

# Coastal Planning in Texas

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**Texas General Land Office**



# The Texas General Land Office (GLO) and the Texas Coast

- **Since 1836:** Manager of Tidally-Influenced State-Owned Submerged Lands.
- **Lead Agency Responsible for:**
  - Coastal Management Program;
  - Beach and Dune Protection;
  - State Coastal Erosion Program;
  - Debris Removal;
  - Coastal Oil Spill Response; and
  - Disaster Recovery Program.



# Three of the Ten Costliest U.S. Hurricanes Impacted Texas

**#2: \$125 Billion – Hurricane Harvey (2017)**



**#7: \$34.8 Billion – Hurricane Ike (2008)**



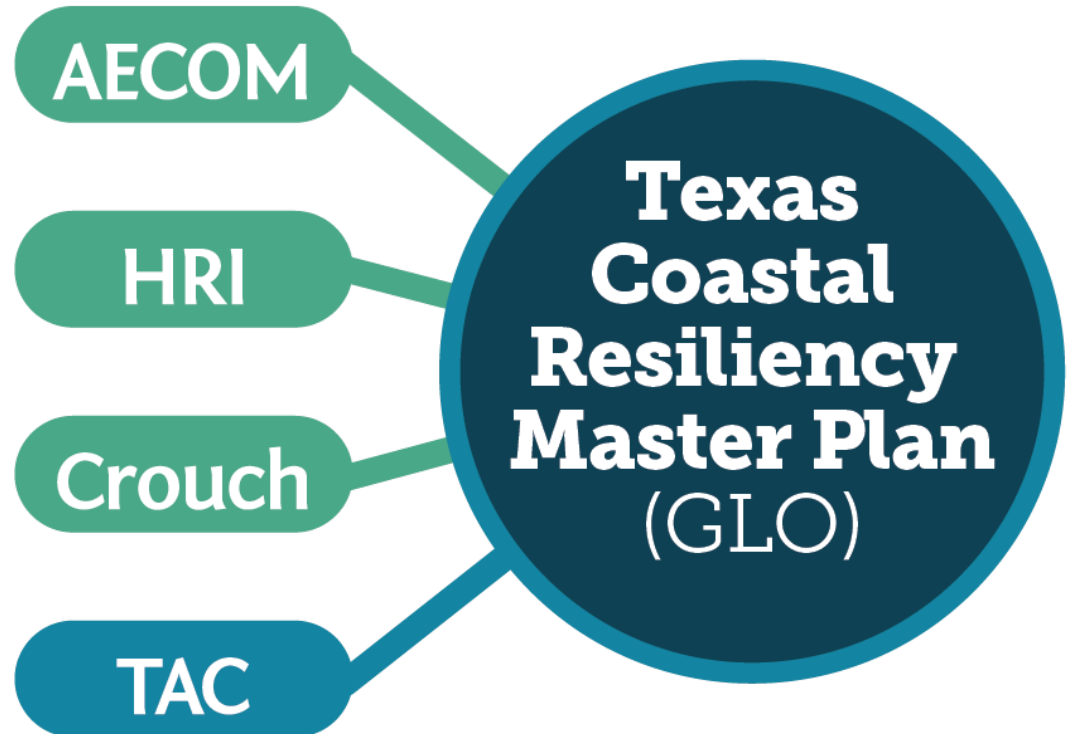
# GLO Coastal Plans

- **Texas Coastal Resiliency Master Plan** provides a framework for community, socio-economic, ecological and infrastructure protection from coastal hazards. The plan is presented to the state legislature.
- Coastal Texas Protection & Restoration Feasibility Study, also known as the **Coastal Texas Study**, is an engineering, environmental and economic analysis to protect the Texas coast. In partnership with the U.S. Army Corps of Engineers, the study will present coastal storm risk management and ecosystem restoration alternatives to Congress for funding.

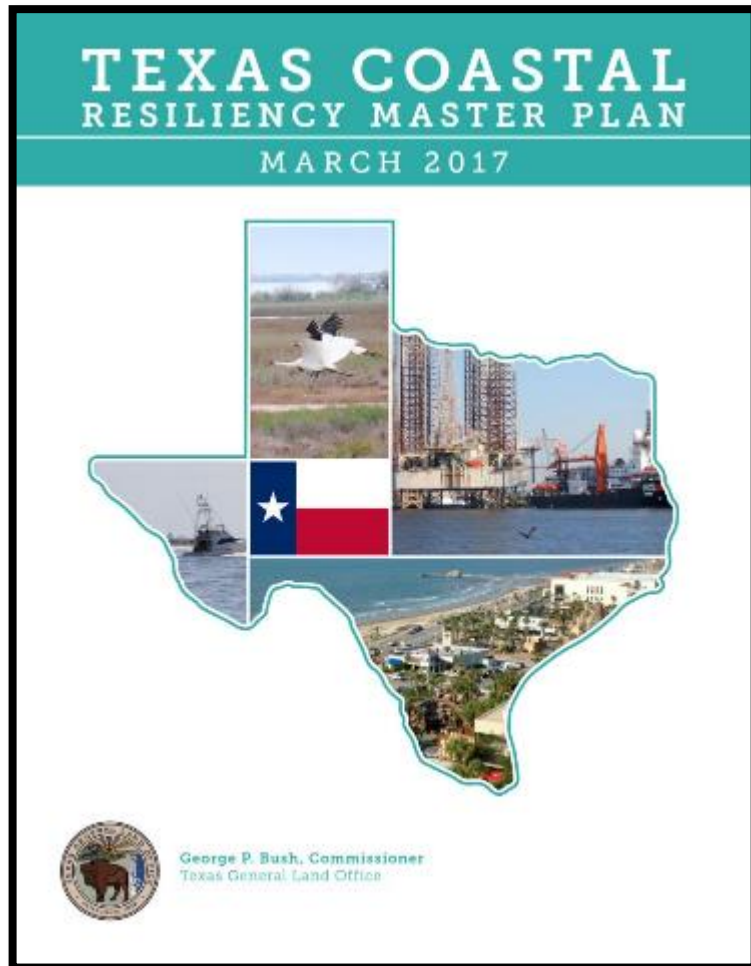


# Planning Team for Texas Coastal Resiliency Master Plan

- GLO contracted with AECOM for engineering services, the Harte Research Institute for data analysis, and Crouch Environmental for education and outreach.
- The Technical Advisory Committee (TAC) is made up of more than 100 coastal experts.



# 2017 Texas Coastal Resiliency Master Plan

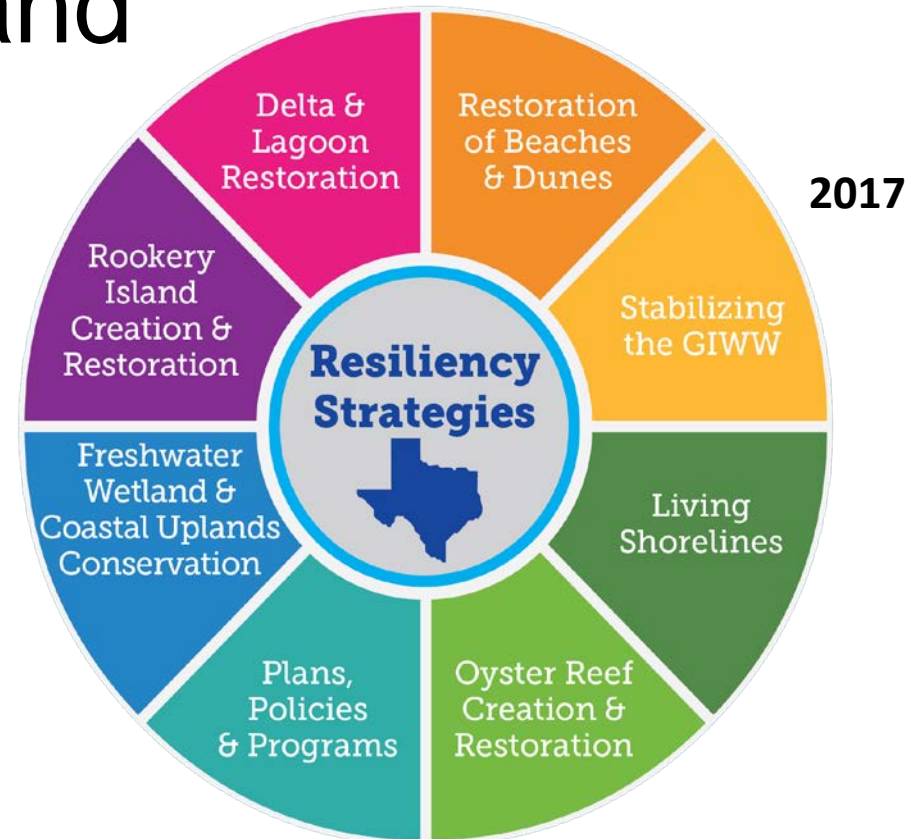


- Described the State of the Coast and a Path Forward toward Resiliency
- Outlined Coastal Issues of Concern (IOCs)
- Defined Ecological Resiliency Strategies
- Identified Tier 1 (highest priority) Projects for the Coast
- Used for Post-Harvey Emergency Appropriations Requests.

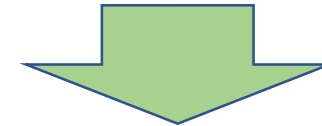
# Region 1 - Tier 1 Projects by Resiliency Strategy

Strategy	ID	Tier 1 Projects	Estimated Cost Range
Restoration of Beaches and Dunes	RI-1	Bolivar Peninsula Beach & Dune Restoration	\$50 M - \$95 M
	RI-2	Follets Island Nourishment and Erosion Control	\$60 M - \$115 M
	RI-7	McFaddin National Wildlife Refuge Shoreline Restoration	\$100 M - \$190 M
	RI-22	Galveston Island West of Seawall to 8 Mile Road Beach Nourishment	\$2 M - \$12 M
Bay Shoreline Stabilization and Estuarine Wetland Restoration (Living Shorelines)	RI-4	Old River Cove Marsh Restoration	\$10 M - \$30 M
	RI-8	Gordy Marsh Restoration & Shoreline Protection	\$15 M - \$35 M
	RI-10	Coastal Heritage Preserve - Phase 4	\$3 M - \$10 M
	RI-11	Sweetwater Preserve Expansion	\$1 M - \$3 M
	RI-12	Pierce Marsh Living Shoreline	\$25 M - \$45 M
	RI-13	IH-45 Causeway Marsh Restoration	\$5 M - \$18 M
	RI-14	Moses Lake Wetlands Restoration - Phase 3	\$1 M - \$3.5 M
	RI-18	Follets Island Marsh Restoration	\$30 M - \$50 M
	RI-21	Bessie Heights Marsh Restoration	\$5 M - \$25 M
RI-23	Follets Island Conservation Initiative	\$4.5 M - \$15 M	
Stabilizing the Texas Gulf Intracoastal Waterway	RI-3	Old River Cove Barrier Island Restoration	\$5 M - \$15 M
	RI-5	Anahuac National Wildlife Refuge Living Shoreline	\$50 M - \$105 M
	RI-6	Willow Lake Shoreline Stabilization	\$3 M - \$8 M
	RI-17	Brazoria National Wildlife Refuge GIWW Shoreline Protection	\$20 M - \$35 M
	RI-19	North Pleasure Island Barrier Island Restoration	\$1.5 M - \$5 M
	RI-20	Sabine-Neches Waterway Barrier Island Habitat Restoration	\$0.5 M - \$1.5 M
Freshwater Wetlands and Coastal Uplands Conservation	RI-15	Salt Bayou Siphons	\$3 M - \$7 M
	RI-24	Sabine Ranch Habitat Protection	\$65 M - \$120 M
Oyster Reef Creation and Restoration	RI-25	Galveston Bay Oyster Reef Planning & Restoration	\$5 M - \$60 M
Rookery Island Creation and Restoration	RI-9	Galveston Bay Rookery Island Restoration	\$45 M - \$80 M
	RI-16	Dickinson Bay Rookery Island Restoration	\$0.5 M - \$2 M
<b>Total for Region 1:</b>			<b>\$510 M - \$1.1 B</b>

# Coastal Issues of Concern and Resiliency Strategies



2017



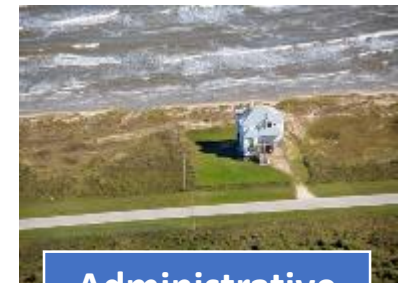
2019



**Ecological Resiliency**



**Societal Resiliency**



**Administrative Resiliency**



# COASTAL RESILIENCY STRATEGIES



## Ecological Resiliency

- Beach and Dune Enhancement
- Wetland Enhancement
- Upland Enhancement
- Oyster Reef Enhancement
- Rookery Island Enhancement
- Freshwater Inflow and Tidal Exchange Enhancement



## Societal Resiliency

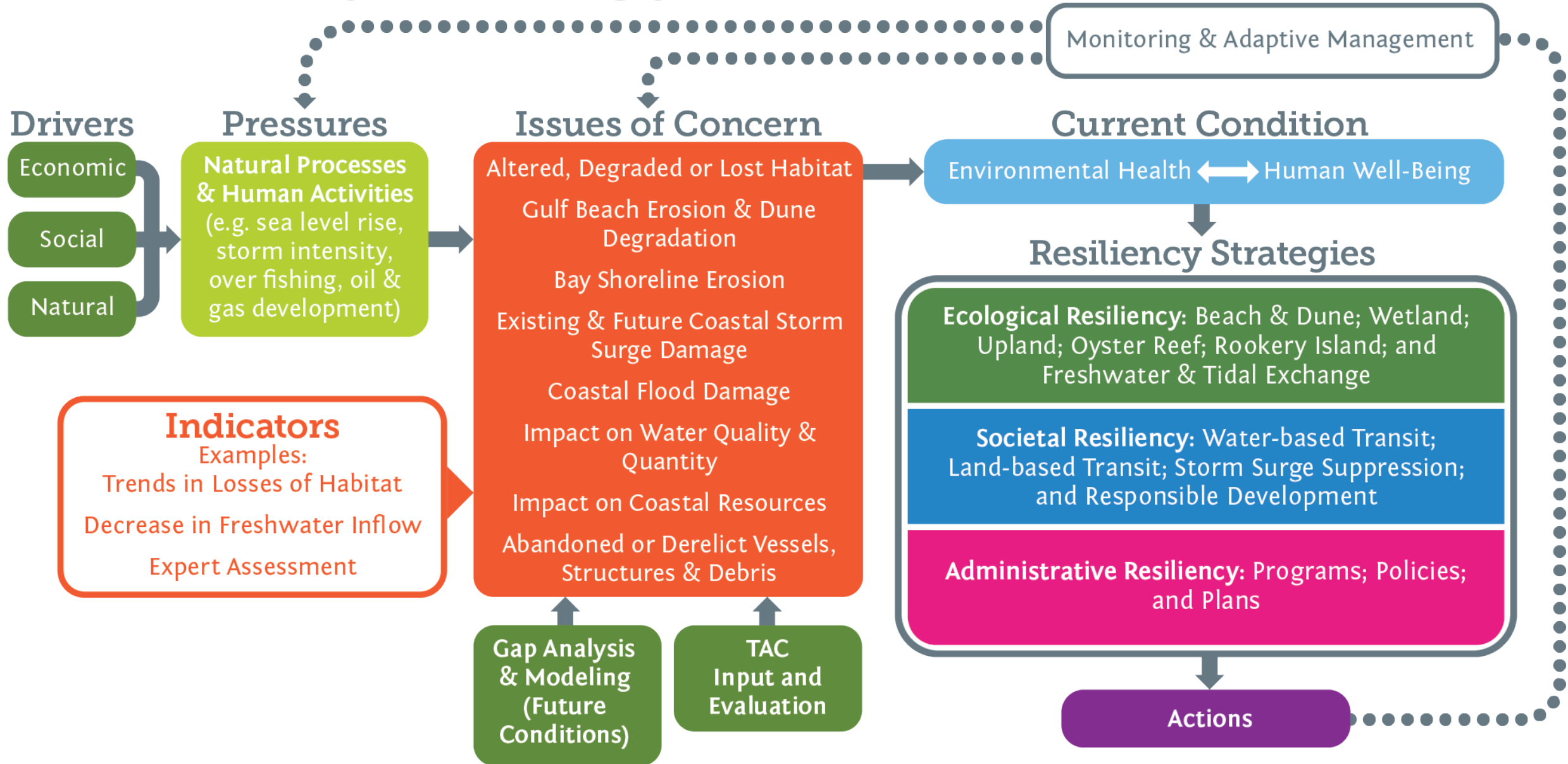
- Water-based Transit Enhancement
- Land-based Transit Enhancement
- Storm Surge Suppression
- Responsible Development



## Administrative Resiliency

- Programs
- Policies
- Plans

# Resiliency Strategy Framework



# Detailed Model Flowchart

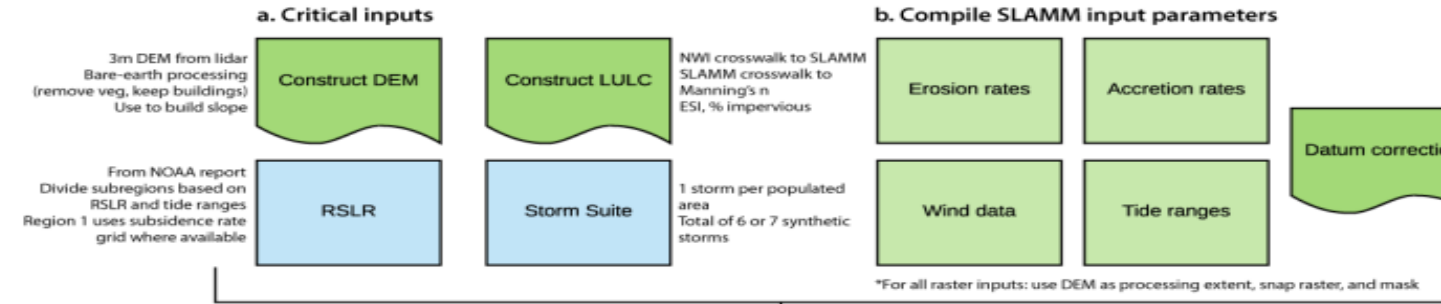
## Three Distinct Models:

- Sea Level Affecting Marsh Migration (SLAMM)
  - Land type changes over time
- SWAN + ADCIRC
  - Storm surge inundation
- HAZUS
  - Monetary infrastructure damages

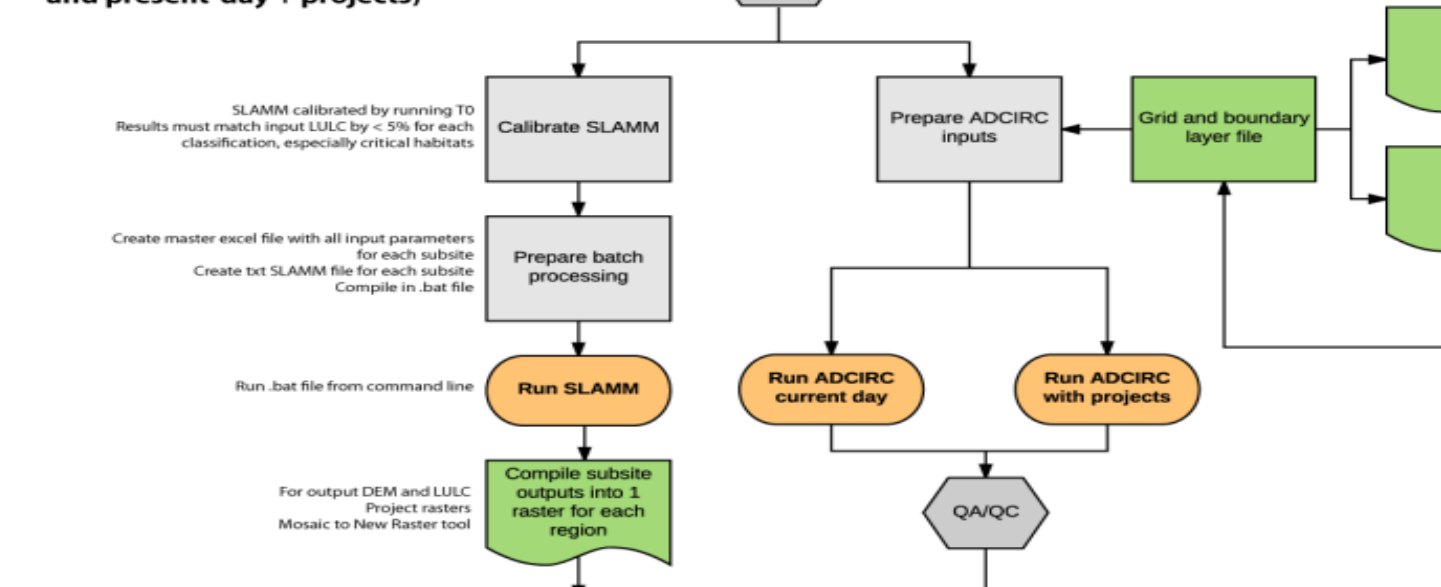
## Three Distinct Scenarios

- Current Conditions
  - Establish base case
- Future Conditions without Projects
  - Establish increasing risk
- Future Conditions with Projects
  - Establish Plan implementation benefits

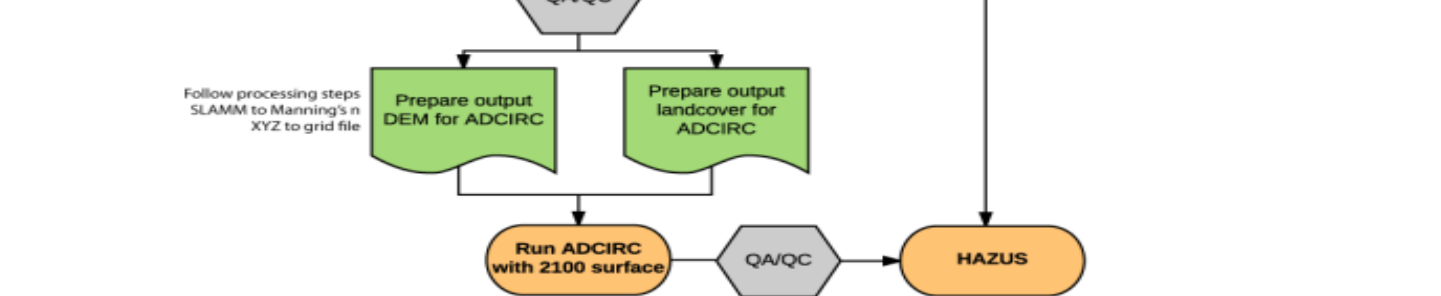
### I. Prepare input data for SLAMM and ADCIRC



### II. Run SLAMM and ADCIRC (present-day and present-day + projects)



### III. Run ADCIRC 2100



# 2019 Texas Coastal Resiliency Master Plan Goals



Develop a list of recommended coastal projects to advance the GLO's mission to make our coastal communities more resilient.



Obtain state and federal funding to implement the recommended projects to restore, enhance and protect the Texas coast.



The GLO's Coastal Resources Division will use the list of projects in the Plan to guide its project selection for funding.



Local leaders can use the Plan as a tool to champion solutions that will make their coastal communities more resilient.

# Schedule for 2019 Texas Coastal Resiliency Master Plan



# Authorization for Coastal Texas Study

*Section 4091, Water Resources Development Act (WRDA) of 2007 Public Law (P.L.) 110-114*

*Coastal Texas Ecosystem Protection and Restoration, Texas.*

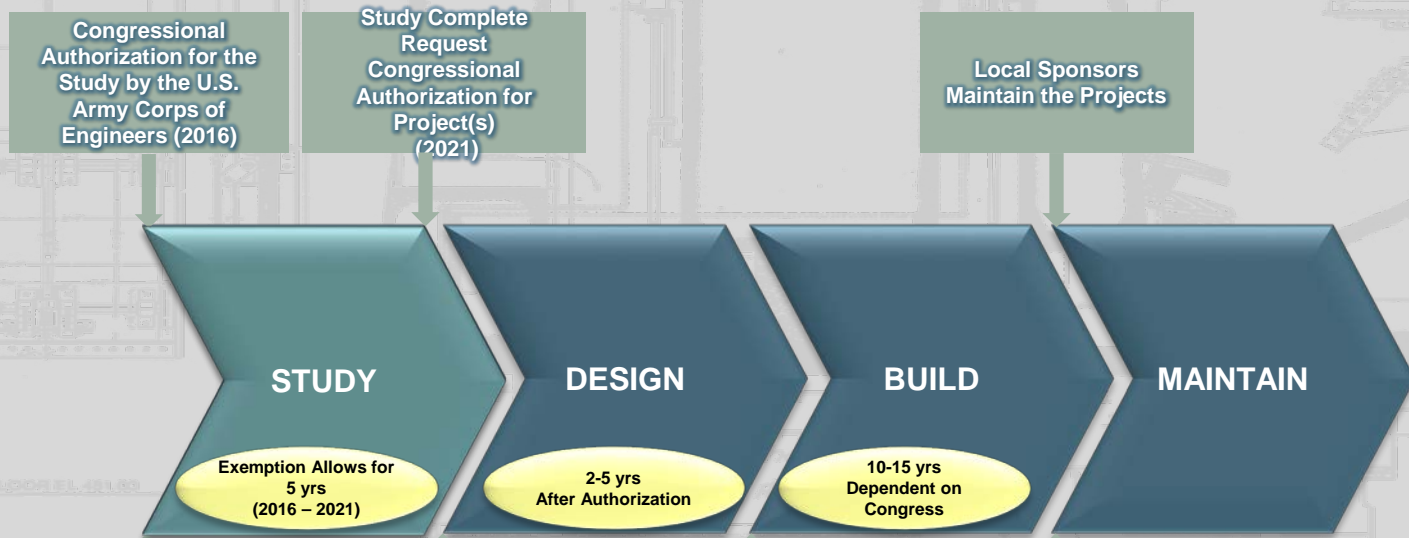
*(a) In General.—The Secretary shall develop a comprehensive plan to determine the feasibility of carrying out projects for **flood damage reduction, hurricane and storm damage reduction, and ecosystem restoration** in the coastal areas of the State of Texas.*

*(b) Scope.—The comprehensive plan shall provide for the **protection, conservation, and restoration** of **wetlands, barrier islands, shorelines, and related lands and features that protect critical resources, habitat, and infrastructure** from the impacts of coastal storms, hurricanes, erosion, and subsidence.*

*(c) Definition.—For purposes of this section, the term “coastal areas in the State of Texas” means the coastal areas of the State of Texas from the **Sabine River on the east to the Rio Grande River** on the west and includes tidal waters, barrier islands, marshes, coastal wetlands, rivers and streams, and adjacent areas.”*



# PROJECT PROGRESSION & MAJOR MILESTONES



Future Dates Dependent on Congressional Authorization AND Congressional Appropriations



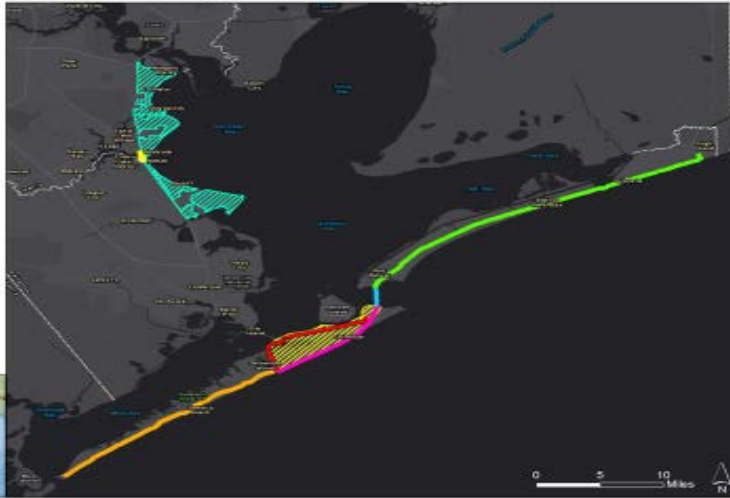
# Coastal Storm Risk Management Alternatives

## Region 1: Alternative A - Coastal Barrier/Nonstructural System

Coastal Texas Protection and Restoration Study

### Alternative A

- High Island to Bolivar Peninsula
- Bolivar Roads and Houston Ship Channel Gates
- Galveston Seawall
- Galveston Ring Levee
- Seawall to San Luis Pass
- Clear Lake Gates
- West Side of Galveston Bay Nonstructural Improvements
- Galveston Island Nonstructural Improvements
- Galveston Bay Risk Reduction will select one of these measures

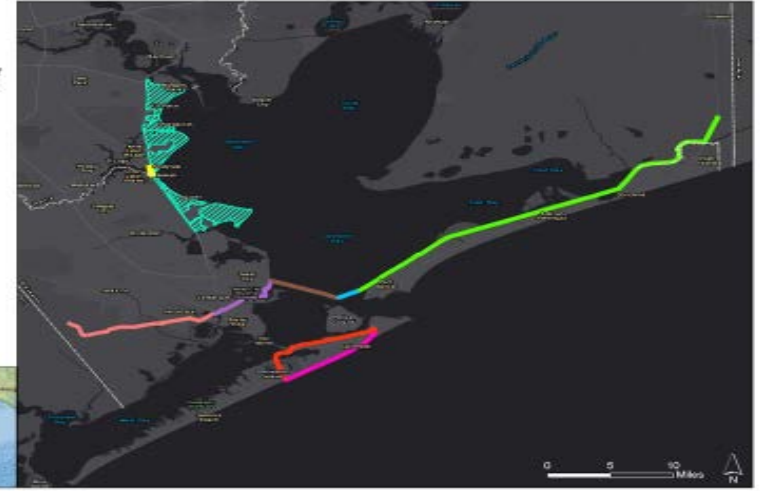


## Region 1: Alternative B - Coastal Barrier

Coastal Texas Protection and Restoration Study

### Alternative B

- High Island to Port Bolivar
- Bolivar Roads and Houston Ship Channel Gates
- Existing Texas City Dike
- Existing Texas City Hurricane Flood Protection Levee (HFPL)
- West Extension of Texas City HFPL
- Galveston Seawall
- Galveston Ring Levee
- Clear Lake Gates
- West Side of Galveston Bay Nonstructural Improvements



## Region 1: Alternative C – Mid Bay

Coastal Texas Protection and Restoration Study

### Alternative C

- Double Bayou to Smith Point
- MidBay Navigation and Environmental Gates
- Existing Texas City Hurricane Flood Protection Levee (HFPL)
- West Extension of Existing Texas City HFPL
- Galveston Seawall
- Galveston Ring Levee



## Region 1: Alternative D Upper Bay Barrier/ Nonstructural System

Coastal Texas Protection and Restoration Study

### Alternative D

- Baytown to Tabbs Bay
- Tabbs Bay Environmental Gates
- Hog Island
- Houston Ship Channel Gates
- Spillman Island
- Highway 146 Alignment
- Bay Perimeter Alignment
- Existing Texas City Hurricane Flood Protection Levee (HFPL)
- Extension of Texas City HFPL
- Galveston Seawall
- Galveston Ring Levee
- West Side of Galveston Bay Nonstructural Improvements
- Alternative D will select one of these measures





# Potential Gate Options for Storm Surge Barrier

Mose Barrier, Venice



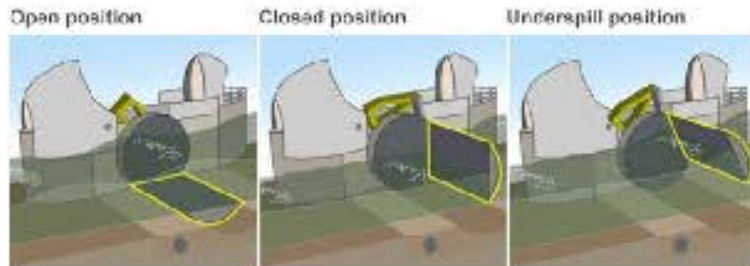
Maeslant Barrier, Netherlands



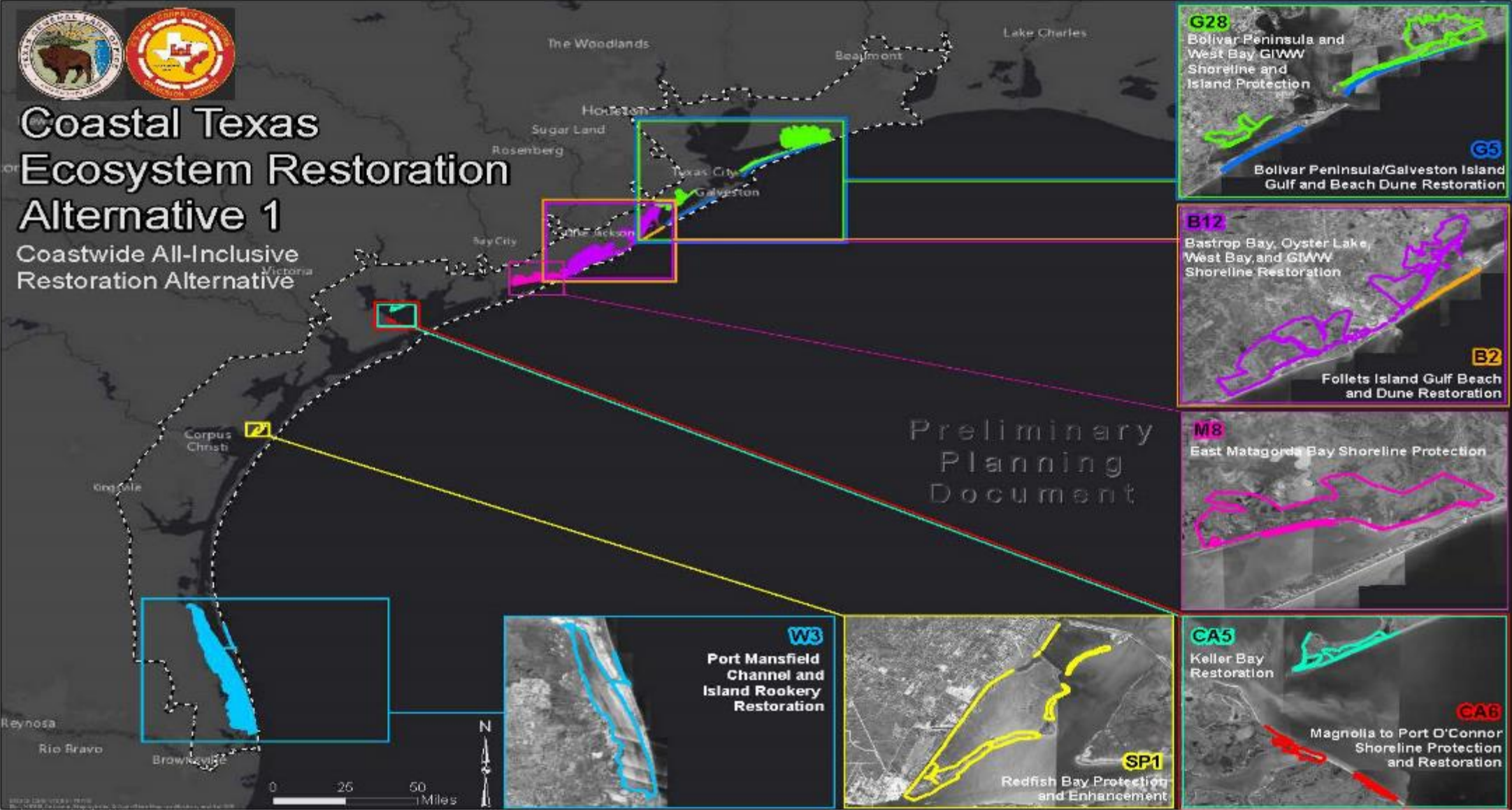
Eastern Scheldt Barrier, Netherlands



Thames Barrier, London



# Ecosystem Restoration Alternatives



# Coastal Texas Protection and Restoration Feasibility Study

## Ecosystem Restoration Measure M8

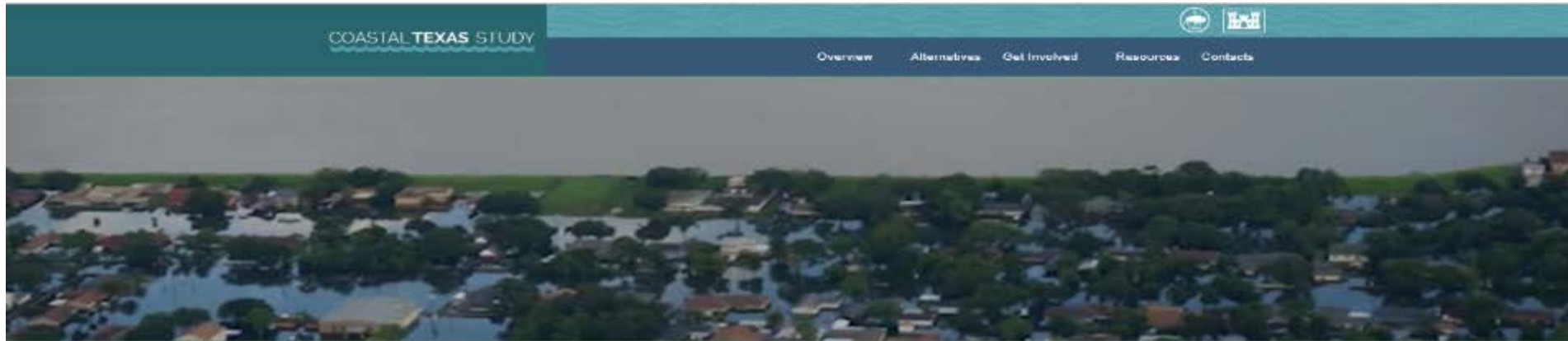
### East Matagorda Bay Shoreline Protection

- Island Restoration
- Oyster Reef
- Out-Year Nourishment  
2065
- Wetland & Marsh  
Restoration - Initial  
Construction
- Revetment/Breakwater

Measure M8 is in Alternatives 1, 2, 3 and 4



# CoastalStudy.Texas.gov



## Coastal Texas Protection & Restoration Feasibility Study

The U.S. Army Corps of Engineers, in partnership with the Texas General Land Office, began an examination in November 2016 of the feasibility of constructing projects for coastal storm risk management and ecosystem restoration along the Texas coast. The Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, will involve engineering, economic and environmental analyses on large-scale projects, which may be considered by Congress for authorization and funding. The feasibility study and report will be complete in 2021. The Coastal Texas Study also will include a Comprehensive Plan to provide a long-term approach to enhance resiliency in coastal communities and improve our capabilities to prepare for, resist, recover and adapt to coastal hazards.



### COASTAL STORM RISK MANAGEMENT

Develop and evaluate coastal storm risk management solutions to reduce the damage from tropical storms and hurricanes incurred by coastal Texas residents, small businesses and industries.

[MORE](#)



### ECOSYSTEM RESTORATION

Increase the net quality and quantity of coastal ecosystem resources by maintaining, pre-flooding and restoring coastal Texas ecosystems, and fish and wildlife habitat.

[MORE](#)



### COMPREHENSIVE PLAN

The Comprehensive Plan will provide an overarching, long-term strategic vision of a resilient Texas coast that supports, protects and sustains the environment, economy and culture of the region.

[MORE](#)

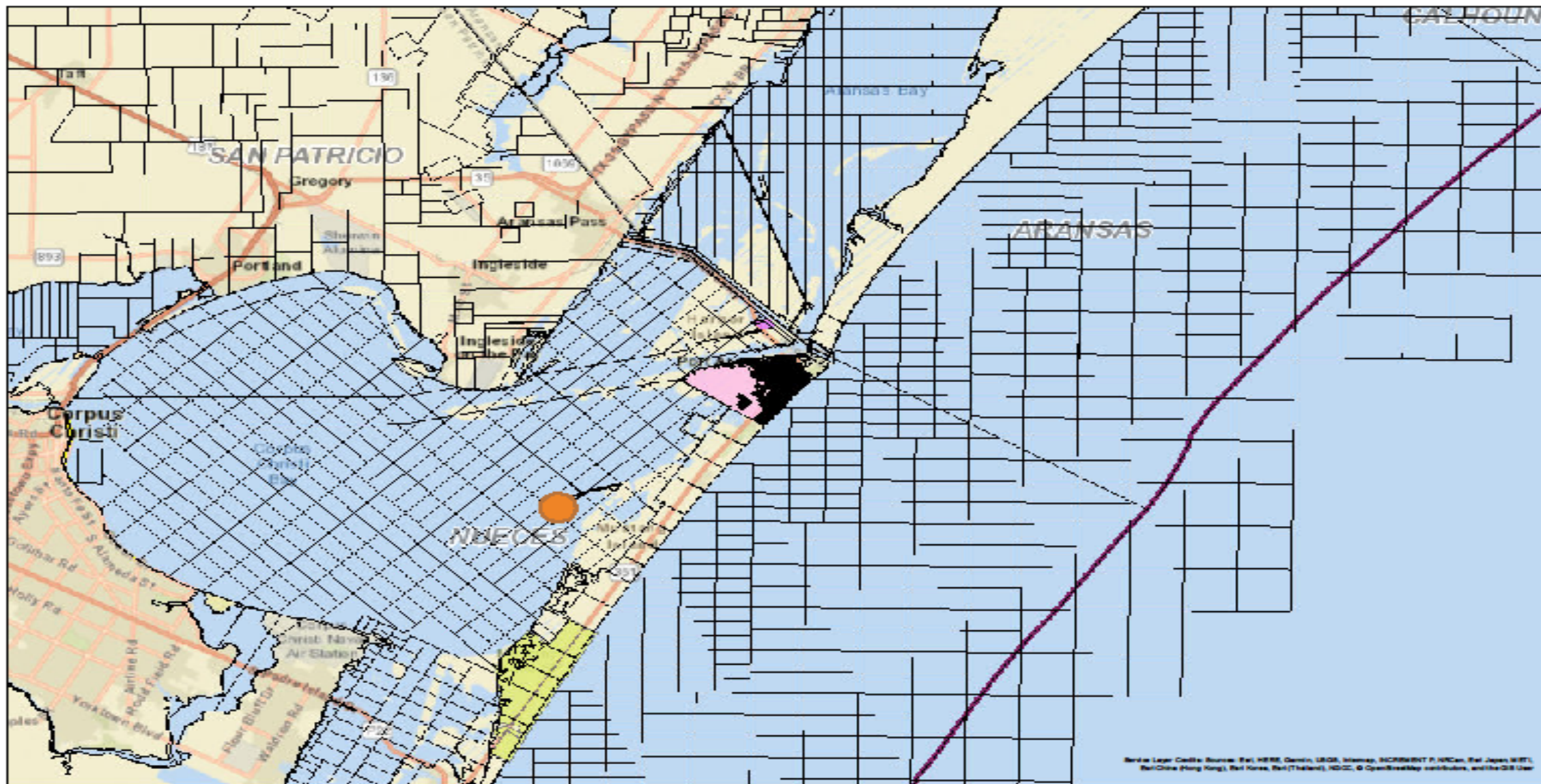
# Restoration Work in Response to Hurricane Harvey

**Placement Area in February 2018**



**Placement Area in July 2018**





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## Shamrock Island, The Nature Conservancy

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Print Date: 8/15/2018

**North Breach**



**South Breach**



# Shamrock Island Preserve

Before Hurricane Harvey

After Hurricane Harvey







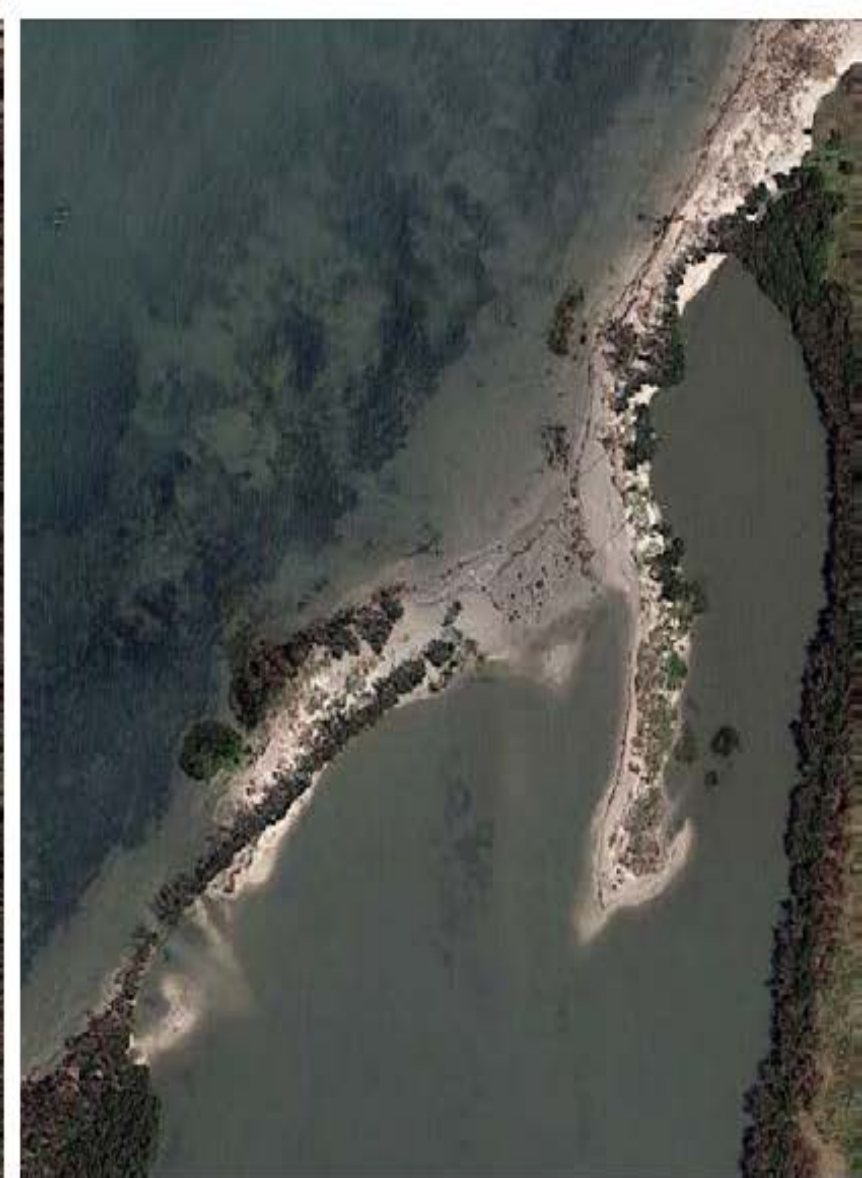
### **Pre-Construction**

Shamrock north breach pre-Construction.  
Google Earth Imagery 11/22/2014



### **Post-Construction**

Shamrock north breach post-Construction.  
Google Earth Imagery 1/01/2017



### **Post-Harvey**

Shamrock north breach post- Hurricane  
Harvey. Google Earth Imagery 8/27/2017

**“Millions of Texans live and work along the coast and the time has come to get serious about investing in its protection. By working together, we will directly address ongoing threats to the Texas coast and ensure a safer, more protected region for future generations.”**

*George P. Bush,  
Commissioner, Texas General Land Office*



Thank you.

