COASTAL TEXAS STUDY

Welcome!

COASTAL **TEXAS** STUDY

The U.S. Army Corps of Engineers (USACE) and the Texas General Land Office (GLO) welcome you to the **Public Meeting for the Coastal Texas Protection and Restoration Feasibility Study.**

US Army Corps of Engineers®
Galveston District

TEXAS GENERAL LAND OFFICE
ESTABLISHED 1836

What is the purpose of this public meeting?

- Invite public participation in the study process
- Solicit public comments for consideration on the Draft Integrated Feasibility Report and Environmental Impact Statement and the proposed Tentatively Selected Plan

We are here to receive ***your comments*** on the **Draft Integrated Feasibility Report and Environmental Impact Statement** and the proposed **Tentatively Selected Plan**.

We want to hear from ***you*** about the ***Coastal Texas Study***.

COASTAL **TEXAS** STUDY

About the Study

What is the purpose of the study?

This study is necessary to determine if there is federal interest in supporting projects for **coastal storm risk management (CSRM)** and **ecosystem restoration (ER)** that would:

- Protect the health and safety of Texas coastal communities
- Reduce the risk of storm damage to residences, industries, and businesses vital to the Nation's economy
- Restore and enhance critical coastal ecosystems

Where is the study area?

The study area consists of the **entire Texas Gulf coast from the mouth of the Sabine River to the mouth of the Rio Grande**, and includes the Gulf and tidal waters, barrier islands, estuaries, coastal wetlands, rivers, and streams that make up the interrelated ecosystems along the coast of Texas.

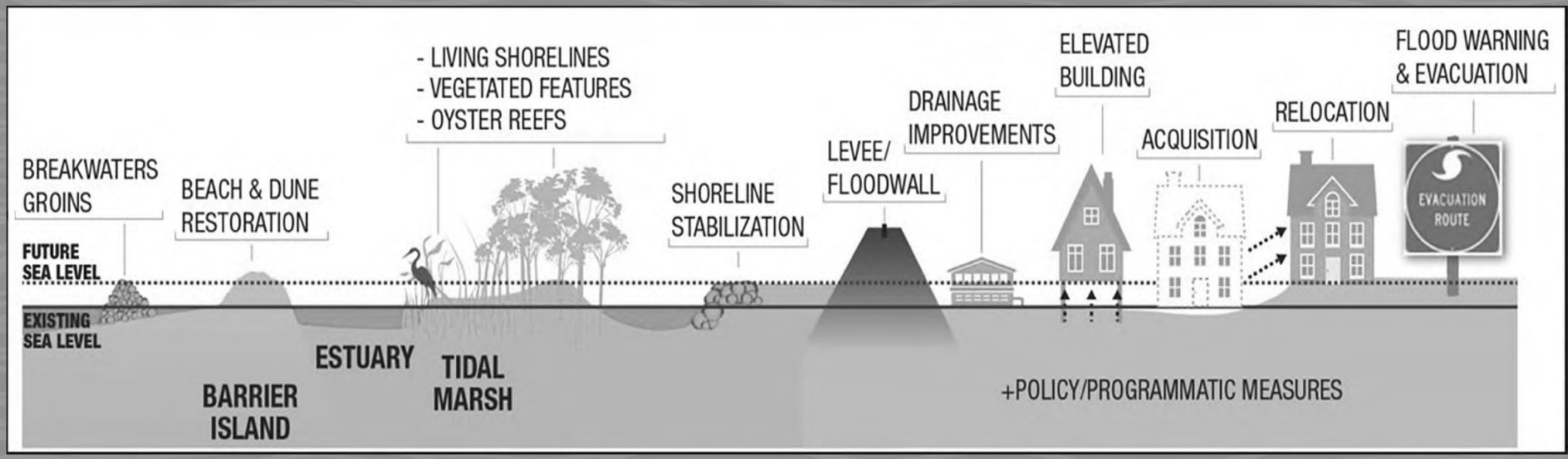
Study Approach

A **"multiple lines of defense"** strategy is utilized in the formulation of the measures and alternatives. Employing three primary goals – **preserve, minimize, and avoid** – coastal communities should consider a system of comprehensive, resilient and sustainable coastal storm risk management and ecosystem restoration solutions.

To achieve a multiple lines of defense approach, the study evaluates the following issues of concern:

- Economic damage to communities from coastal storm surge
- Shoreline erosion
- Loss of threatened and endangered critical habitats
- Disrupted hydrology

A combination of measures form a **multiple lines of defense strategy**.



What is the goal of the study?

The goal of the Coastal Texas Study is to:

- Promote a sustainable economy by reducing the risk of storm damage to residential structures, industries, and businesses critical to the Nation's economy
- Promote a sustainable coastal ecosystem by minimizing future land loss, enhancing wetland productivity, and providing and sustaining diverse fish and wildlife habitat

What is the study objective?

The objective of the Coastal Texas Study is to develop a comprehensive plan that will manage the risk associated with coastal storms while avoiding and minimizing impacts to the region's environmental resources.

COASTAL **TEXAS** STUDY

The Study Process

What is an Environmental Impact Statement (EIS)?

As required by the National Environmental Policy Act (NEPA), an EIS is prepared to analyze the significant impacts that a major Federal action may have on the environment and local community.

What is a Feasibility Study?

The feasibility study process evaluates solutions to problems by analyzing the engineering, economic, environmental, cost, real estate, and other impacts and aspects of alternative solutions.

This study process is then used to identify a plan of most value to the national economy.

The EIS preparation and Feasibility Study are being ***conducted concurrently*** to result in a single **Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS).** The DIFR-EIS documents the planning process undertaken for the study.

The **USACE** is leading the study in collaboration with the non-federal sponsor, the **GLO**.

How can I provide comments on the DIFR-EIS?

U.S. Army Corps of Engineers, Galveston District

Attention: Ms. Jennifer Morgan, Environmental Compliance Branch, Regional Planning and Environmental Center

Mail: P.O. Box 1229, Galveston, TX 77553-1229

Email: CoastalTexas@usace.army.mil

Website: coastalstudy.texas.gov

All comments must be received or postmarked by January 9, 2019

Where are we in the study process?

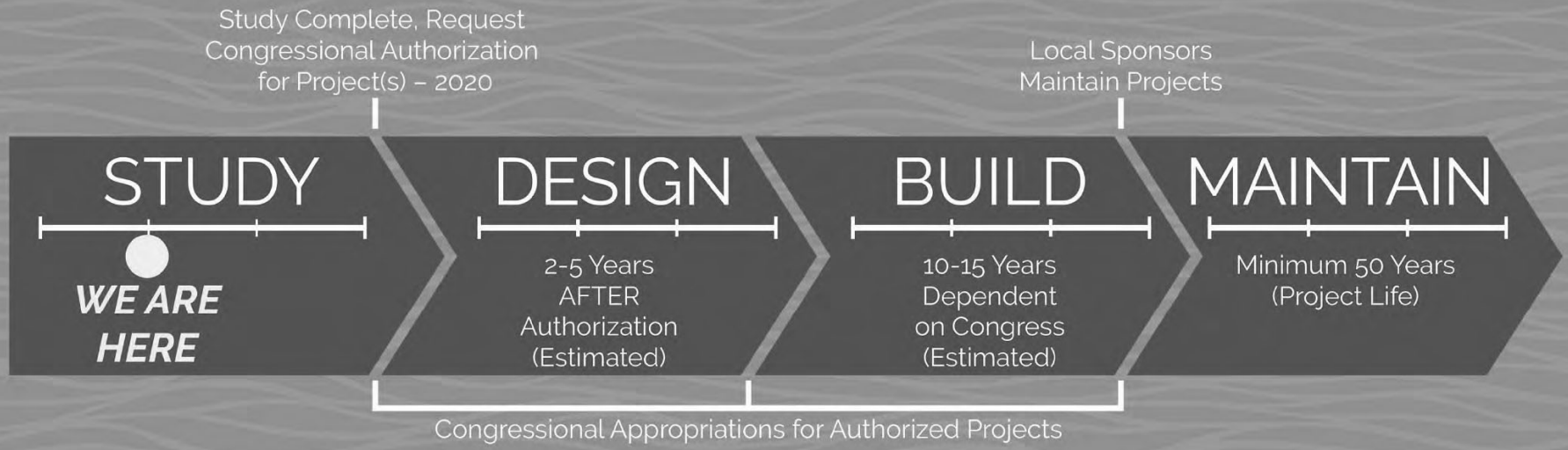
The study team is currently in the ***public comment period*** for the DIFR-EIS. Following this period, the study team will review and address the public comments received. The USACE and GLO leadership will use this information to produce the final report.

It is anticipated that the ***Final Integrated Feasibility Report and Environmental Impact Statement*** will be published for public, state, and agency review in ***2020***.

What are the next steps?

After the study phase, a Recommended Plan will be refined and proposed for congressional authorization and funding. Construction of the Recommended Plan is dependent upon approved congressional funding.

ESTIMATED PROJECT SCHEDULE



Study Milestones

- Final submittal of scoping comments – September 2014
- Identified viable projects for consideration, evaluation and comparison – June 2016
- Identified projects for feasibility analysis and identify a Tentatively Selected Plan - May 2018
- Released DIFR-EIS for public review – October 2018
- Upcoming: Release Final IFR-EIS for final comment – Fall 2020

COASTAL **TEXAS** STUDY

The Tentatively Selected Plan

The Tentatively Selected Plan (TSP) is formulated to achieve an integrated system of risk reduction actions and includes a combination of ***both coastal storm risk management and ecosystem restoration measures*** that work together to enhance coastal resiliency.

Coastal Storm Risk Management (CSRM) and Ecosystem Restoration (ER) measures were developed and evaluated through ***several screening workshops*** and then assembled into alternatives to ***reduce risk of coastal hazards to the natural and human environment*** for the Texas coast.

The study team recognizes that there are ***opportunities to optimize*** the design and alignment of the TSP to ***minimize impacts*** to structures and the environment.

In ***future planning and design phases***, the study team will take into account public comments and best engineering practices to optimize specific details of the TSP such as levee heights, floodwall heights, pump station sizes, use of nonstructural features, and precise project alignments.

The TSP includes 3 main components:

1. Comprehensive Ecosystem Restoration along the Texas Coast
2. A Coastal Barrier CSRM system to address storm surge in the upper Texas Coast
3. A South Padre Island CSRM measure to address storm surge and erosion in the lower Texas Coast

The total estimated cost of the Tentatively Selected Plan ranges ***between $23 billion and $32 billion*** based on the best information available and reflects potential changes in material costs, schedule, and unforeseen issues.

This range is based on the best information available during development of the DIFR-EIS and reflects potential changes in materials costs, schedule, and unforeseen issues.

The Tentatively Selected Plan cost estimate will ***continue to be developed and refined*** in the future planning and design phases.

COASTAL TEXAS STUDY

Coastal Storm Risk Management and Ecosystem Restoration

Coastal storm risk management (**CSRM**) and **ecosystem restoration** (**ER**) measures work together to ***restore and enhance*** ecologic coastal features and ***reduce the risk*** of coastal storm damage.

CSRM Measures

Levees, floodwalls, surge barrier gates, pump stations, house raising and buyouts

ER Measures

Marshes, beaches, dunes, islands, oyster reefs, breakwaters, hydrologic restoration

Coastal Storm Risk Management

Coastal storm risk management (**CSRM**) measures consist of features such as levees, floodwalls, navigable and environmental surge barrier gates, raising structures, and home buyouts.

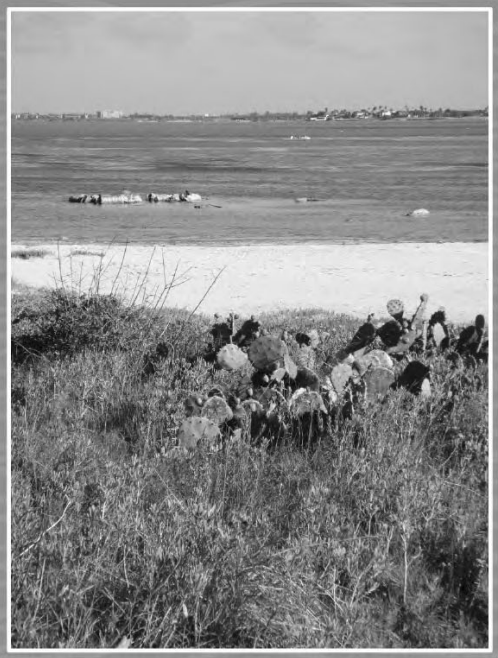
Reconstructed Levees,
New Orleans, Louisiana

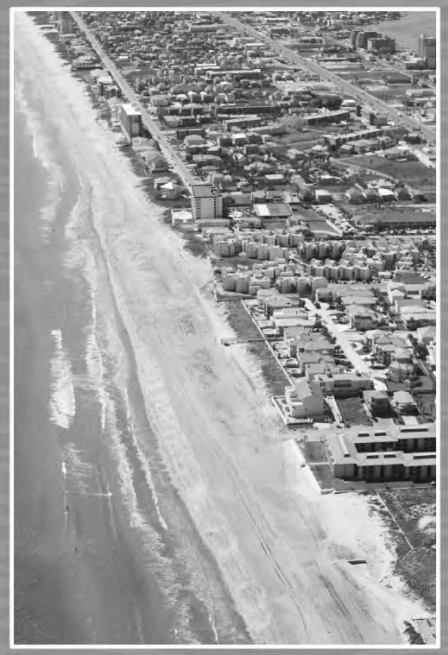
Malamocco Tidal Gates,
Venice, Italy

Storm Surge Barrier,
Maeslantkering, Netherlands

Ecosystem Restoration

Ecosystem restoration (**ER**) measures consist of features that include habitat restoration and shoreline erosion control through wetlands, oyster reefs, beach/dune, and island restoration.





ER measures address important coastal ecosystems in need of restoration, including wetlands, seagrass beds, sea turtle nesting habitat, piping plover critical habitat, and bird island rookeries.

Structural CSRM components are supported by ER measures that provide a ***natural buffer and multiple lines of defense*** from coastal storms.

Port Aransas, Texas

South Padre Island, Texas

Coastal Texas Study Team Contacts:

U.S. Army Corps of Engineers:

Kelly Burks-Copes

Kelly.A.Burks-Copes@usace.army.mil

Texas General Land Office:

Tony Williams

Tony.Williams@glo.Texas.gov

First lines of defense for coastal communities during storms and hurricanes are islands and shorelines with beach and dunes that form the Texas coastal barrier systems.

Second lines of defense include wetlands, marshes, rookery islands, and oyster reefs. First lines of defense include CSRM structural features.

Second Line of Defense

First Line of Defense

Combinations of ER measures formulated in a specific geographic location restore diverse habitats and provide ***multiple lines of defense***.

Posters

STORM SURGE BARRIERS | COASTAL TEXAS STUDY

Coastal Texas Study DIFR-EIS

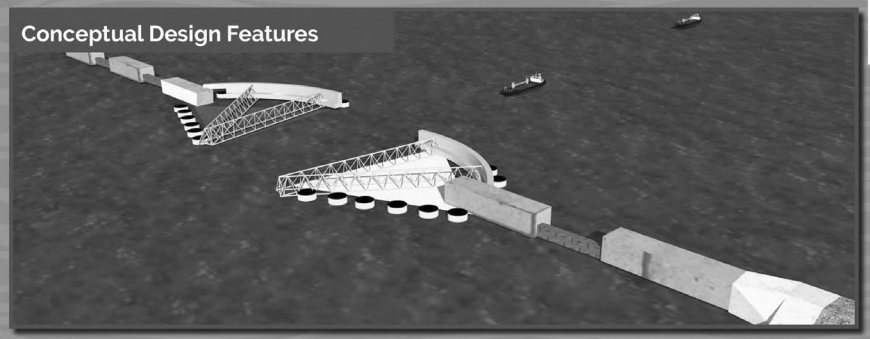
- Used for Baseline Design and Cost development for alternative identification and evaluation
- Used to inform baseline Environmental Impacts
- Based on known designs and risk, based on existing projects

Post Public/ Independent/ Policy Review & Contingent on Agency Decision Milestone Approval

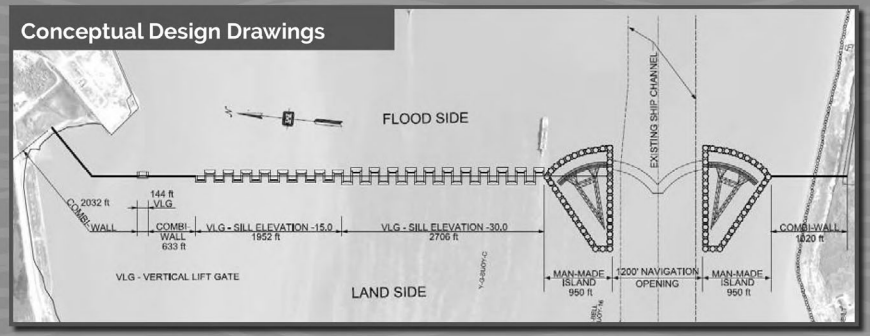
Focus on Scaling Measures and Features

- Continue to focus on avoiding, minimizing and reducing environmental impacts
- Focus on Risk and Reliability
- Focus on Operation Concerns
- Focus on Construction Cost Concerns

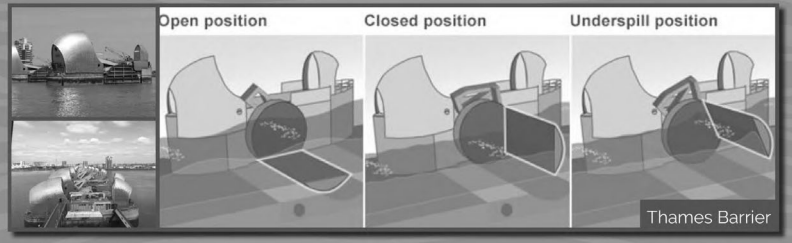
Conceptual Design Features



Conceptual Design Drawings



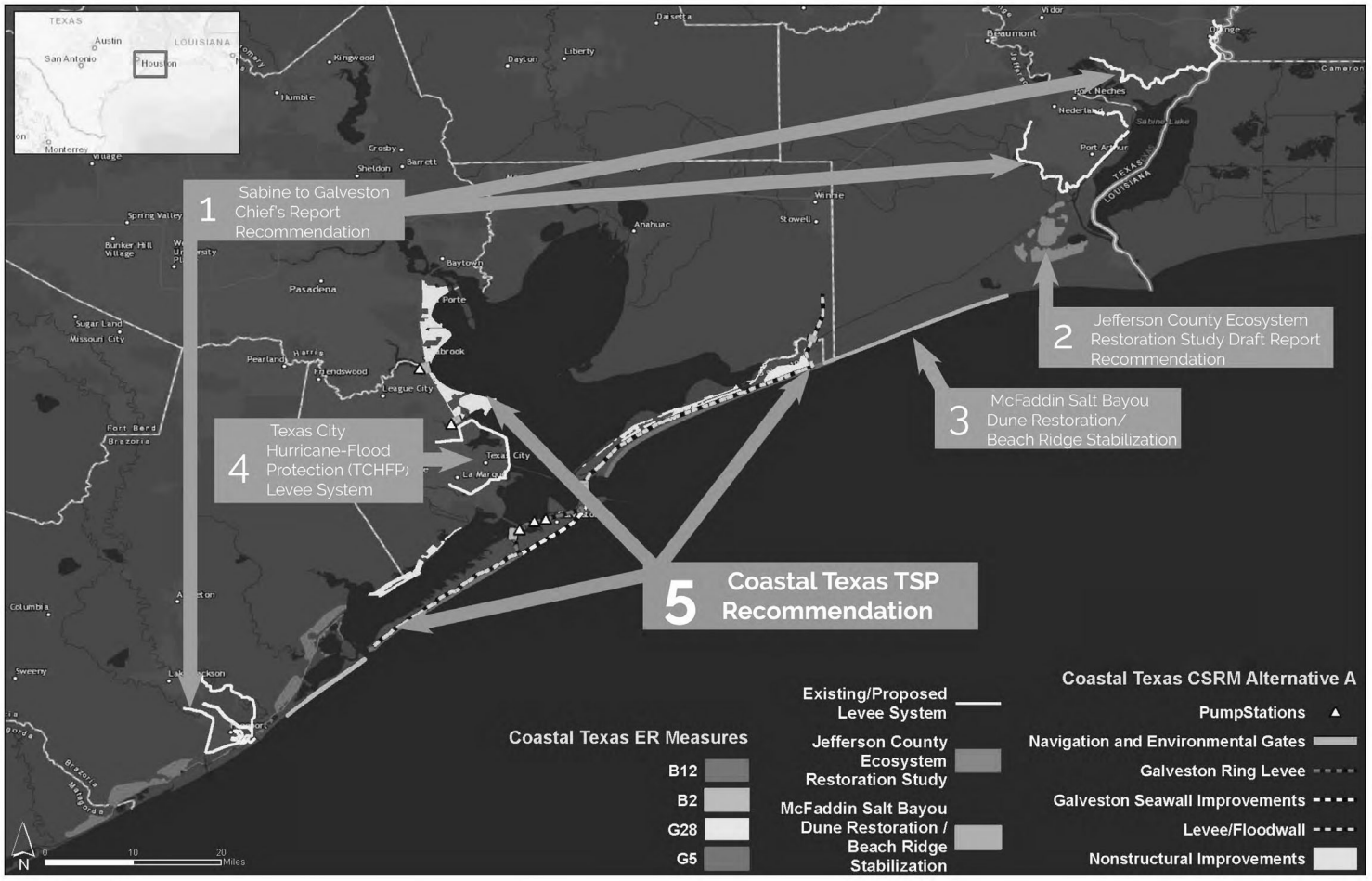
Conceptual Construction Position Within Navigation Areas



REGIONAL PLANNING

AN OVERALL COASTAL SYSTEM

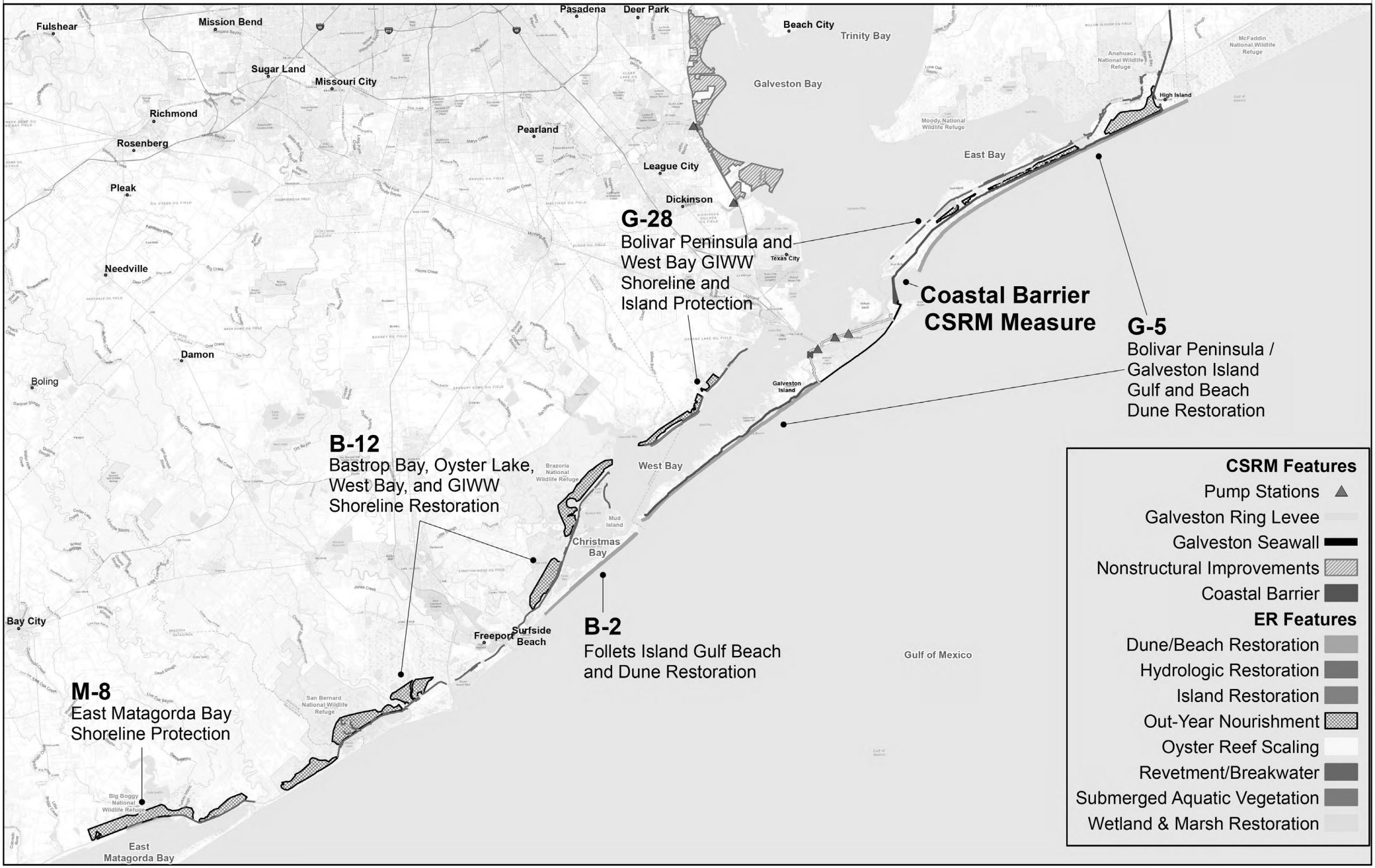
- Systems approach when reviewing the region's larger system context
- Greater flexibility and greater focus on critical infrastructure
- Multiple lines of defense approach
- Builds upon existing projects and other proposed recommendations yet to be built
- Focuses on maintaining existing landscape features when considering sea level rise scenarios



ID	PROJECT OR STUDY	DESCRIPTION (LEAD AGENCY)	STATUS
1	**Sabine Pass to Galveston Bay**	Improvements to the existing Freeport and Port Arthur Hurricane Protection System levees and the 27 miles of new levees and floodwall in Orange County (USACE)	Authorized and Funded
2	**Jefferson County Ecosystem Restoration Study**	Restoration of 8,421 acres of marsh and construction of 6,592 linear feet (1.25 miles) of offset breakwaters that would be placed along the south bank of the Gulf Intracoastal Waterway (USACE)	Draft Report Released June 2018
3	**McFaddin Salt Bayou Dune Restoration/ Beach Ridge Stabilization**	Construction of approximately 20 miles of dune ridge and nourished beach face along the McFaddin National Wildlife Refuge shoreline (USFWS)	On-going construction
4	**Texas City Hurricane-Flood Protection (TCHFP) Levee System**	Repairs to existing levee system walls and repairs to the inlet area of the Moses Lake floodgate. Also includes Jefferson County's Drainage District No. 7 pump stations suffered Harvey related damages and funding was approved for repair (USACE)	Existing Levee System Repairs approved under Public Law 115-123, the Bipartisan Budget Act of 2018
5	**Coastal Texas TSP Recommendation**	Coastal risk reduction system made up floodwalls (inverted T-walls), floodgates, seawall improvements, drainage structures, pump stations, and surge barrier gates with ER measures that are intended to restore and create habitat and support structural CSRM efforts by providing a natural buffer from coastal storms	Draft Report Released October 2018

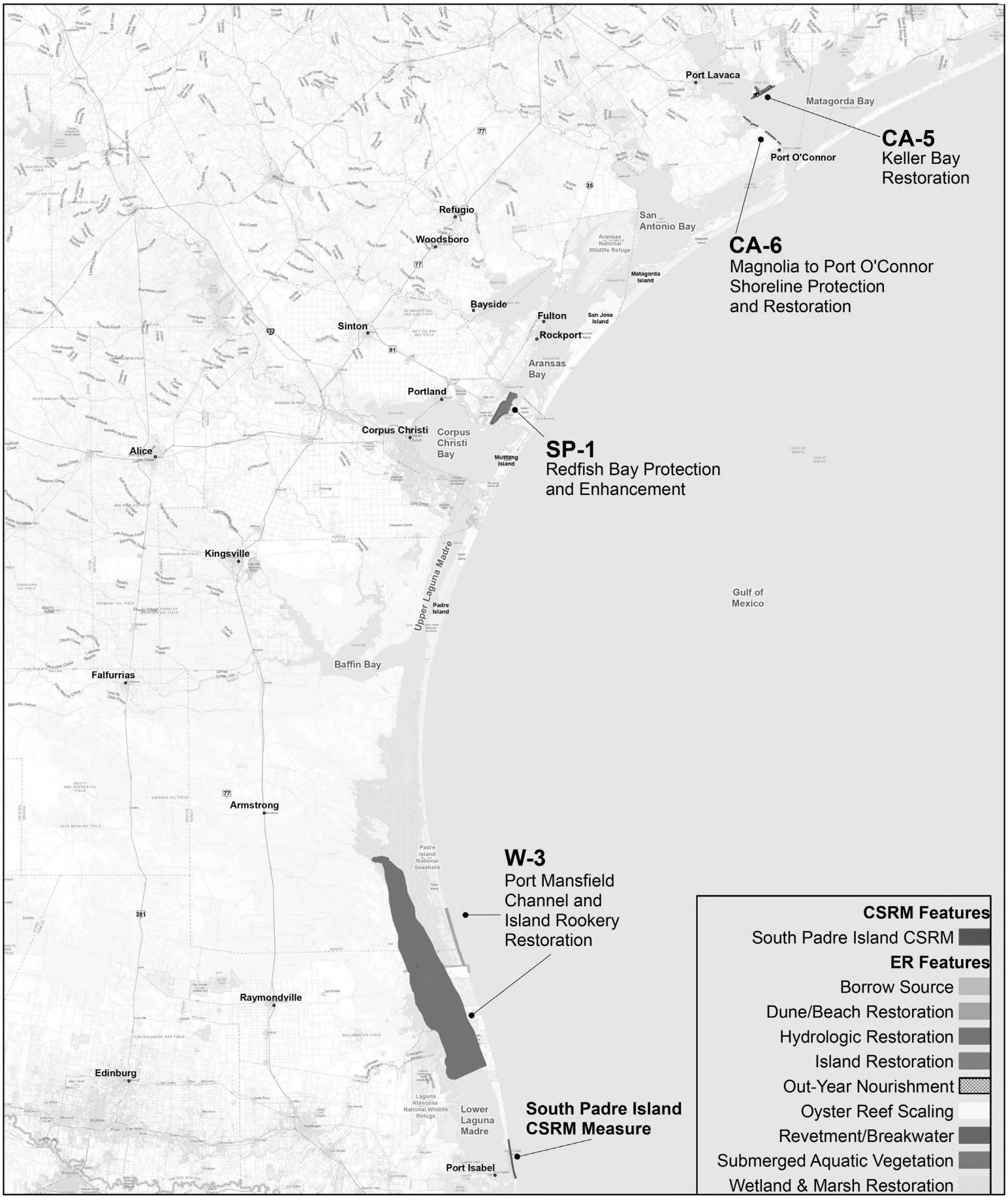
UPPER TEXAS COAST
TENATIVELY SELECTED PLAN

COASTAL **TEXAS** STUDY

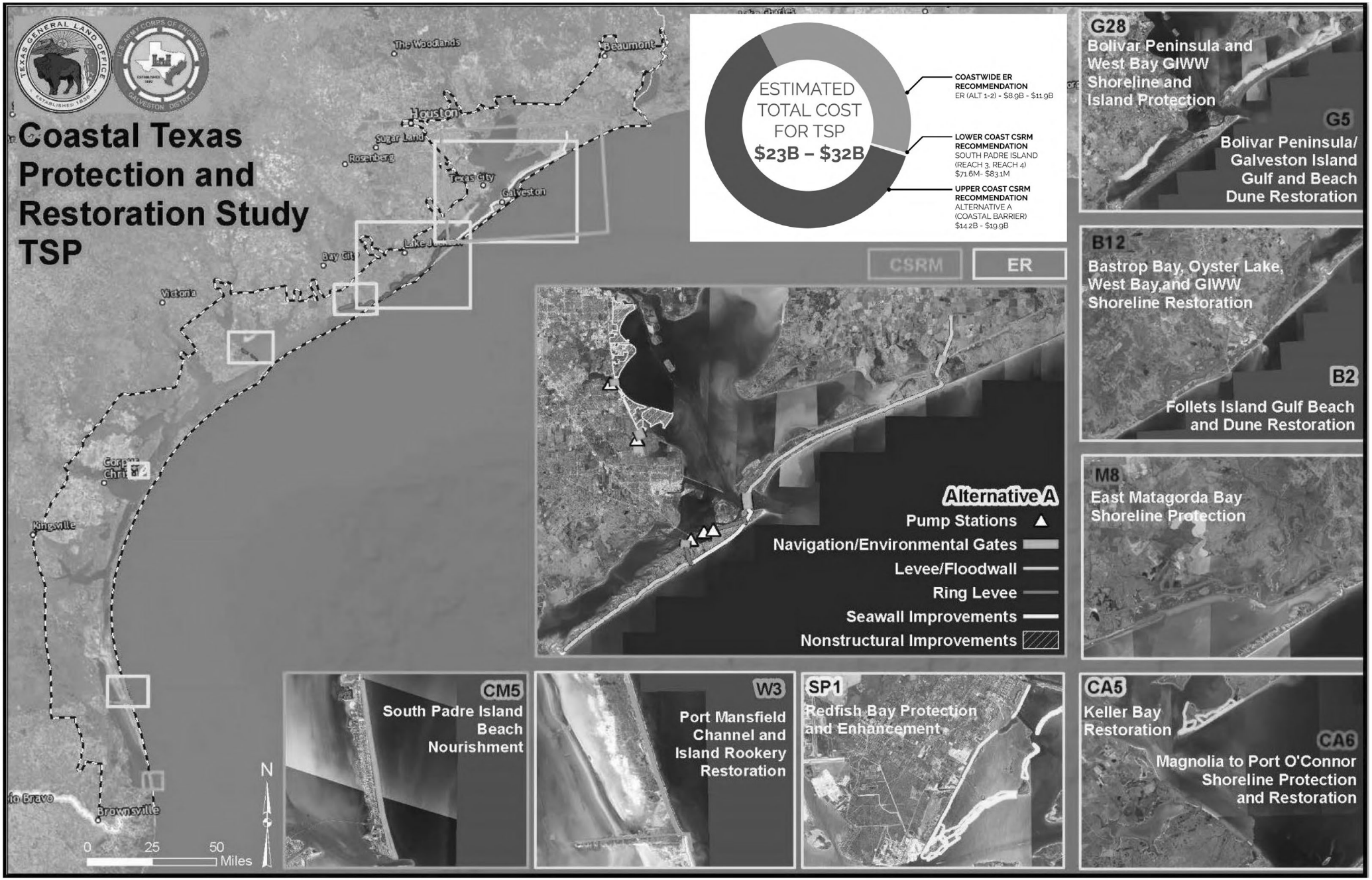


LOWER TEXAS COAST
TENATIVELY SELECTED PLAN

COASTAL **TEXAS** STUDY



THE TENTATIVELY SELECTED PLAN



ECOSYSTEM RESTORATION

ECOSYSTEM RESTORATION GOALS

Goal #1:
Promote a resilient and sustainable coastal ecosystem by reducing future land loss and restoring, creating, and enhancing coastal wetlands to achieve and sustain a coastal ecosystem that can support and protect the environment, economy, and culture of the Texas coast.

Goal #2:
Restore natural landscape features and hydrologic processes that are critical to sustainable ecosystem structure and function and that provide diverse fish and wildlife habitats.

Objective 1: Shoreline Protection
Reduce/prevent shoreline erosion of barrier systems, bays, and channels

Objective 2: Hydrologic Connectivity
Restore and/or create hydrologic connectivity of sensitive estuarine ecosystems

Objective 3: Estuarine Bay Systems Restoration
Restore, create, and/or protect critical estuarine wetlands, tidal flats, etc.

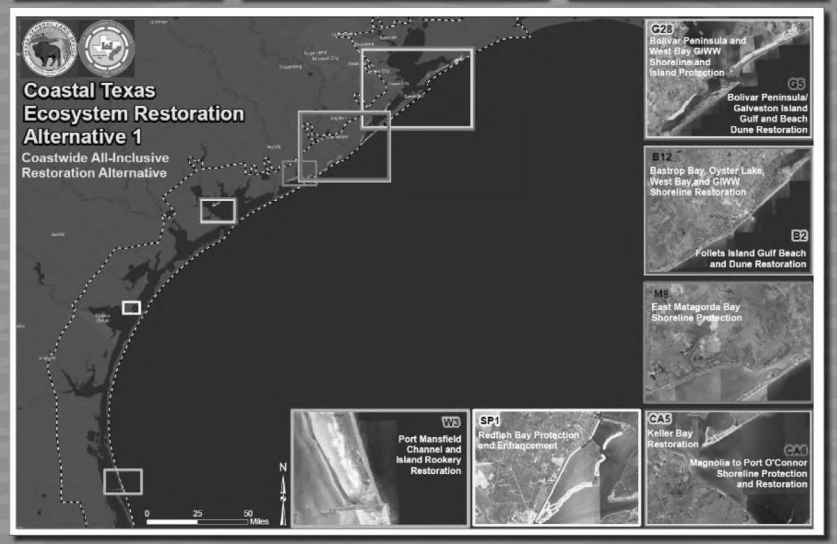
Objective 4:Barrier Beach, Dune and Back Marsh Restoration
Nourish and protect barrier beach, dune, and back marsh

Objective 5: Oyster Reef Restoration
Restore and/or create important oyster reefs

Objective 6: Migratory Bird Habitat Restoration
Restore and/or create important habitat used by migratory birds

Objective 7: Bird Island Rookeries Restoration
Restore and/or create important islands used as bird rookeries

Objective 8: Restore Habitat Used by Species of Concern
Restore and/or create habitat used by species of concern, such as Federally listed species, shorebirds, Federally managed aquatic species (e.g., EFH), and others



ENVIRONMENTAL IMPACTS & MITIGATION

DIRECT IMPACTS

Upper Coast CSRM: Acres Lost or Altered

Cover-type Lost	Coastal Barrier (TSP)	Bay Rim
Non-Tidal Wetlands	512.5	227.1
Tidal Wetlands	338	172
Oyster Reef	0	0.035
Open Water	2154	564
Developed/Upland	1520.9	1371.2
Total Footprint	**4525.3**	**2334.3**

South Padre CSRM: Acres Temporarily Altered

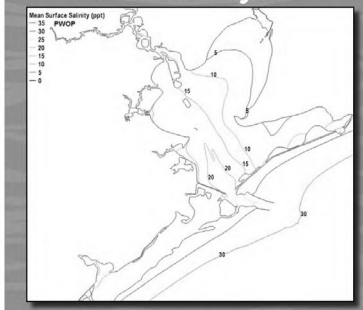
Cover-type	South Padre Island
Open Water	358.5
Dune	0.5
Beach	2.2
Developed/Upland	4.6
Total Footprint	**365.8**

INDIRECT IMPACTS

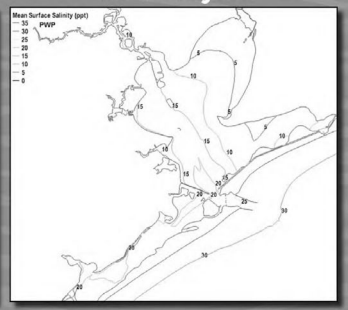
3D Adaptive Hydraulics (AdH) Modeling Conducted to Understand Potential Environmental Impacts:

- Altered tidal exchange (tidal amplitude and tidal prism) from the surge gates through Bolivar Roads, would cause wetlands to either stay submerged at low tide or not be inundated at high tide
- Reduction in velocity in the bay, but increase in velocity at the gate

Modeled Surface Salinity Without Project



Modeled Surface Salinity With Project



Approximately 2-4 ppt decrease = slightly fresher water

POSITIVE IMPACTS

Ecosystem Restoration: Created/Restored Area in Acres

Ecosystem Restoration Feature	Acres
Revetment/Breakwater	737
Island Restoration	838
Marsh Restoration	1,985
Oyster Reef Creation	44
Dune/Beach Restoration	7,576
Out-year Estuarine Marsh Nourishment	33,342

MITIGATION

Mitigation is a term used to describe projects or programs intended to offset known impacts to an existing historic or natural resource such as a stream, wetland, endangered species, archeological site, paleontological site or historic structure. To "mitigate" means to make less harsh or hostile.

Mitigation needs are determined by evaluating the quality of habitat, calculating habitat units (AAHUs) which then determines acreage of high functioning habitat to be created.

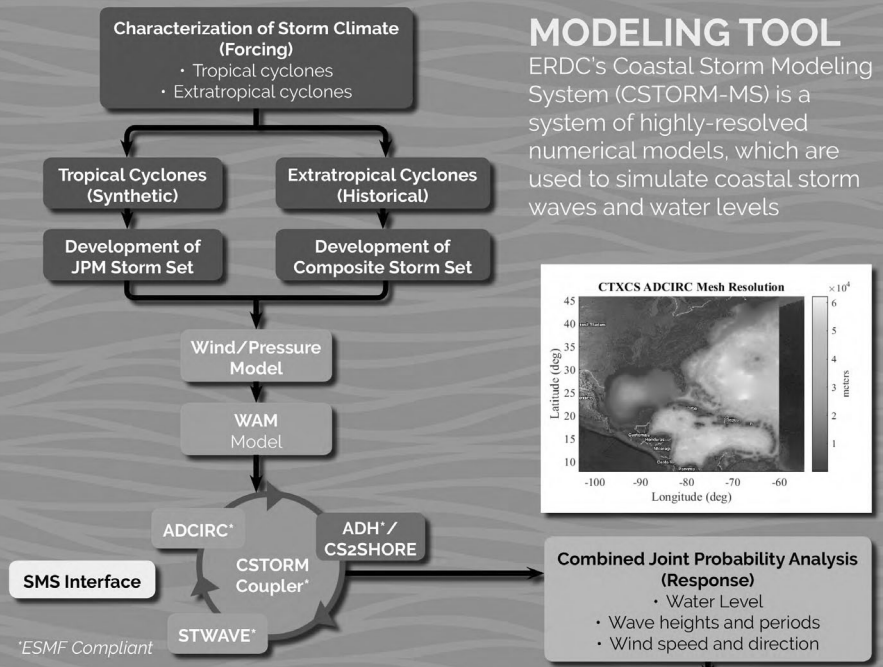
Direct: Approximately, 850 acres of wetlands impacted by direct footprint of CSRM construction these impacts will be mitigated with creation of similar wetlands to replace lost functions.

Indirect: Due to the changes in tidal exchange, of the 38,696 acres of tidal wetlands surrounding the bay, approximately 3,375 acres of wetlands along the interior of the bay are expected to be indirectly impacted, potentially leading to eventual deterioration of those habitats. These impacts will be mitigated with creation of similar wetlands to replace lost functions.

Total: 8,226 acres of wetland mitigation required to offset impacts based on current alignment*

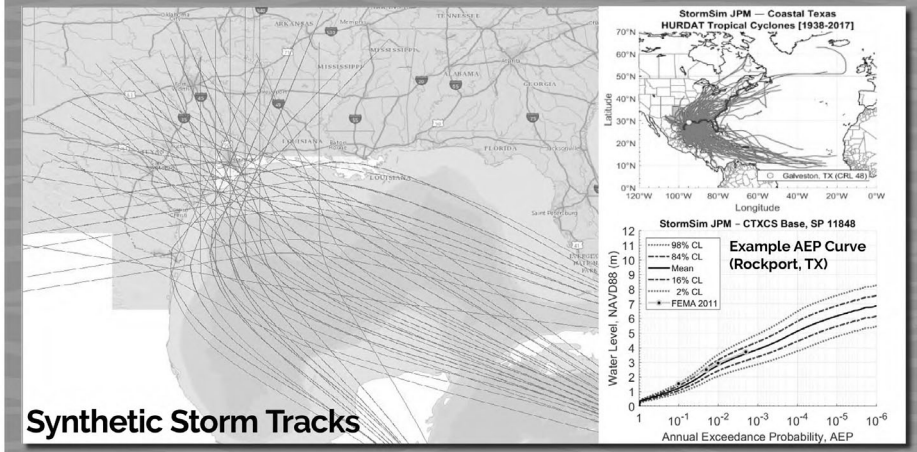
Through optimization, mitigation acres needed may be reduced

SURGE IMPACTS: WITHOUT ACTION AND WITH TSP

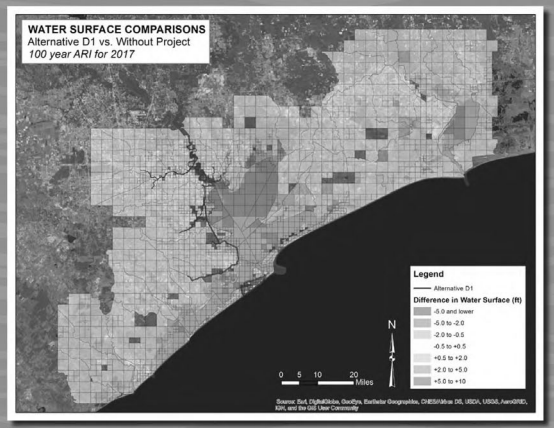


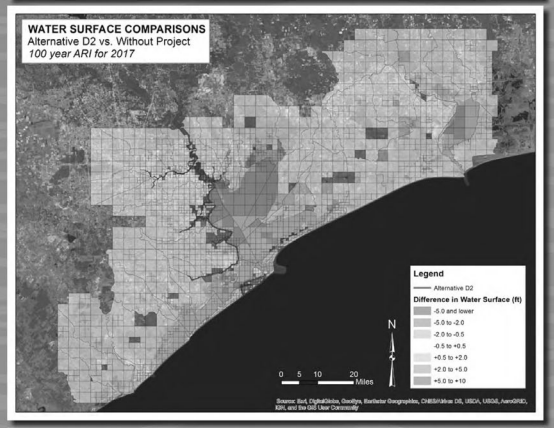
MODELING TOOL

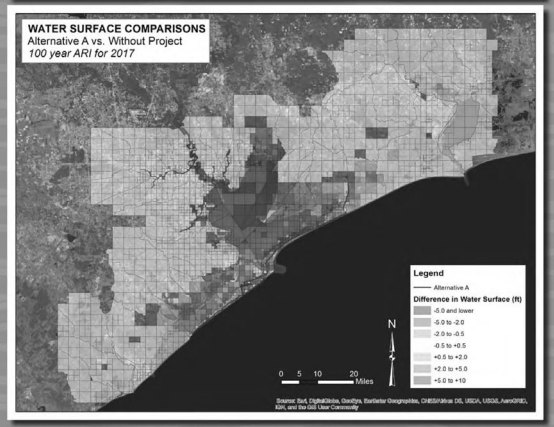
ERDC's Coastal Storm Modeling System (CSTORM-MS) is a system of highly-resolved numerical models, which are used to simulate coastal storm waves and water levels



Based on the major tropical cyclones identified from the HURDAT2 database, the parameter space of storm properties was identified and then the joint probabilities of these responses were computed. The statistical analysis of the response of the 660 simulated storms was conducted at over 18,000 save point locations to produce response statistics including AEP and average recurrence interval. storms provide recurrence intervals from very frequent year events to very rare 100,000 + year events.

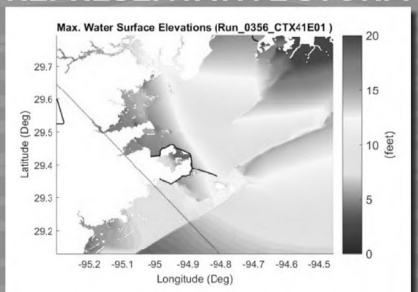




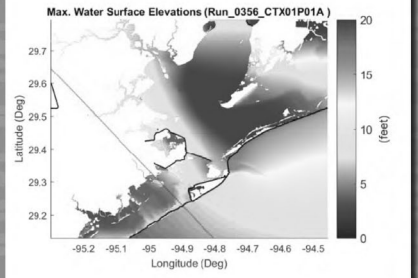


Spatial maps showing impact (100 Year AEP) on storm surge while comparing base case (without project) with different alternatives evaluated (A, D1 and D2)

RESPONSE FROM A REPRESENTATIVE STORM



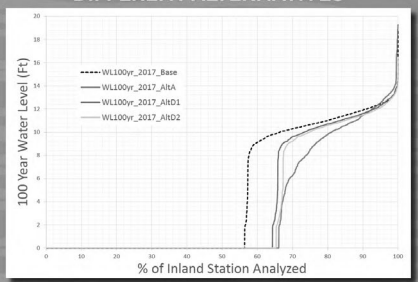
Base (Without Project)



Alt A

CAT 4 storm, (CP= 915 mb, Rmax = 24.6 nm). Maximum wind speeds reached 152 mph. Landfall was just south of Galveston Island but north of Freeport, TX, with an almost perpendicular angle of coastline. Significant reduction is storm surge has been observed with alternative A.

EXAMPLE: RELATIVE PERFORMANCE COMPARING SURGE REDUCTION WITH DIFFERENT ALTERNATIVES

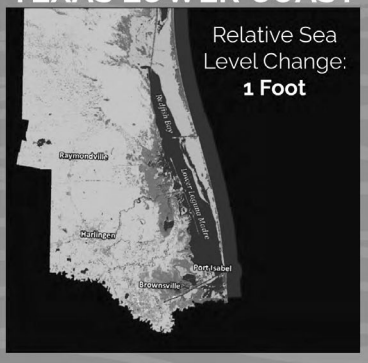
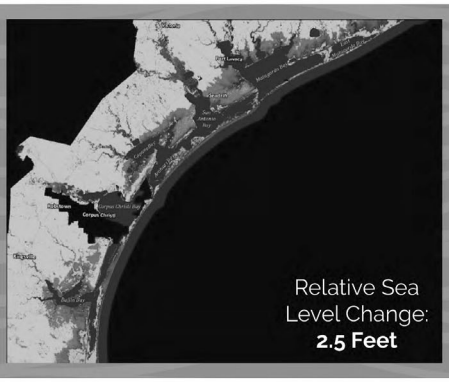
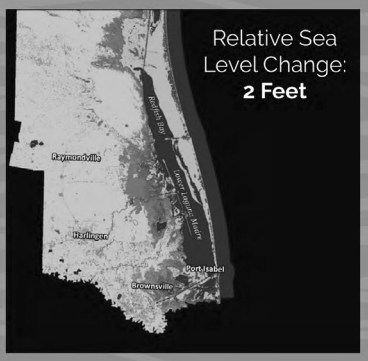


FUTURE WITHOUT PROJECT CONDITIONS

- Increased risk with relative sea level rise impacts
- Over wash of high salinities into sensitive wetlands environments
- Increase in breaches to barrier island systems

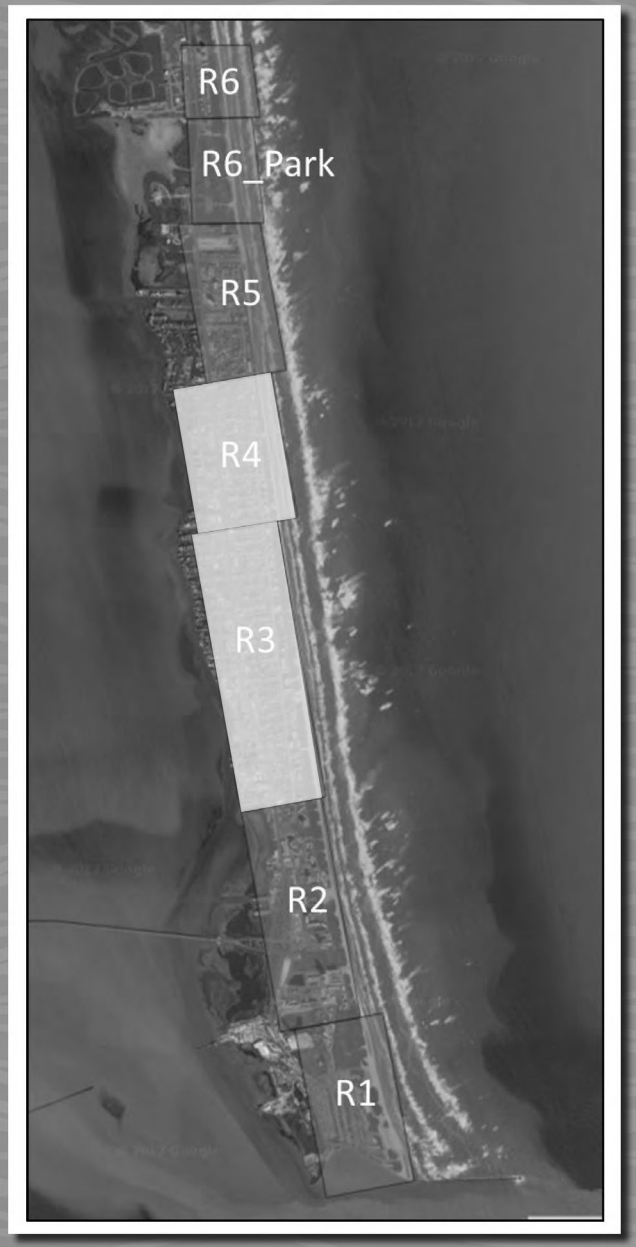
RANGE OF POTENTIAL RELATIVE SEA LEVEL CHANGE AT 2085

Relative Sea Level Change

	TEXAS UPPER COAST	TEXAS MIDDLE COAST	TEXAS LOWER COAST
LOW			
INTERMEDIATE			
HIGH			

- Palustrine Scrub/Shrub Wetland
- Palustrine Emergent Wetland
- Brackish Wetland
- Estuarine Wetland
- Unconsolidated Shore
- Water

SOUTH PADRE ISLAND BEACH AND DUNE - CSRM



- Overall erosion since the 1980's is between 5 and 25 feet/year in the northern portion
- History of Beneficial Use (BU) placement of sediment from the Brazos Island Harbor to offset long term erosion since 1988
- BU efforts uncertain when timing and funding is limited
- Concentration of structure and contents and population at risk along study area
- Analysis of life cycle costs and benefits confirm that a 12.5-foot dune and 100-foot wide berm for 2 miles in Reach 3 and 4 and a10 year renourishment cycle.
- Analysis of recreation benefits may justify a longer beachfill length, or GLO may pursue a longer beachfill as a "Locally Preferred Plan".