna Heights Acquisition)	The proposed project would protect wetland, coastal prairie and thornscrub habitat adjacent to the Bahia Grande unit of the Laguna Atascosa National Wildlife Refuge through acquisition of the 1,400-acre Laguna Heights parcel. The protection of this parcel will protect the shoreline of the Bahia Grande wetland complex and will assist in the maintenance of the functional values of the Bahia Grande wetland system, much of which has recently been restored.	4	Conservation of existing high quality habitat will greatly increase viability for protected species and migrating birds. Project location is near currently protected open space and parks, which makes a greater expanse of habitat for migrating birds, protected species and estuarine rare species.
9060	Beach Re-Nourishment at Padre Island National Seashore	This project proposes to place dredged sediment from the Mansfield Channel and transferred sand from the south side of the jetties onto the Padre Island National Seashore from Mansfield Channel to 15 miles north of the channel. The beach on these 15 miles of seashore is currently eroding into the primary dune line and cutting off public access because sediment flow is blocked by the jetties. This area amounts to one fifth of the park's Gulf beach and is the most heavily used beach for nesting by the endangered Kemp's Ridley sea turtle. Further erosion will result in inlets forming in old wash overs that are currently snowy plover nesting habitat. USACE had previously dredged the channel every 2 to 3 years, which was sufficient to maintain the beach; however, due to budget cuts, the channel has not been dredged since 2011.	4	Beneficial use of dredge material and installation of geotextile tubes has proven to be an effective method to increase land mass, thereby increasing viability of sand dunes. Additional benefit from removing sands from jetty buildup allows for multiple benefit locations.