Adaptation of the ***VIMS' Shoreline Management Model*** *to Assess Site Suitability of Living Shorelines and Emphasize Best Shoreline Management Practices in the Peconic Estuary*

Karinna Nunez,
Pamela Mason, Tamia Rudnicky

Peconic Estuary Partnership

Technical Advisory Committee Meeting

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VIMS | William & Mary
Virginia Institute of Marine Science
Center for Coastal Resources Management

Background

- Shoreline erosion is a major issue for property owners and environmental planners.

- Increasing trend to adopt and implement strategies that provide the **best management alternatives** to conventional hardening for erosion protection with **minimum adverse effects on riparian and intertidal habitats**

Shoreline Management Model (SMM)

This model was developed to inform, assist, enhance, and streamline regulatory decisions by identifying best management practices **(BMP)** for tidal shoreline erosion control.

Shoreline Management Model (SMM)

Purpose & Intent

1. Provide living shoreline site suitability assessment
2. Generate shoreline management best practice recommendations

For natural & currently defended shorelines with determined problems

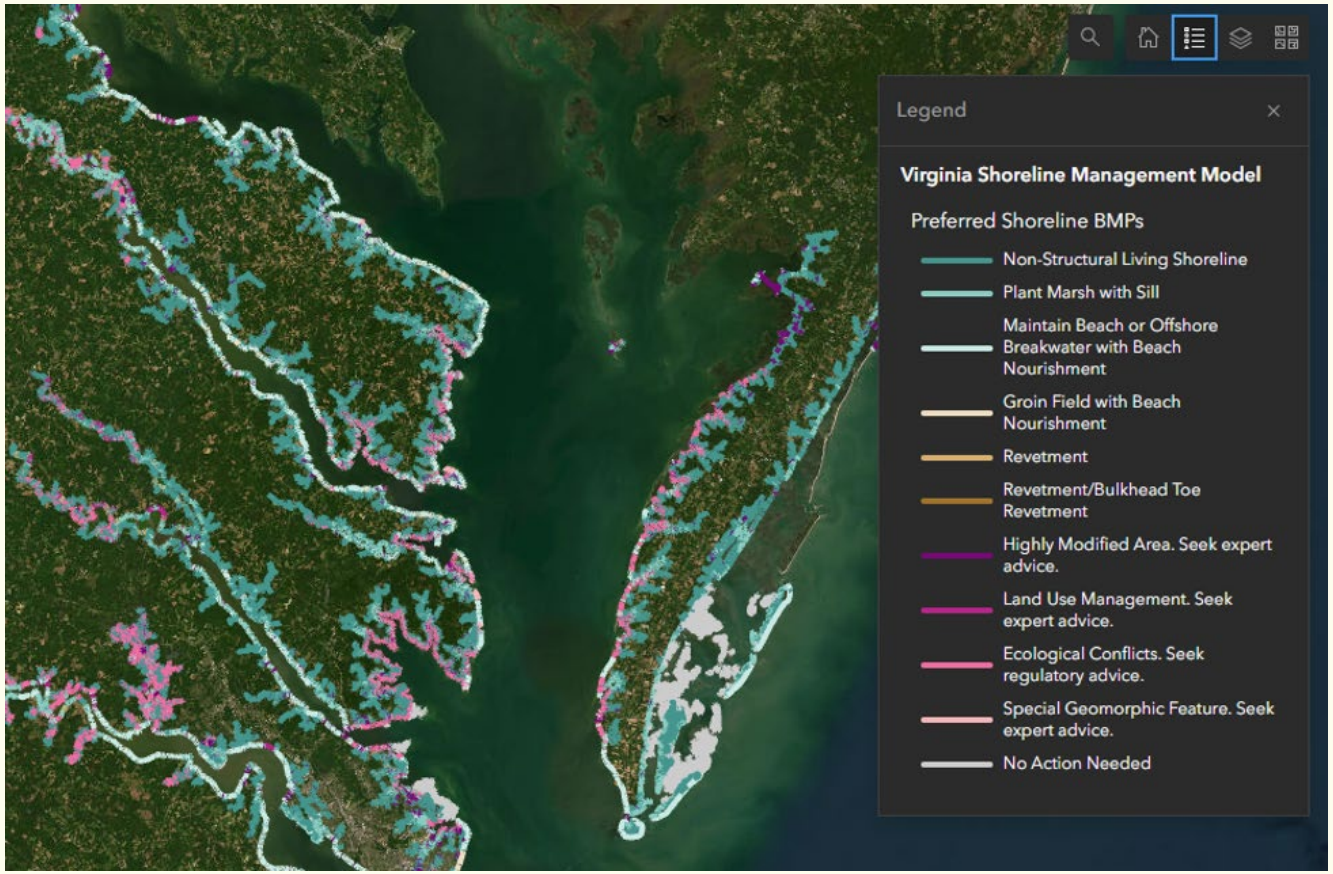
Upland Bank Erosion

Marsh Edge Erosion

Failing Defense Structures

Shoreline Management Model (SMM)

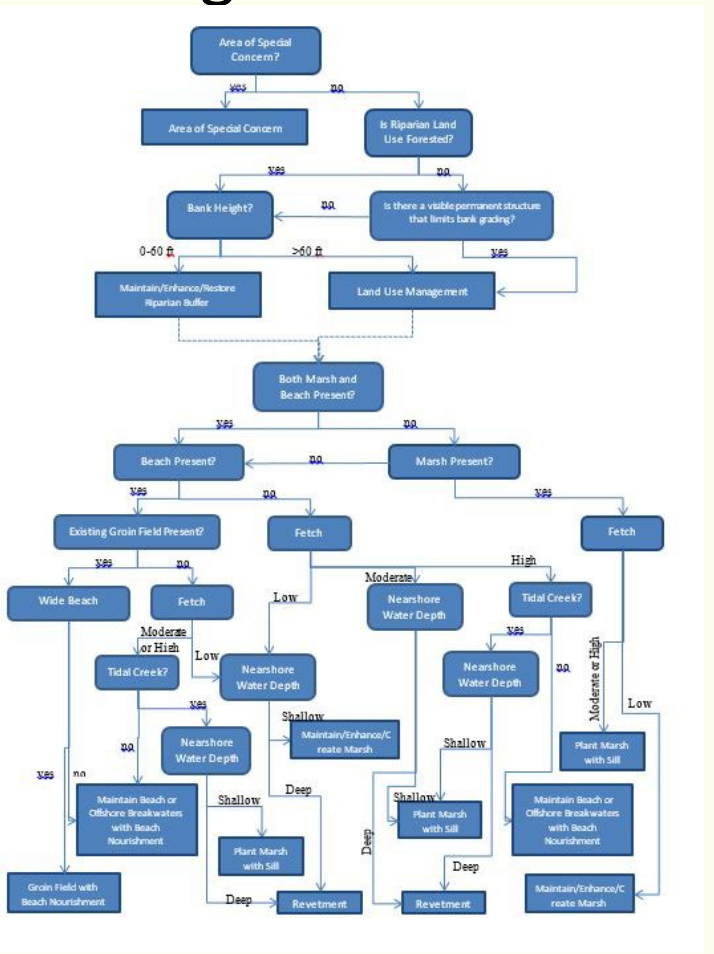
The SMM is spatially-explicitly model run in ArcGIS that provides a recommended approach for tidal shoreline erosion control and **identifies where living shorelines are suitable.**



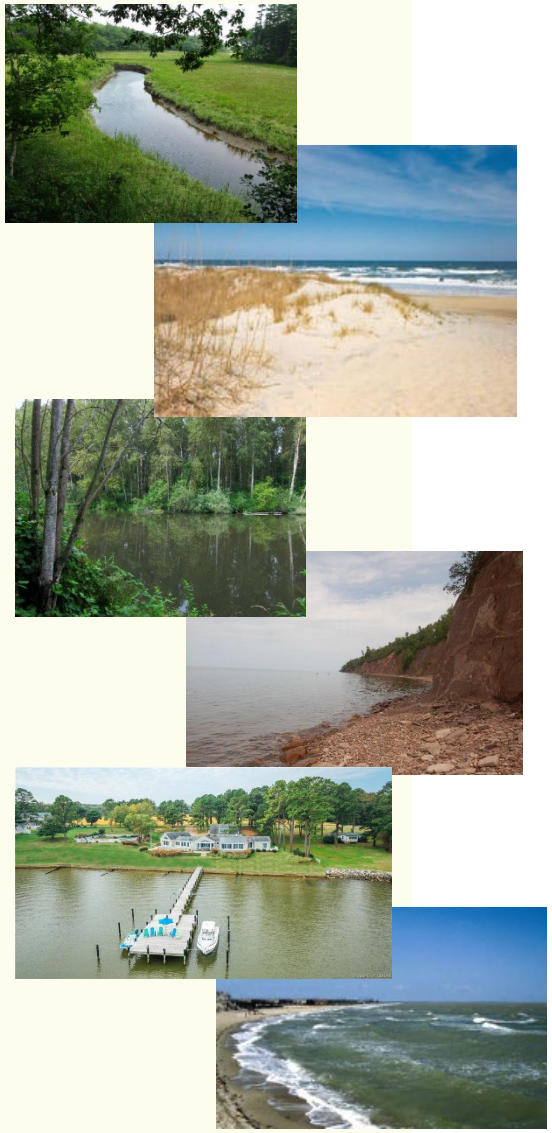
SMM v.5.1 – Decision Tree Logic

Recommended erosion control strategies are based on **decision trees,** developed to inform shoreline decision-making reflective of:

- Current scientific knowledge of how shorelines respond to natural conditions and anthropogenic measures.
- The direct and cumulative impacts of conventional shoreline stabilization.
- Best professional judgment from over 4000 shoreline site visits.



Shoreline Management Model v. 5.1 - Input & Output



Input Data

- Bank Height
- Beach
- Canals (navigable)
- Fetch
- Nearshore Bathymetry
- Permanent Structures
- Public Boat Ramps
- Riparian Land Use
- Roads
- Sand Spits
- Shoreline Protection Structures
- Submerged Aquatic Vegetation (SAV) or Mangroves
- Tidal Marsh
- Tributary Designation

All Data Transferred to Single Shoreline

Shoreline

Model Input: Single Shoreline with Multiple Attributes

Shoreline Management Model (SMM)

- Undefended Shoreline
- Shoreline with Existing Bulkhead
- Shoreline with Existing Revetment

Model Output

Output Recommendations

Living Shoreline

- Maintain Beach or Offshore Breakwater with Beach Nourishment
- Non-Structural Living Shoreline
- Plant Marsh with Sill

Traditional

- Groin Field with Beach Nourishment
- Revetment
- Revetment/Bulkhead Toe Revetment

Special Considerations

- Ecological Conflicts
- Highly Modified Area
- Land Use Management
- No Action Needed
- Special Geomorphic Feature

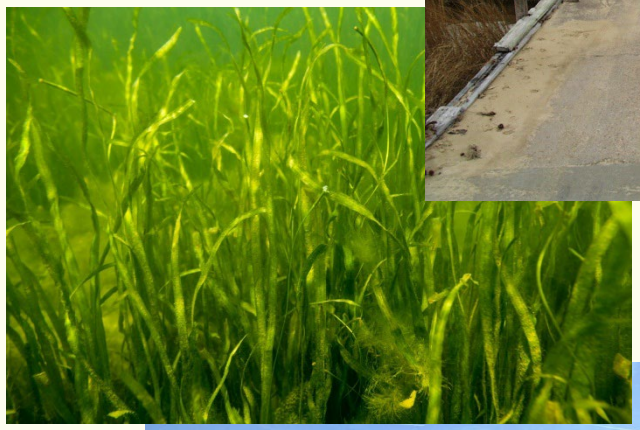
Source:

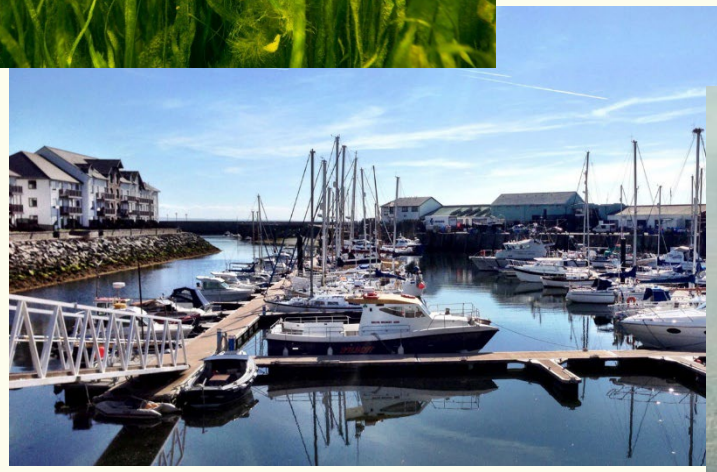
Nunez, K., Rudnicky, T., Mason, P., Tombleson, C., Berman, M. (2022). A geospatial modeling approach to assess site suitability of living shorelines and emphasize best shoreline management practices. Ecological Engineering. 179. 106617.

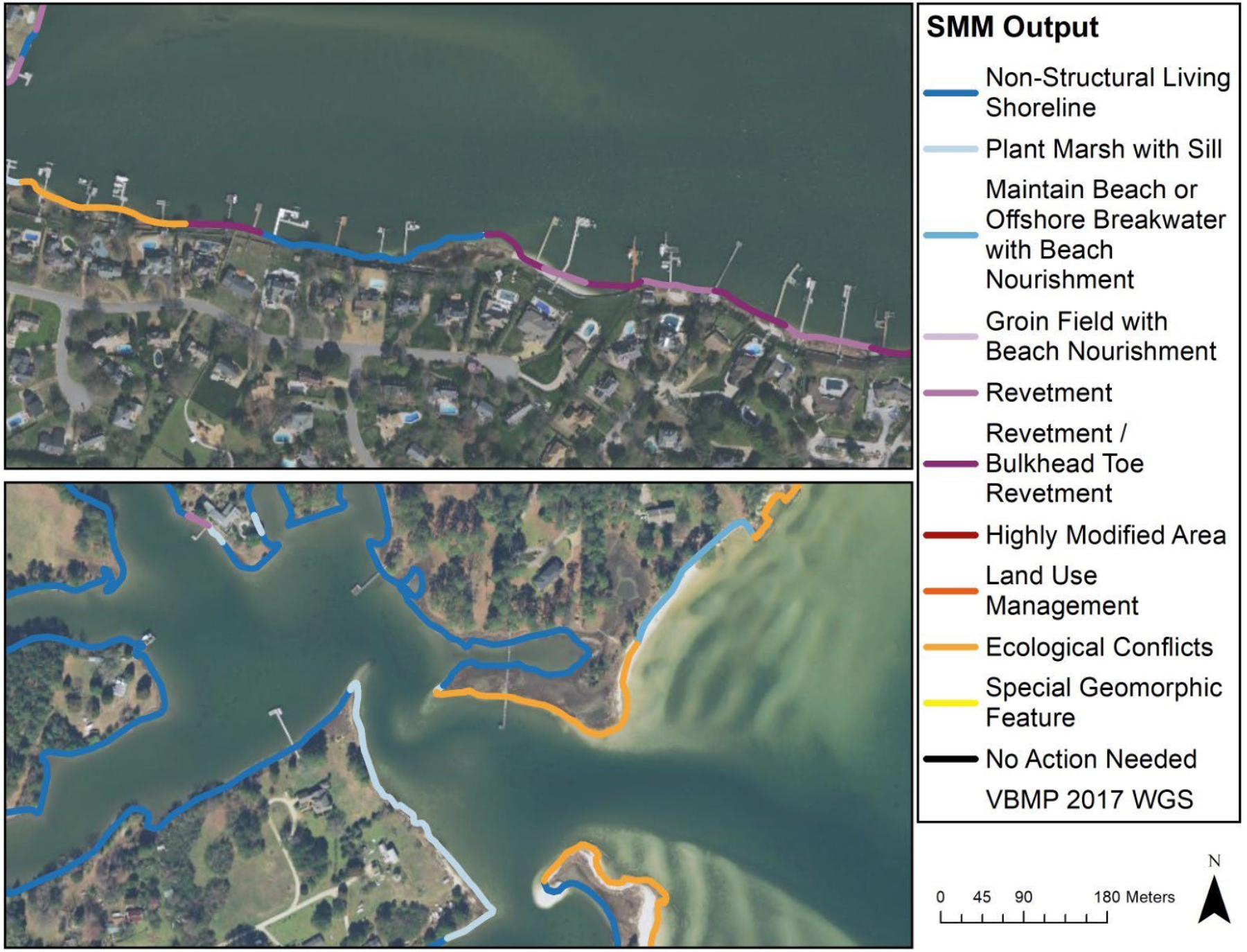
SMM – Shoreline Best Management Practice Recommendations:

SPECIAL CONSIDERATIONS

- Ecological Conflicts
- Highly Modified Area
- Land Use Management
- No Action Needed
- Special Geomorphic Feature






SMM Output
Non-Structural Living Shoreline
Plant Marsh with Sill
Maintain Beach or Offshore Breakwater with Beach Nourishment
Groin Field with Beach Nourishment
Revetment
Revetment / Bulkhead Toe Revetment
Highly Modified Area
Land Use Management
Ecological Conflicts
Special Geomorphic Feature
No Action Needed
VBMP 2017 WGS
0 45 90 180 Meters
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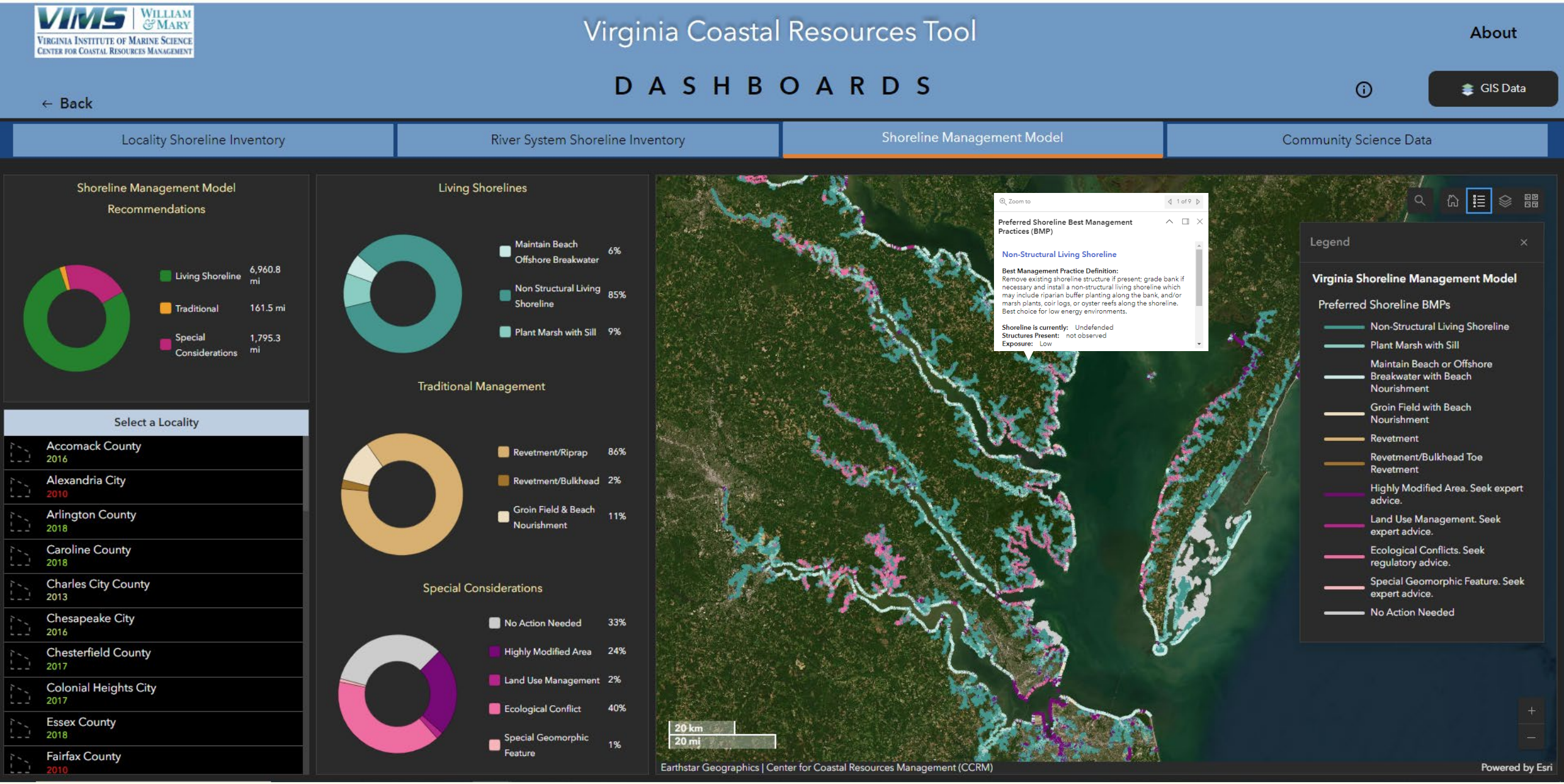


https://cmap22.vims.edu/VACoastalResourcesTool/?page=CoastalViewerPage

SMM (v.6)

Model Inputs

Current Input Data

- Bank Height
- Beach
- Canals (navigable)
- Fetch
- Nearshore Bathymetry
- Permanent Structures
- Public Boat Ramps
- Riparian Land Use
- Roads
- Sand Spits
- Shoreline Protection Structures
- Submerged Aquatic Vegetation (SAV) or Mangroves
- Tidal Marsh
- Sheltered Waterway

New Input Data

- **Bank Slope**
- **Agriculture land use**
- **Wave Energy**
- **Rare Threatened Endangered Species**
- **Proximity to Narrow Creeks**
- **Federal Channels**

Site suitability for oyster structures

- **Salinity**
- **Substrate**
- **Bathymetry**
- **Wave Energy**

SMM(v.6)

Output Recommendations (n = 21)

SMM Output Recommendations – Main Categories

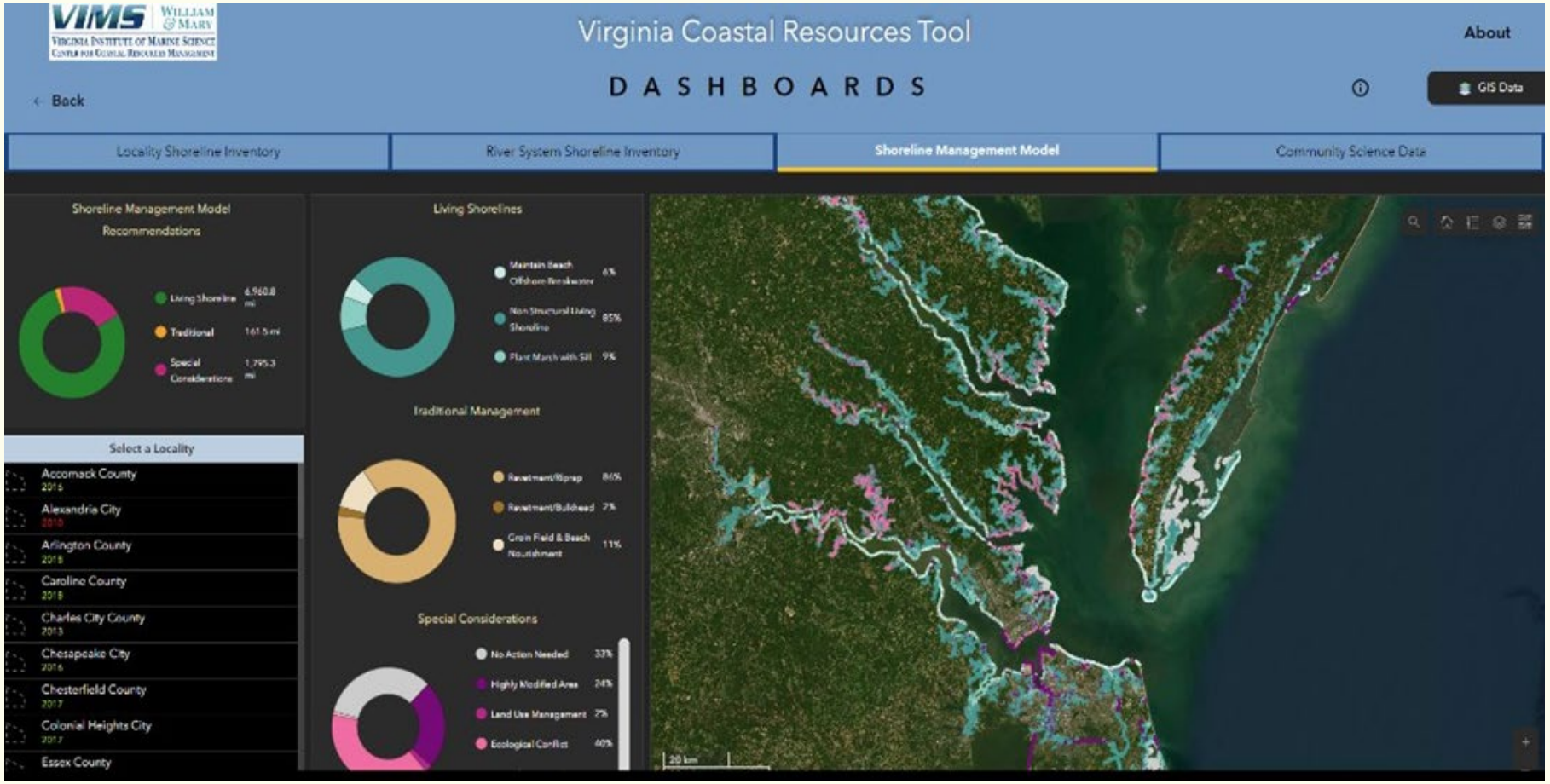
- Living Shoreline
- Traditional Structure

Best Management Practices (BMPs) for erosion control (displayed on the shoreline)

SMM Site Suitability for Oyster Structures Outputs

- Oyster Bags
- Constructed Oyster Reef

Site suitability for habitat enhancement (displayed in the water)



Model Application

Parcel – Scale Shoreline Management

- Regulatory agencies and Wetland Boards (VA)
- Shoreline professionals & contractors
- Private citizens

Pollutant Load Reduction Potential

- Tidal marsh creation & shoreline management BMPs
- Defended shoreline retrofits

Community Resiliency

- Targeting protection & restoration natural and nature-based features
- Living shoreline ranking & co-benefits

Regional Customization

- Exportable code + regional terminology and regulations

Regional Applications - Customized Recommendations

Virginia

Maryland

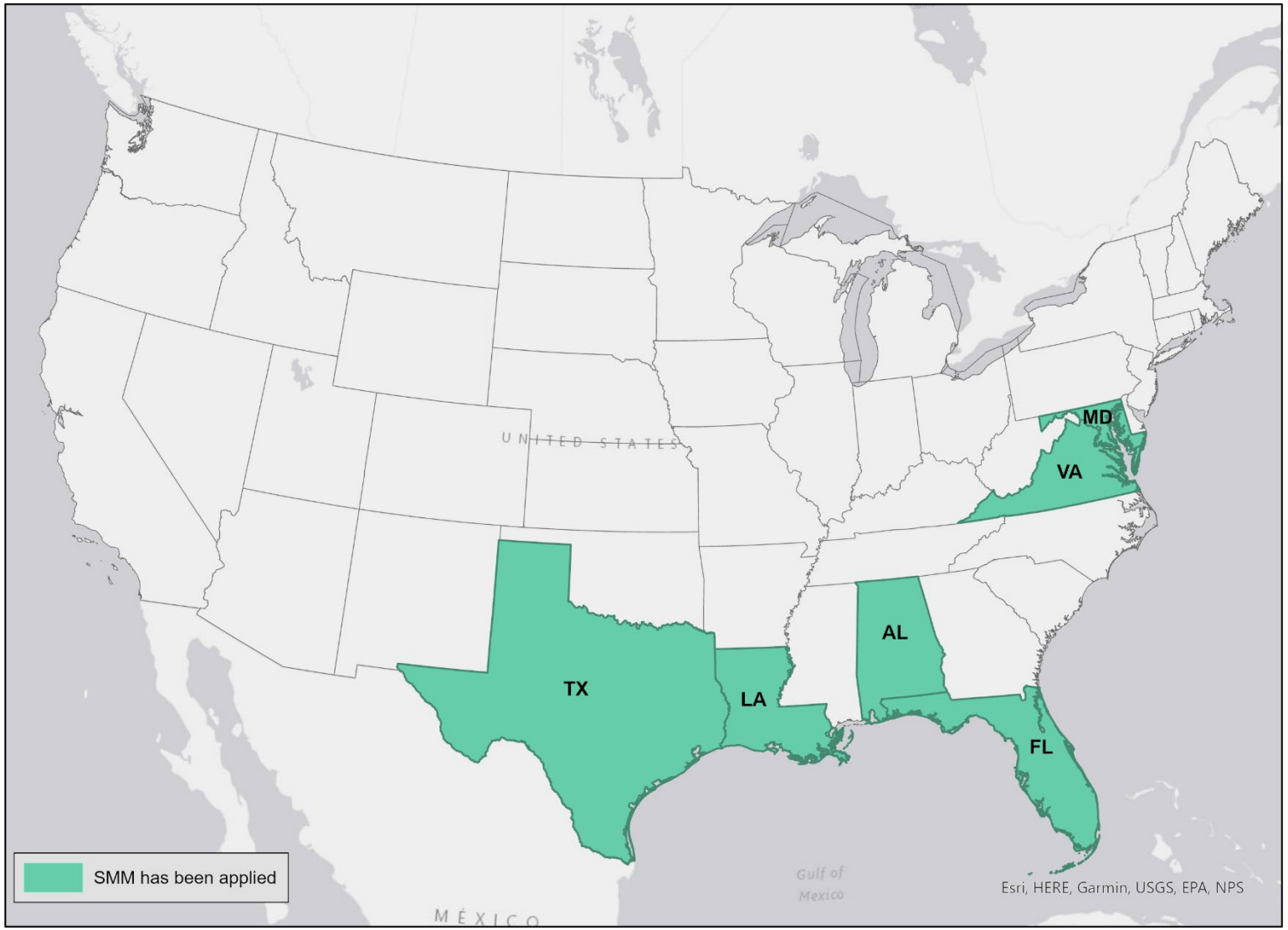
Texas

Florida – Tampa Bay

Louisiana – Lake Pontchartrain

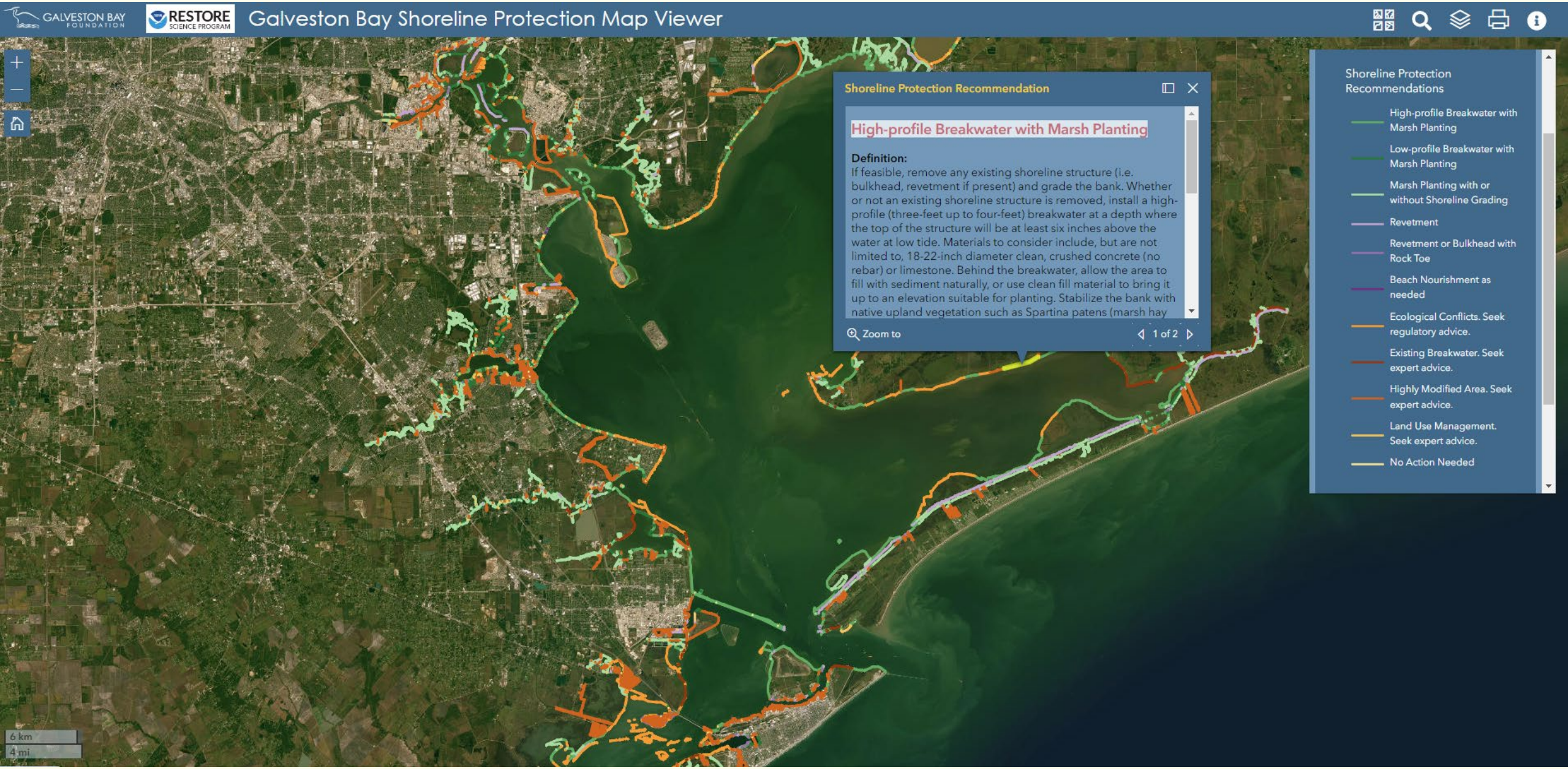
Alabama – Mobile Bay

Alabama & Florida – Pensacola Bay



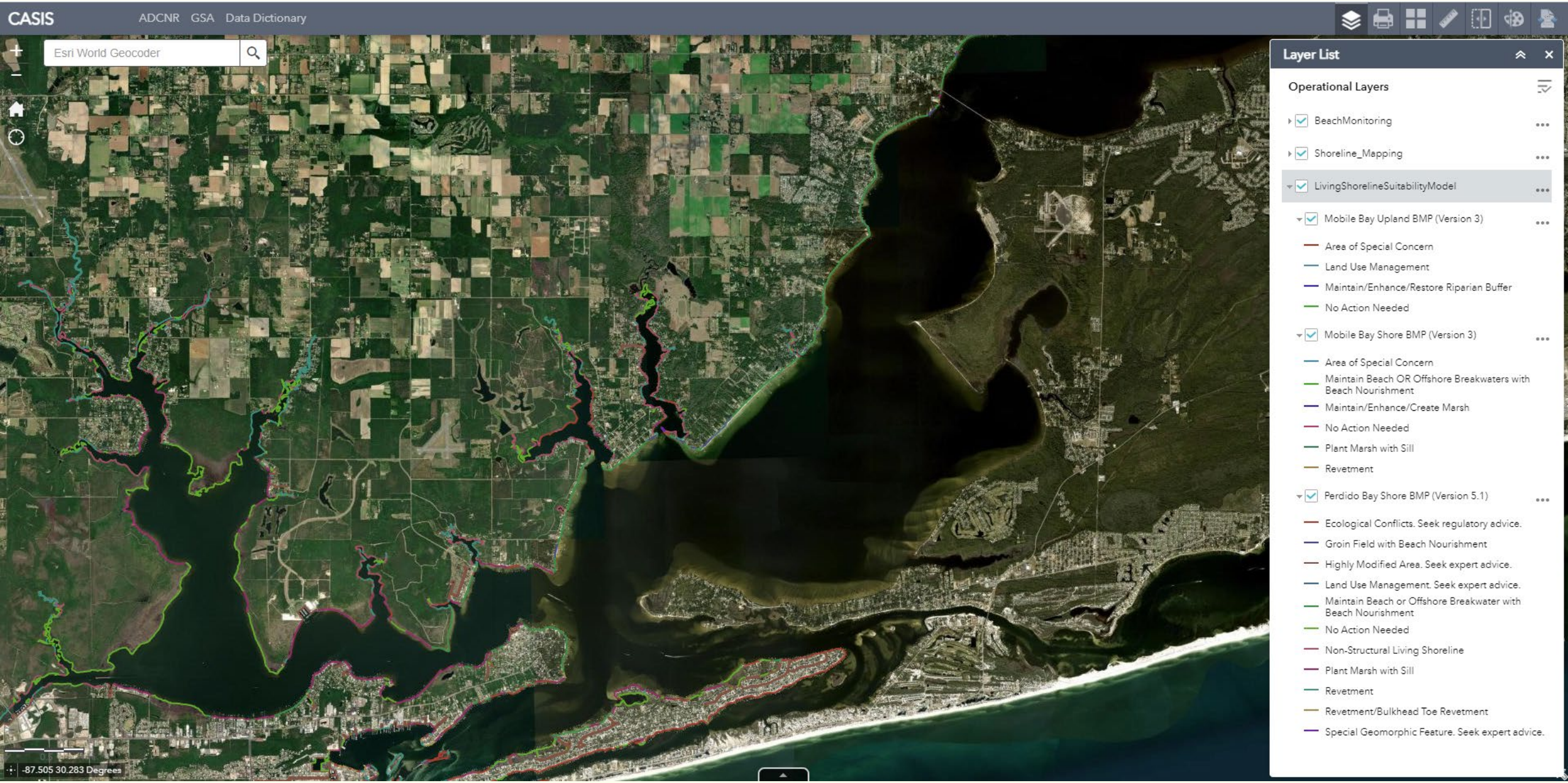
SMM website: https://www.vims.edu/ccrm/advisory/ccrmp/bmp/smm/

Texas



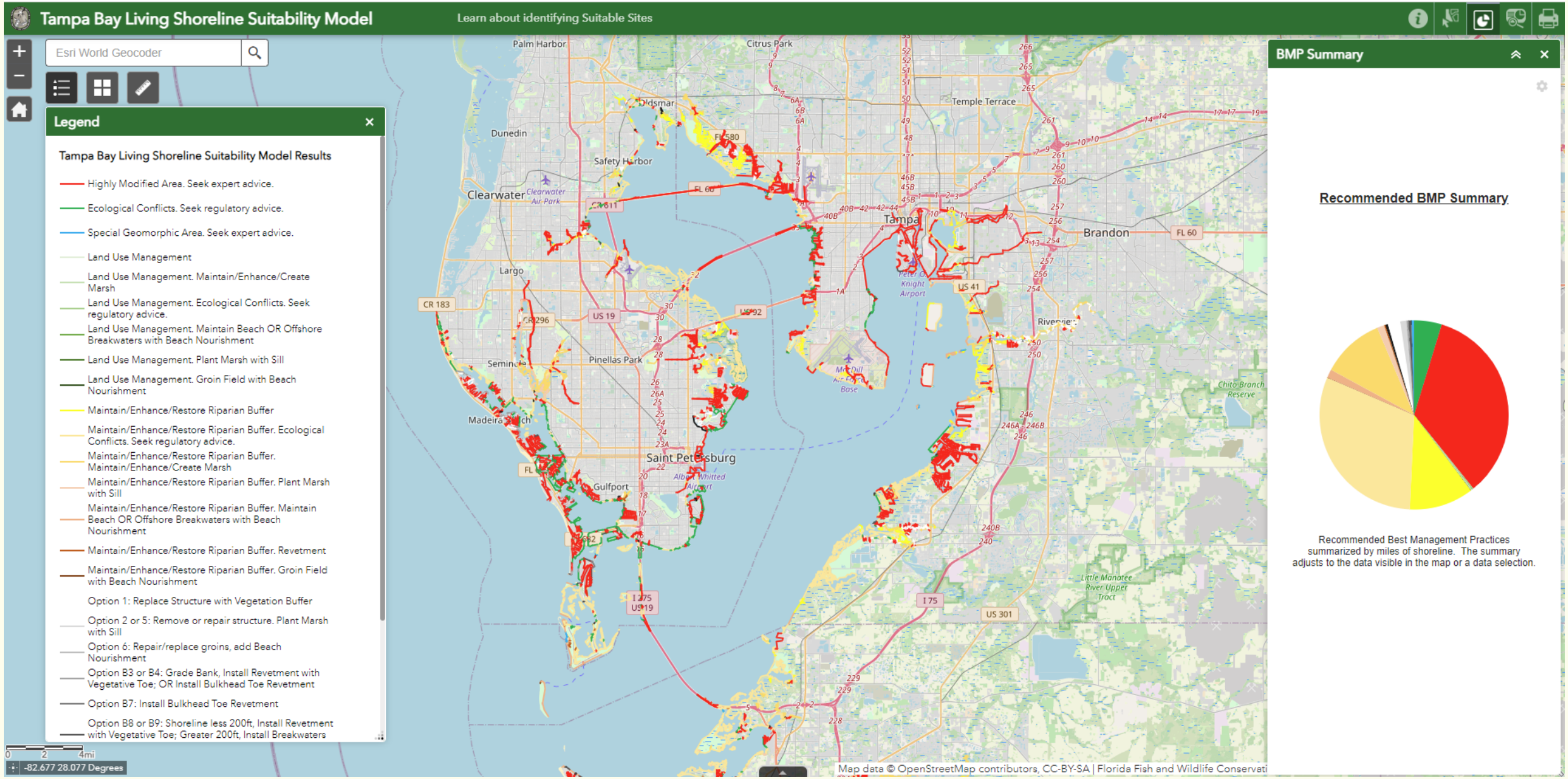
https://cmap22.vims.edu/GBShoreProtectViewer/

Alabama and Louisiana



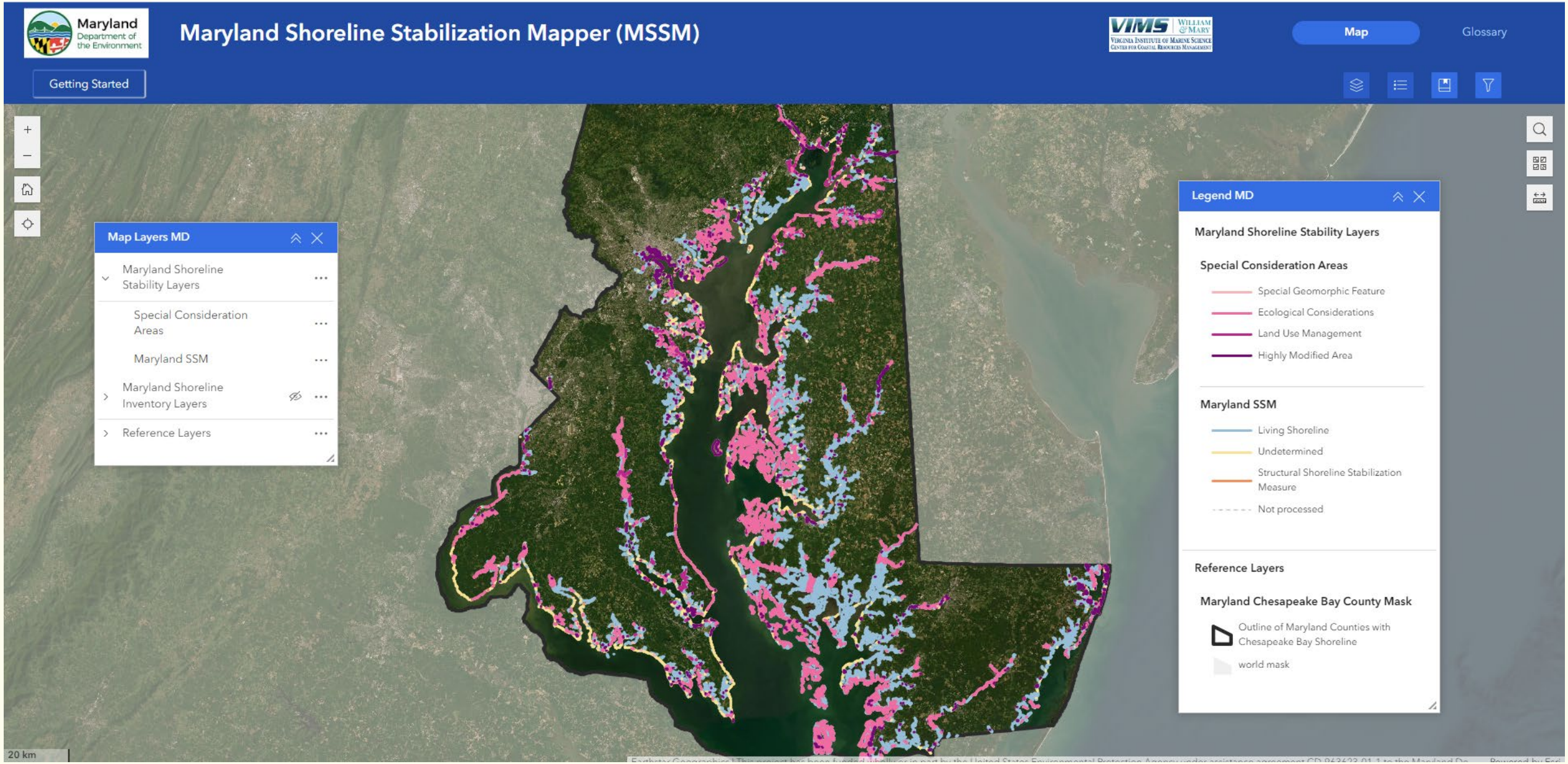
https://www.gsa.state.al.us/apps/CASIS/index.html

Florida



https://myfwc.maps.arcgis.com/apps/webappviewer/index.html?id=e4d76fa267dc4bac97d407d20566ae42

Maryland

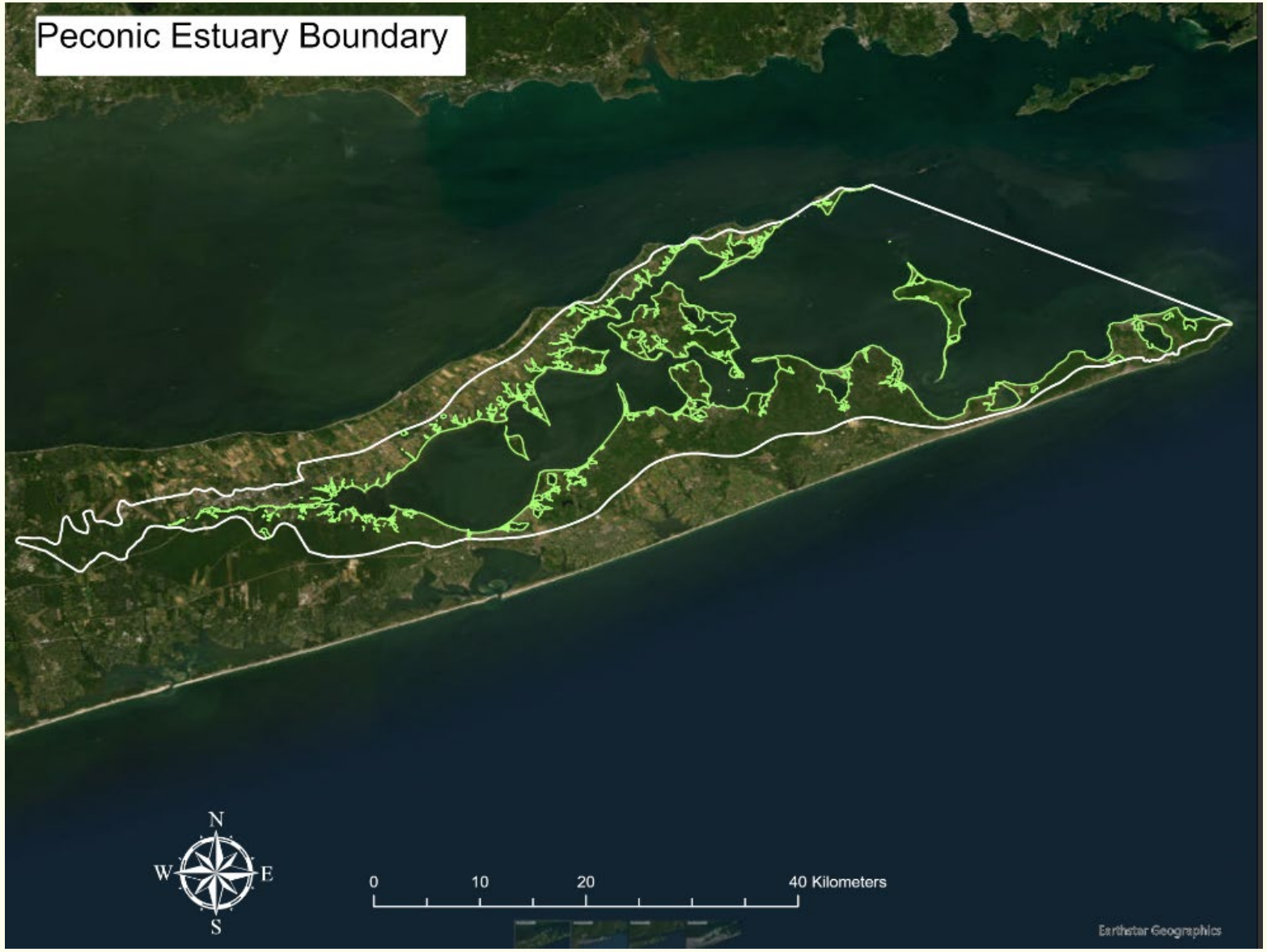


https://cmap22.vims.edu/MSSMTool/

Peconic Estuary

Goal:

To **customize** (based on stakeholders' input) and **apply** the **VIMS' Shoreline Management Model (SMM) v.6** to the **Peconic Estuary** to understand which areas are suitable for living shoreline construction and to facilitate efforts to improve shoreline management decision-making in New York.



SHORELINE BEST MANAGEMENT PRACTICES

Shoreline Management Model

Home > CCRM > Shoreline Management > Shoreline Best Management Practices > Shoreline Management Model

Shoreline Management Model – SMM

website: https://www.vims.edu/ccrm/ccrmp/bmp/smm/index.php

Questions?

Karinna Nunez
Center for Coastal Resources Management
Virginia Institute of Marine Sciences
804-684-7273
karinna@vims.edu

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