

**Bottom-Up Community  
Assessment Exercise:  
Galveston Bay, TX**

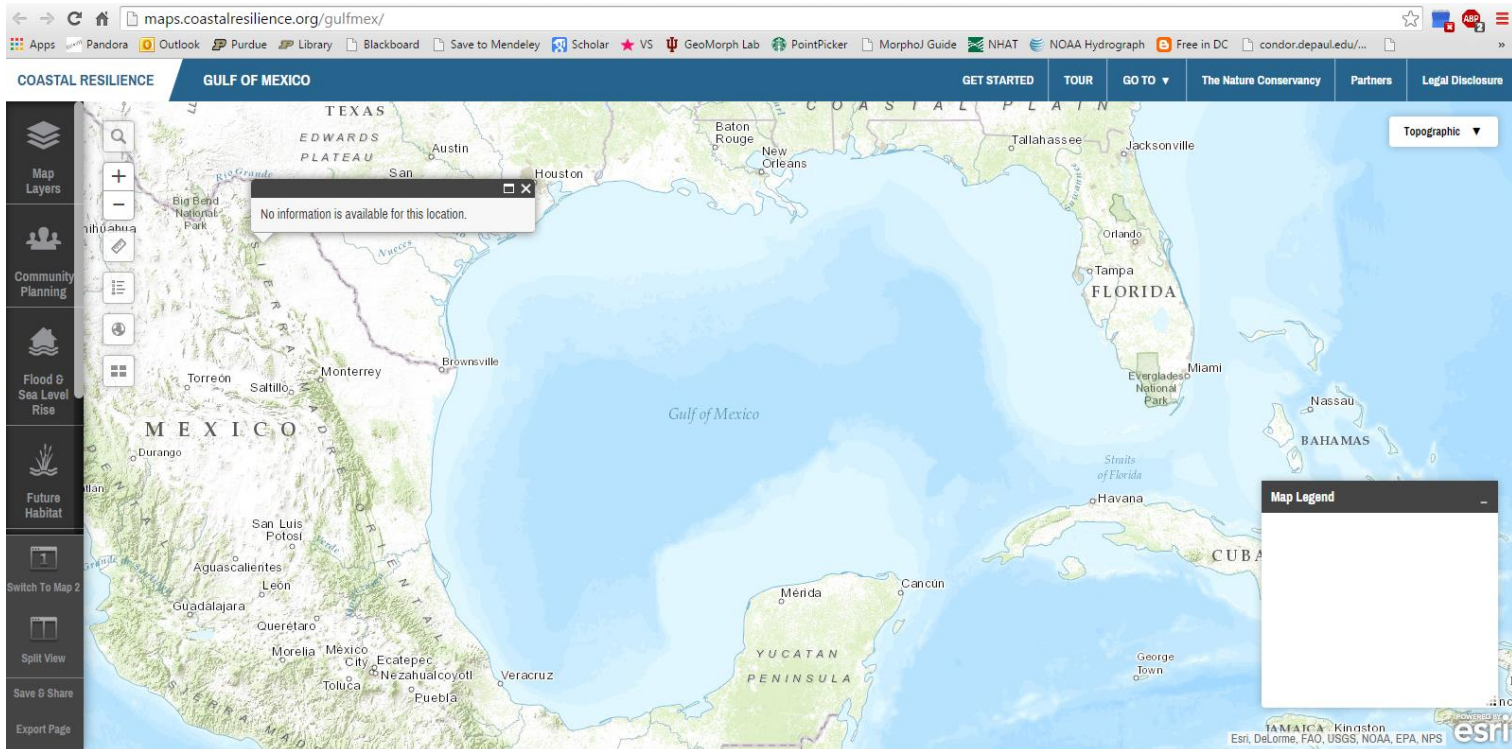
*ASBPA*

*Coastal Resilience Course*

# Goals

- Gain Familiarity with TNC Coastal Resilience Tool
- Demonstrate understanding of resilience concepts by applying them to a bottom-up planning study
  - Overview: resilience review, study area, community needs
  - Group breakouts
  - Group report outs

# The Nature Conservancy Coastal Resilience Tool: Gulf of Mexico Region



Additional Regions Include: California, Connecticut, Southeast Florida, New Jersey, New York, and Washington



# Resilience

prepare, resist, recover, adapt

- Community - Humans have the capacity to learn and make conscious decisions to avoid future losses
- Ecological Resilience - Ability to maintain same functioning without transitioning into a new state. In general, changes must be gradual for successful adaptation.
- Engineering Resilience - The ability of a *system* to **prepare for**, **resist**, **recover**, and **adapt** to achieve *functional performance* under the stress of disturbances **through time**.

# What is a resilient coastal system?

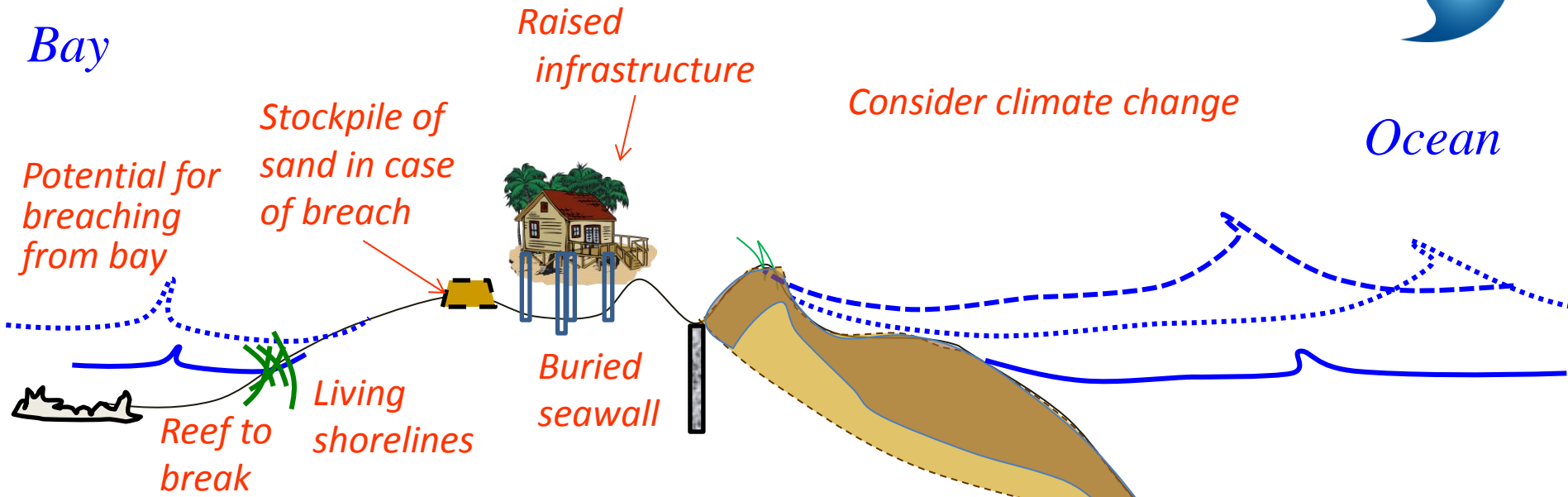
*Hypothetical Example: Galveston, TX*

Narrow portion of island; beach access creates vulnerability



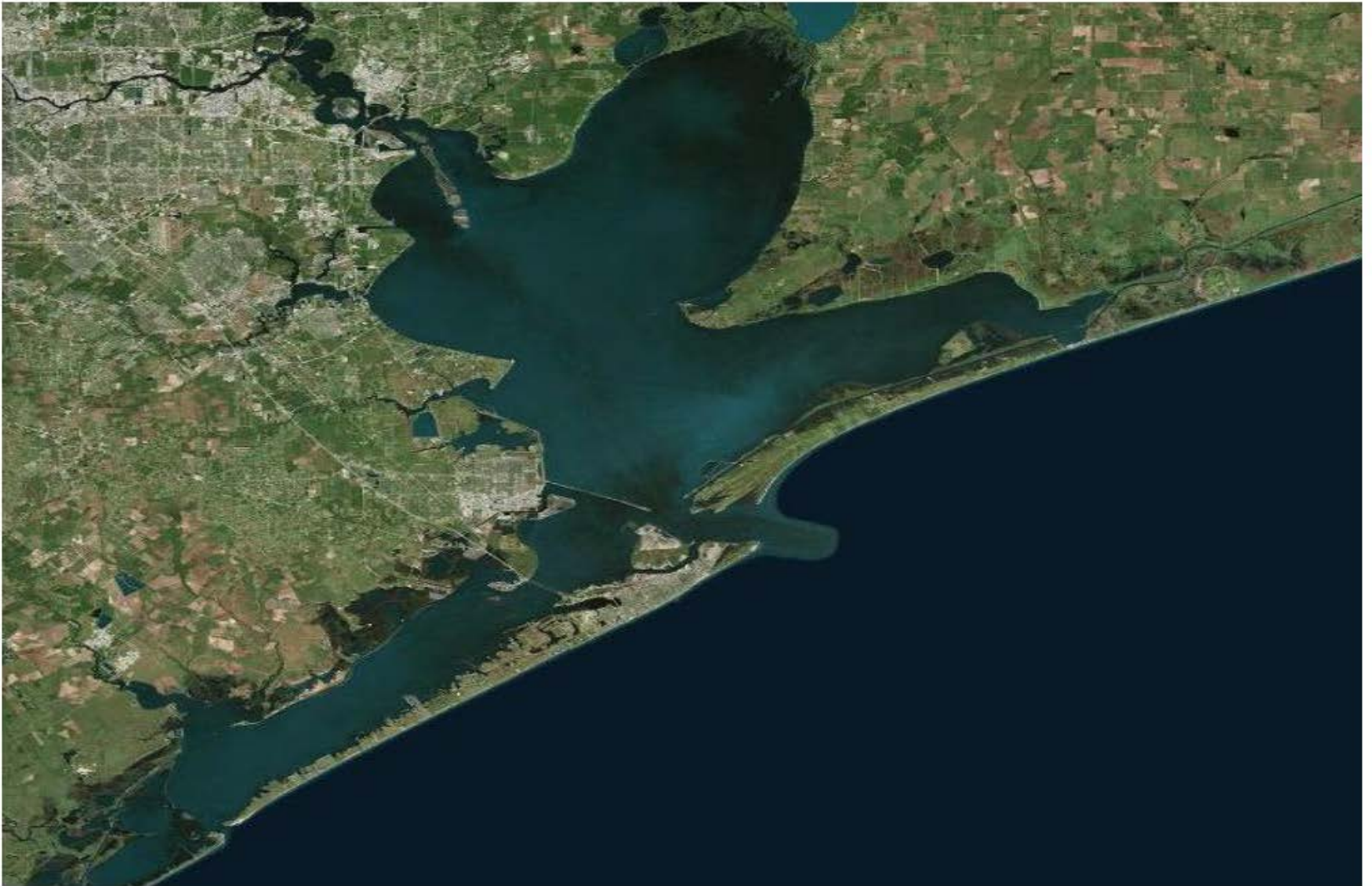
# What is a resilient coastal system?

*Hypothetical Example: Galveston, TX*



prepare	resist	recover	adapt
<ul style="list-style-type: none"> <li>-Height of dune, raised road beds, and raised inf. consider SLR</li> <li>-Stockpile of sand</li> <li>-Early warning system for residents</li> </ul>	<ul style="list-style-type: none"> <li>-Raised infrastructure</li> <li>-8' dunes</li> <li>-buried seawall for backup protection</li> <li>-reef to break back bay waves</li> </ul>	<ul style="list-style-type: none"> <li>-living shorelines and reef natural regrowth</li> <li>-faster recovery times because of limited damage</li> <li>- Raised roadbed provides quick access for recovery actions.</li> </ul>	<ul style="list-style-type: none"> <li>-seawall design incorporates option to raise its height</li> <li>-room for living shoreline &amp; dunes to retreat/advance</li> <li>- Disturbance adapted vegetation grows back stronger</li> </ul>

# Exercise Selection Process: Galveston Bay Area



# What is a resilient coastal system?

*Hypothetical Example: Galveston, TX*

Narrow portion of island; beach access creates vulnerability





# Exercise Selection Process: Community Planning Tool

COASTAL RESILIENCE GULF OF MEXICO

**Community Planning**

The Community Planning app is the location where resilient communities host their locally specific data to further inform their decisions and track their successes. It is also where the community comes to view their information alongside and with the other Coastal Resilience data layers. This app provides information for a community-driven engagement process over time.

**Community Cross Section**

**Community Specific Data**

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Community Planning  
= locally hosted data

Galveston Bay Area:

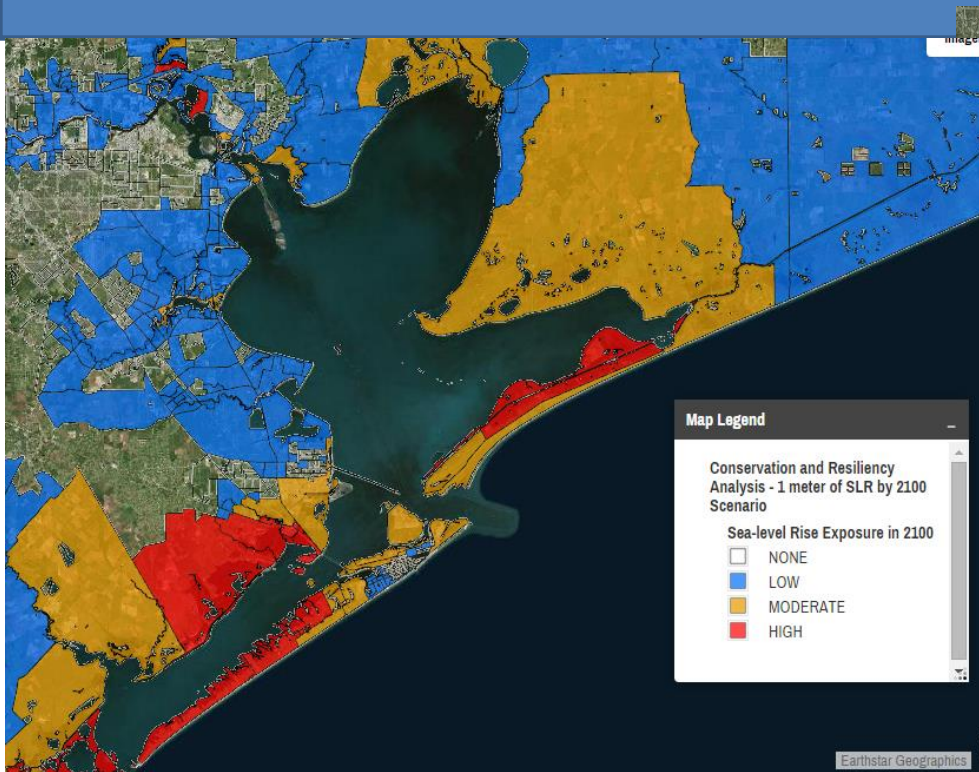
- Carbon sequestration and emission
- Carbon storage
- Community Risk & Resilience (*incl SLR and storm surge projections*)
- Fishery habitat change (*ex. Blue crab, brown shrimp, red drum*)
- Marsh conservation

# Community Planning Tool: Methods

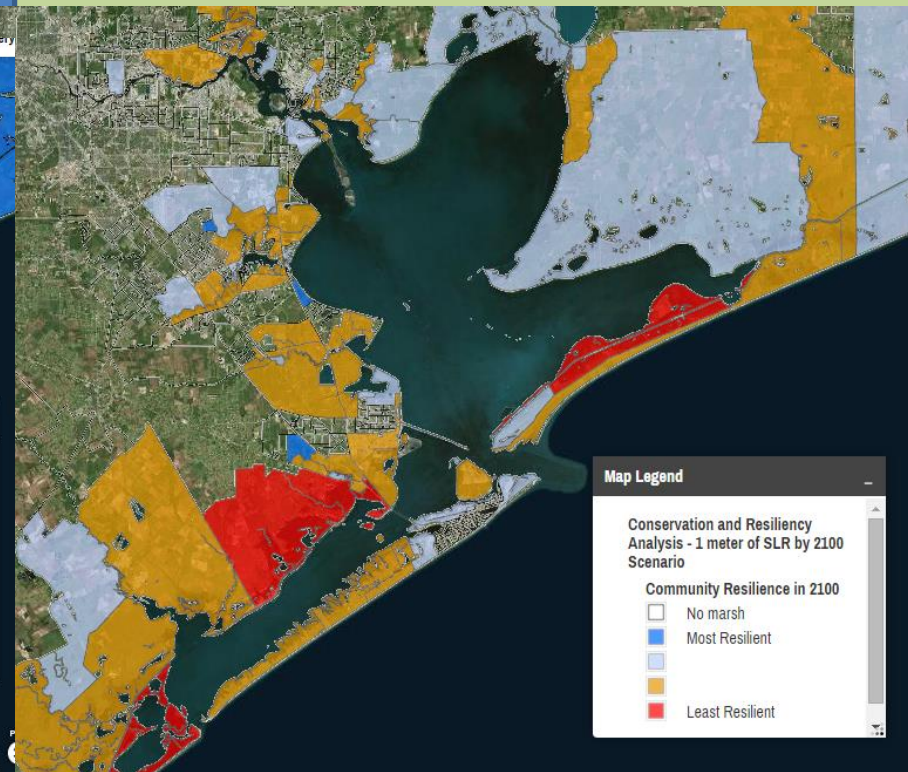
- Sea Level Risk Exposure
  - Percentage of each block group in Galveston Bay that are potentially exposed to 1 m of SLR in the year 2100. Low (<5%), Moderate (5-10%), and High (>15%) based on percent of block area inundated
- Resilience Assessment
  - Combination of Community Risk Analysis, Marsh Viability Analysis to identify most or least resilient communities based on social vulnerability, exposure, environmental viability
  - High resilience = lower social vulnerability, less exposure to storm surge inundation, marsh systems that can maintain or increase in size with 1m of SRL by 2100.

# Community Planning Tool: Results

## Sea Level Risk Exposure 1m by 2100



## Resilience Assessment



# Exercise Selection Process: Risk Explorer

## TNC Defines

**Risk =**

Vulnerability

X Exposure

- Scored with or without Sea Level Rise
- Can identify priority conservation areas
- Priority restoration areas for oyster reefs
- Vulnerability is scored using choice of social vulnerability variables:
  - Total pop'n
  - Older pop'n
  - Families in poverty

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**Risk Explorer**

**Risk Explorer**

Risk Explorer allows communities to assess risk by examining their coastal exposure and social vulnerability. More importantly, it helps to identify solutions and priority sites where habitat management and restoration may most reduce risk. It is organized by state.

**Coastal Hazard Risk**

**High Risk Areas:**  
Coastal development with no habitat can increase risk.

**Habitat Loss and Risk:**  
Loss of habitat erodes the coast and increases wave energy.

**Reducing Risk with Habitat Restoration:**  
Marshes and oysters gather sediment and reduce wave energy.

Sea Level Rise

Habitat Loss

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Jumbile Cove

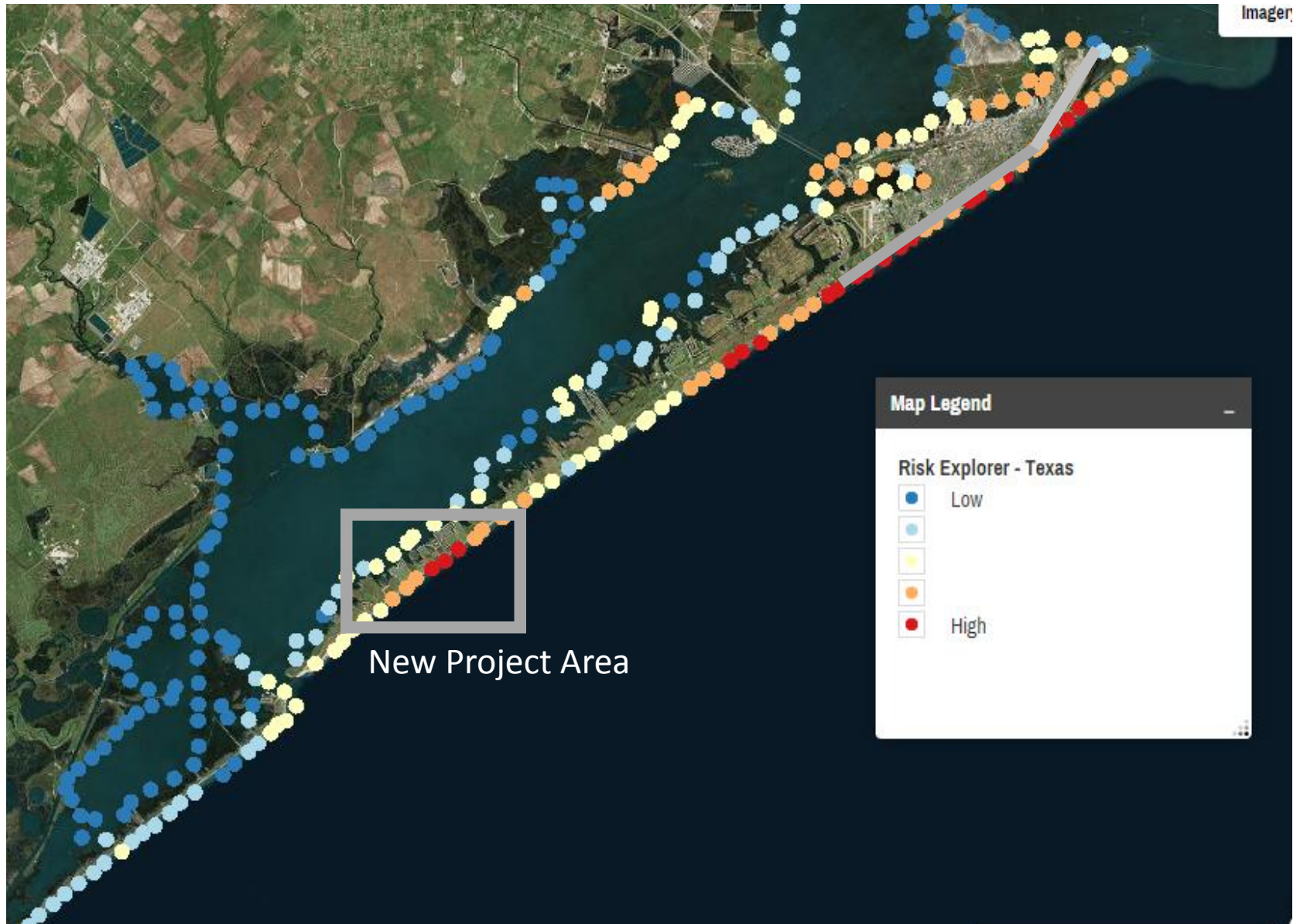
Jamaica Beach

# Risk Explorer: Methods

Calculating a Risk Score = Exposure x Vulnerability

- i. **Exposure** of coastline segment calculated by 7 biological and physical variables including geomorphology, habitats, SLR, relief, wind exposure, wave exposure, storm surge. Methods described in National Climate Assessment (2013).
- ii. **Vulnerability** is calculated using social vulnerability indicators from the American Community Survey's 2006-2010 summary file. User can chose of 3 social vulnerability variables.

# Risk Explorer: Results



# West Galveston Island Project Area



Sea Isle Neighborhood

Terramar Beach

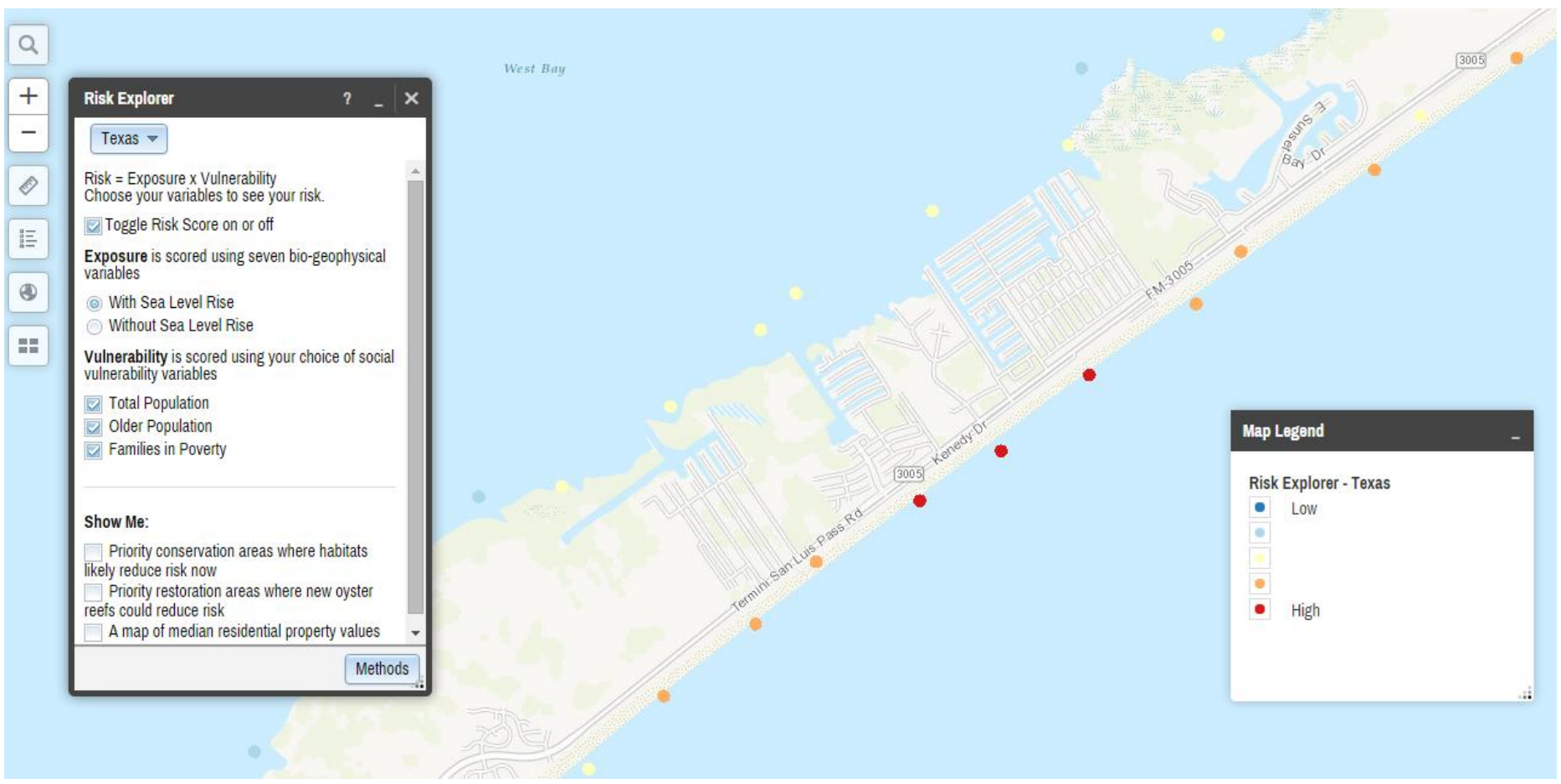
Bay Harbor

# Neighborhood Association & TGLO Planning Needs

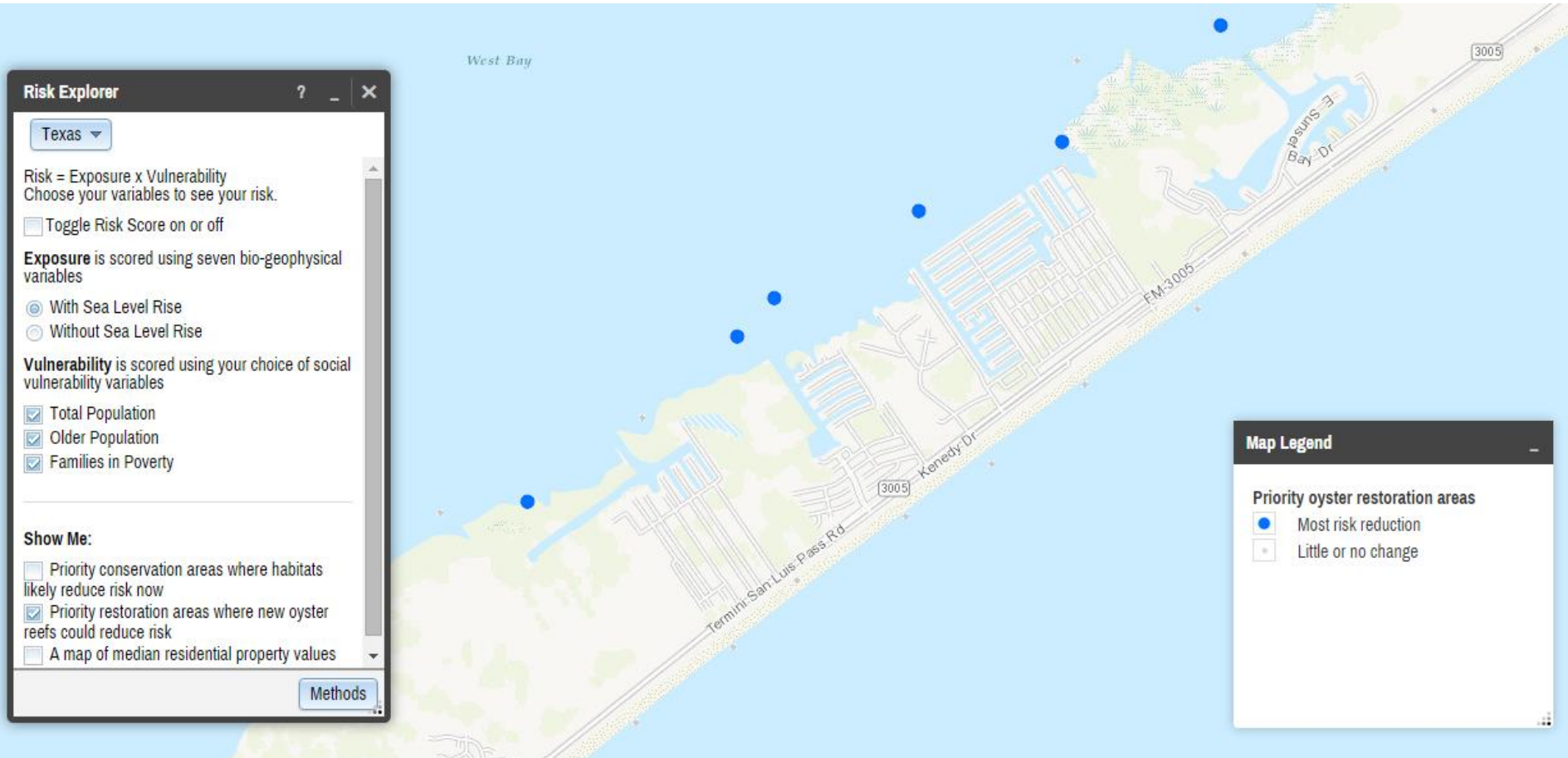
- Issues to be addressed:
  - Threat of back-bay flooding and storm surge
  - Environmental restoration
  - Beach erosion
  - Maintain public access
- Address 1 meter of SLR by 2100



# Risk Score



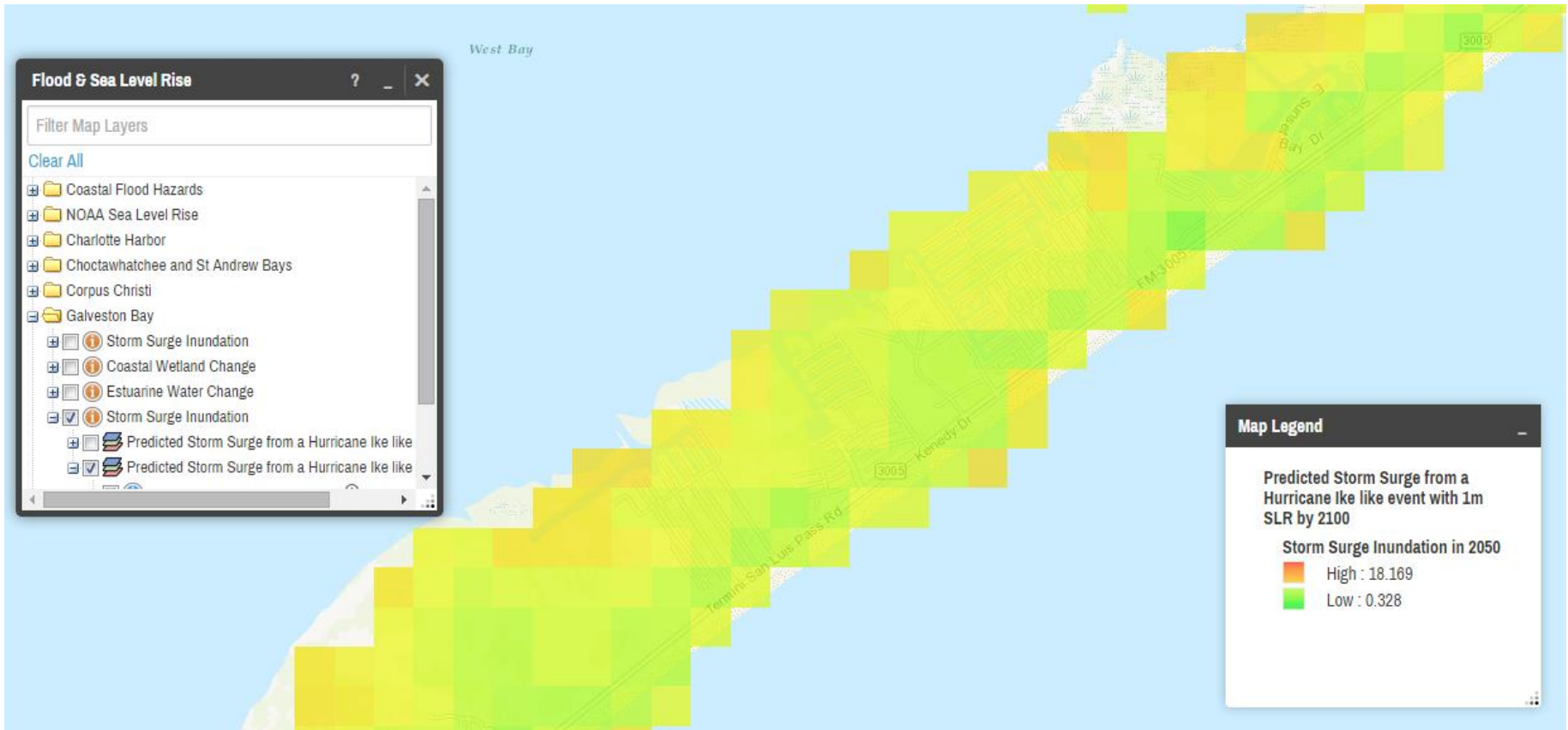
# Priority Oyster Restoration Areas



# NOAA SLR Indicator – .9 m SLR



# Predicted Storm Surge – with 1m SLR



# Change in Habitat – 1 meter by 2100



# Aerial Views of Area



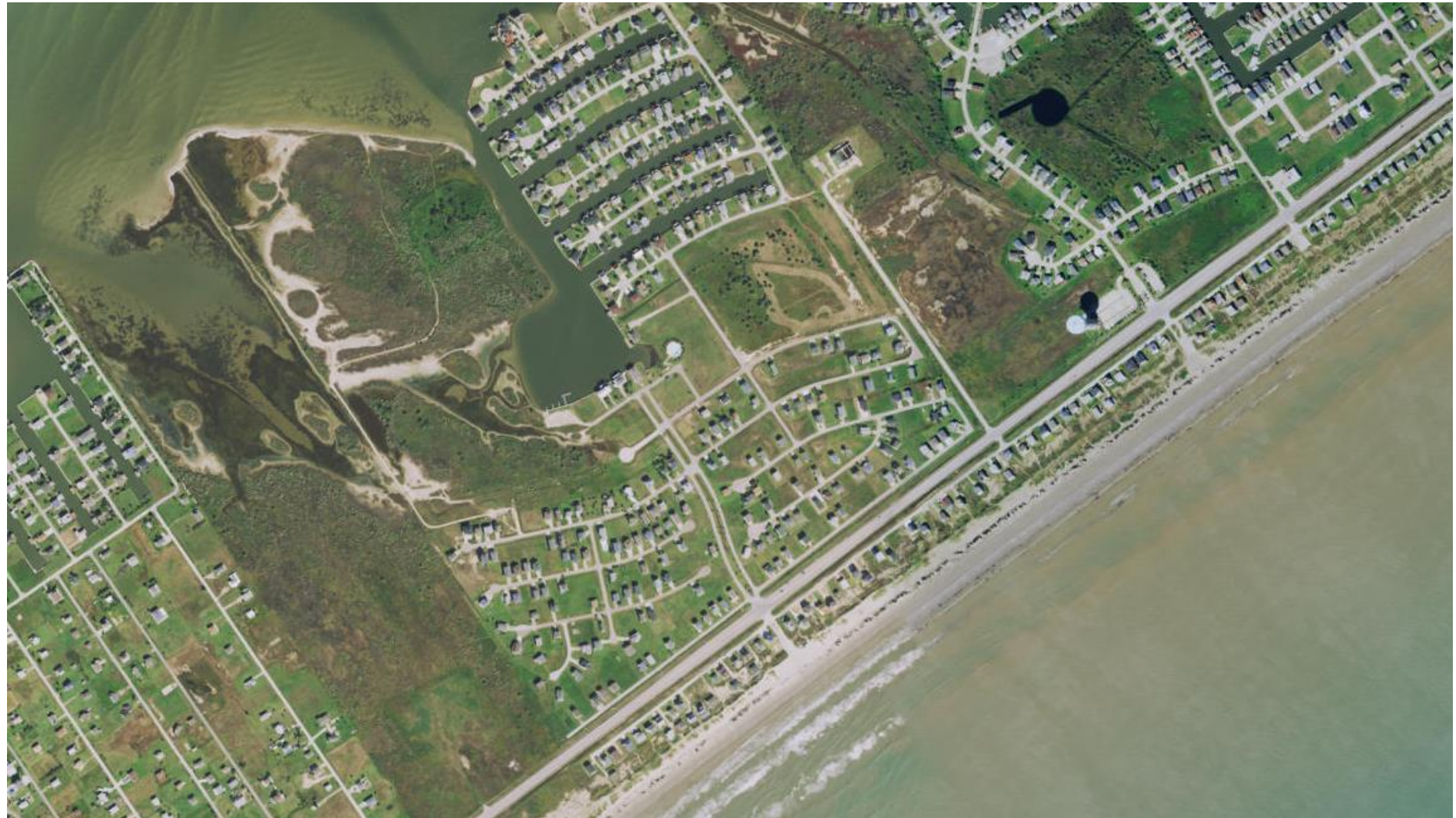


# Bay Harbor





# Terramar



# Sea Isle

