VIMS Shoreline Management Model

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VIMS | William & Mary
Virginia Institute of Marine Science

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Shoreline Management Model

Model Background

Inputs & Outputs

Advantages & Limitations

Products & Applications

Little Magothy River, Anne Arundel County MD

Shoreline Management Model

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

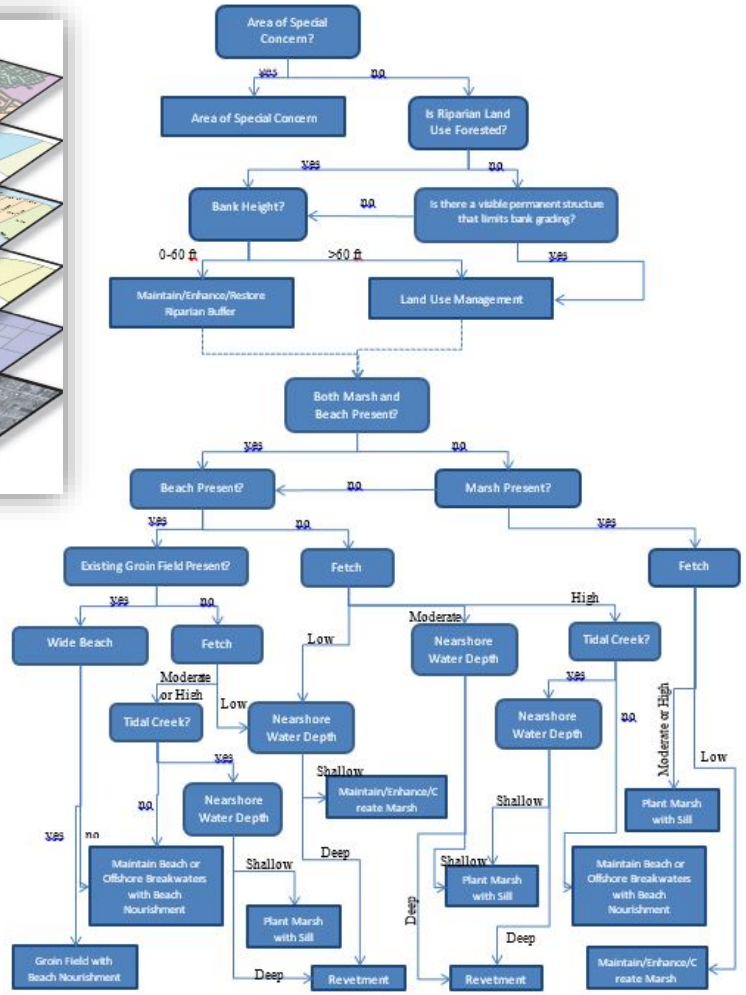
Failing Defense Structures

Shoreline Management Model
Purpose & Intent

Shoreline Expert Best Professional Judgment

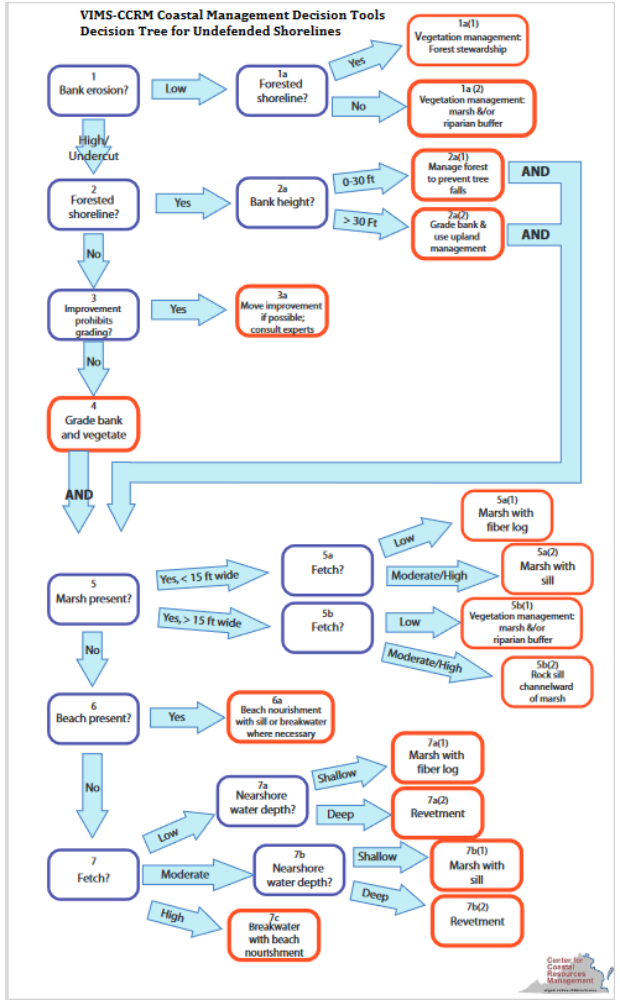
Collective scientific knowledge

Automated ArcGIS Model

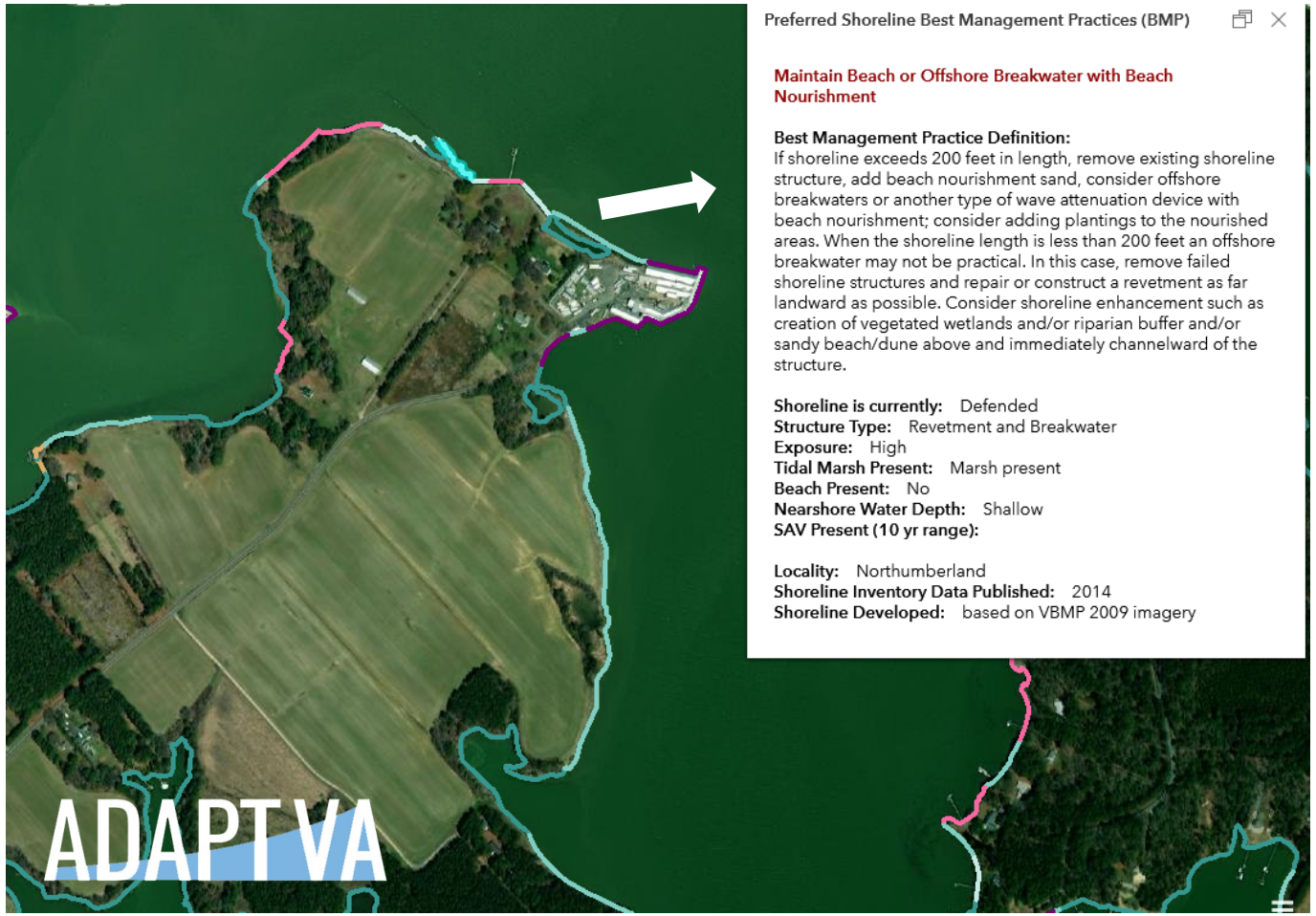


Shoreline Management Model
Purpose & Intent

Original Decision Tree PDF
requires subjective interpretation



Easy to use map viewer
with site-specific attribute display



Shoreline Conditions Factored into Model

BASELINE SHORELINE

Land – water, tidal marsh, or beach interface

SHORELINE INVENTORY

Natural Features *presence or absence tidal marshes, beaches, SAV*

Upland bank height *imagery, field inspection, videography &/or LIDAR*

Existing shoreline defense structures

Riparian land use *within 100 feet of shoreline*

Special shoreline conditions *Canals, boat ramps, marinas & sand spits*

POST-INVENTORY

Nearshore bathymetry *distance to 1m contour NOAA topobathy*

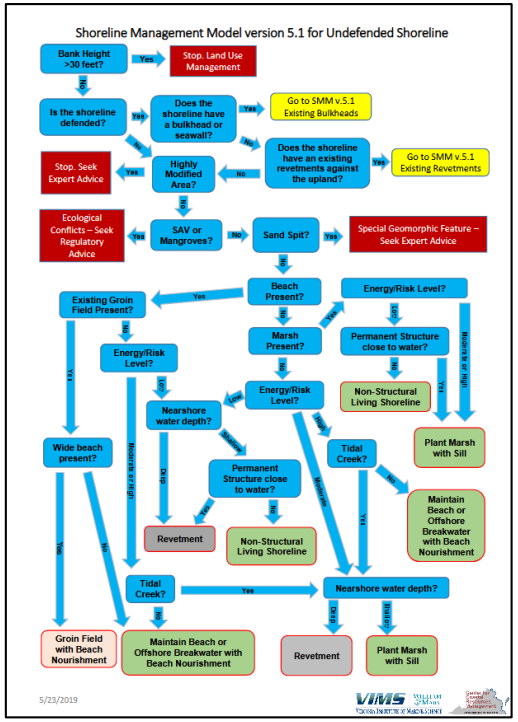
Wave exposure *fetch model captures maximum and average fetch*

Permanent structure proximity *buildings & roads*

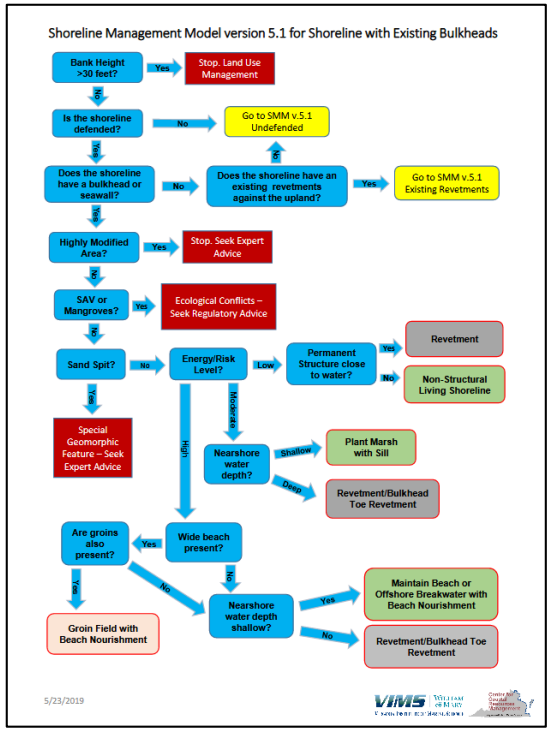
Shoreline Management Model *v. 5.1 (Virginia)*

Combines 3 submodels

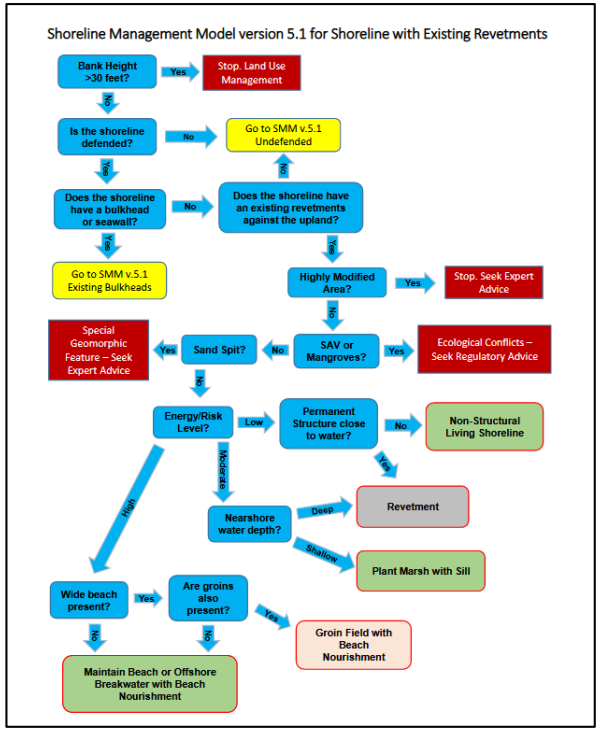
Undefended Shorelines



Existing Bulkheads



Existing Revetments



[View Online]

Model Output
Shoreline Best Management Practice Recommendations

Non- Structural Living Shoreline

Plant Marsh with Sill

Maintain Beach or Offshore Breakwater with Beach Nourishment

Revetment

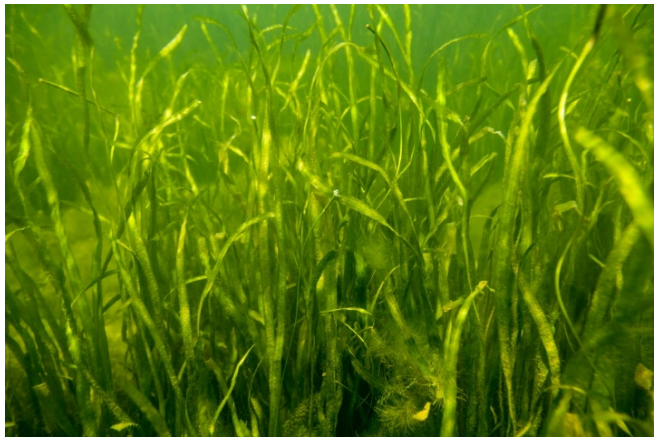
Bulkhead Toe Revetment

Groin Field with Beach Nourishment

Model Output

Special Considerations

Ecological Conflicts – SAV Presence



STOP
seek expert advice

Special Geomorphic Feature

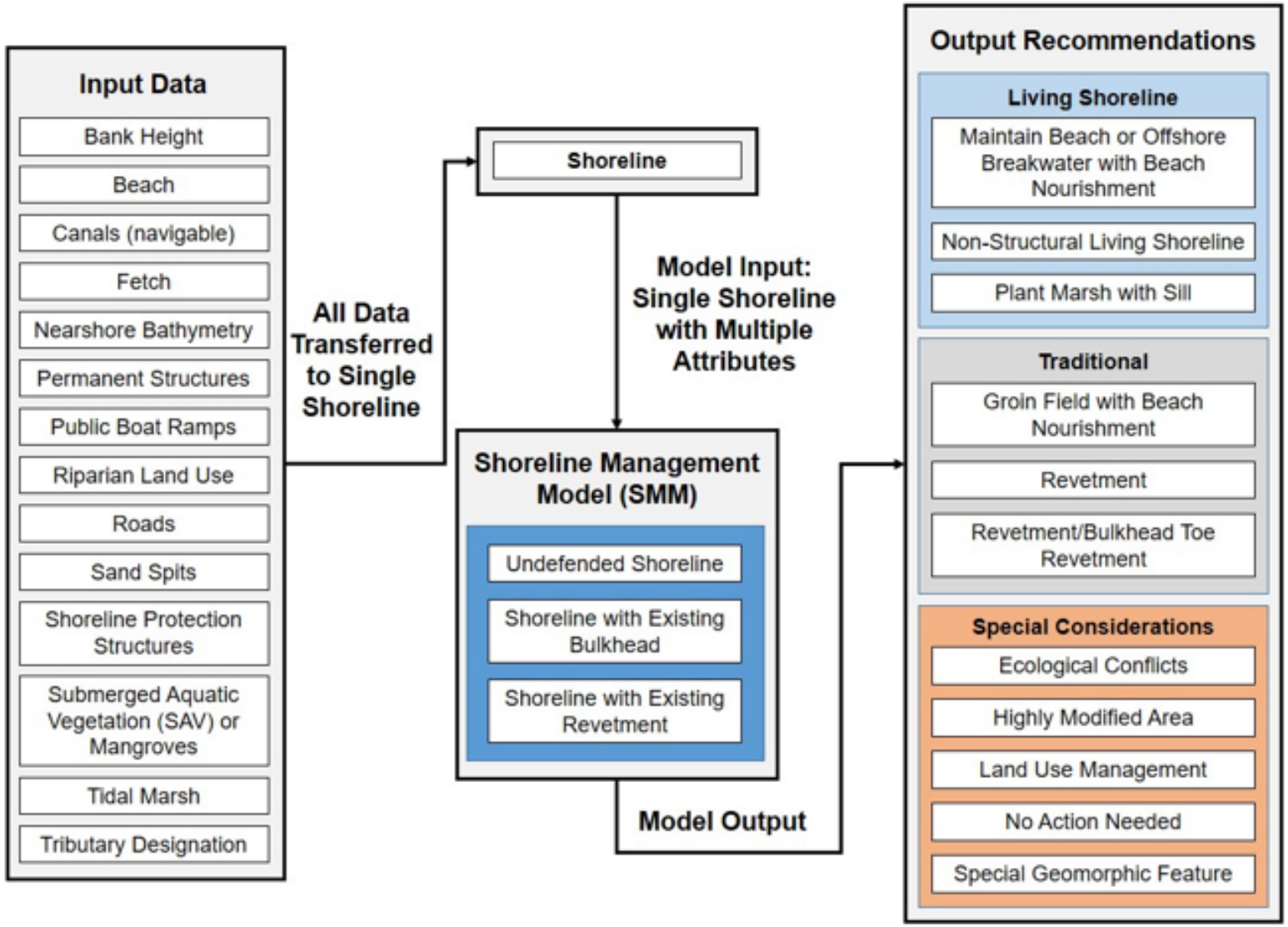
Land Use Management
Bank height > 30 ft

Highly Modified Areas

No Action Needed

Shoreline Management Model *v. 5.1*

Input & Output

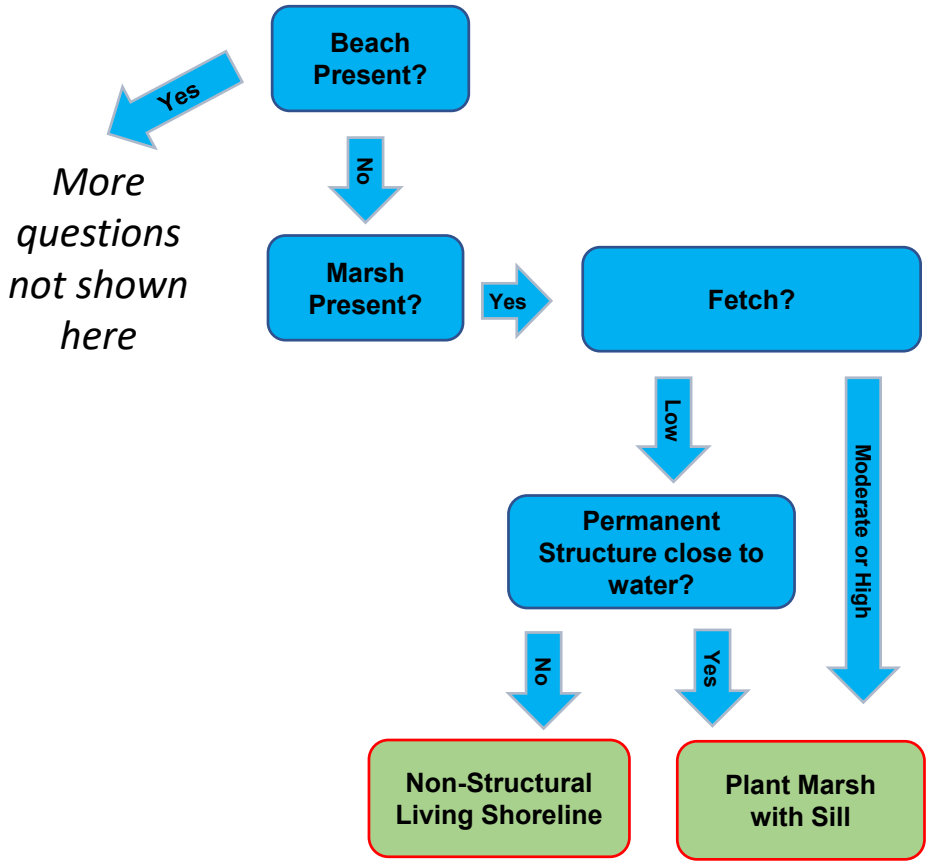


Source: Nunez et al in progress

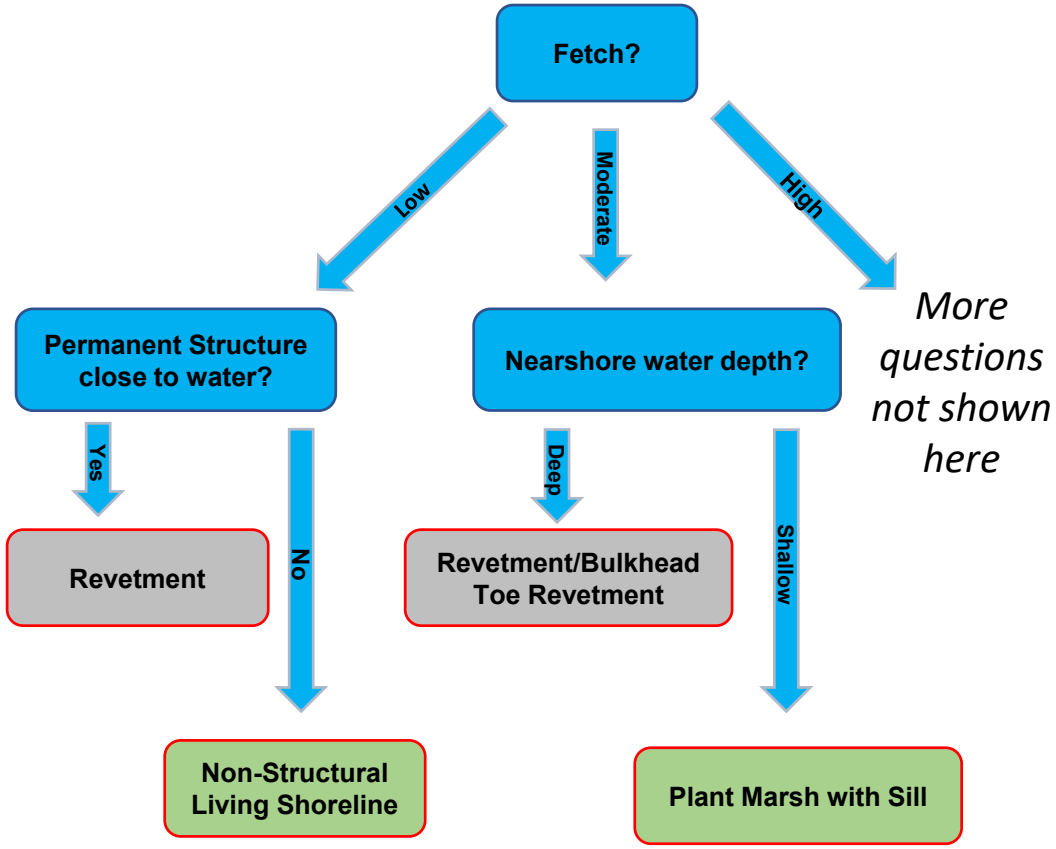
Model Output *Virginia v. 5.1*
Scenario Examples

No Special Considerations

Undefended with Existing Tidal Marsh



Existing Bulkhead



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

N

EXAMPLE OF SPATIAL OUTPUT

LINE FEATURES DISPLAY SHORELINE MANAGEMENT RECOMMENDATIONS

Model Limitations

SHORELINE MANAGEMENT SUITABILITY FACTORS NOT INCLUDED

Erosion potential

Stabilization need

Flooding potential

Sediment type & hardness

Boat wakes

Upland topography & slope

Upland vegetation conditions

Local biota

Parcel dimensions - length

Invisible infrastructure

Land use changes since 2017

Shoreline ownership

Potentially conflicting land uses

Potentially conflicting water uses

Costs

Shoreline Management Model Products

Click banners for links

Dedicated Web Site

SHORELINE BEST MANAGEMENT PRACTICES

Shoreline Management Model

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

Shoreline Management Model – SMM

Adapt VA Interactive Map

ADAPT VA

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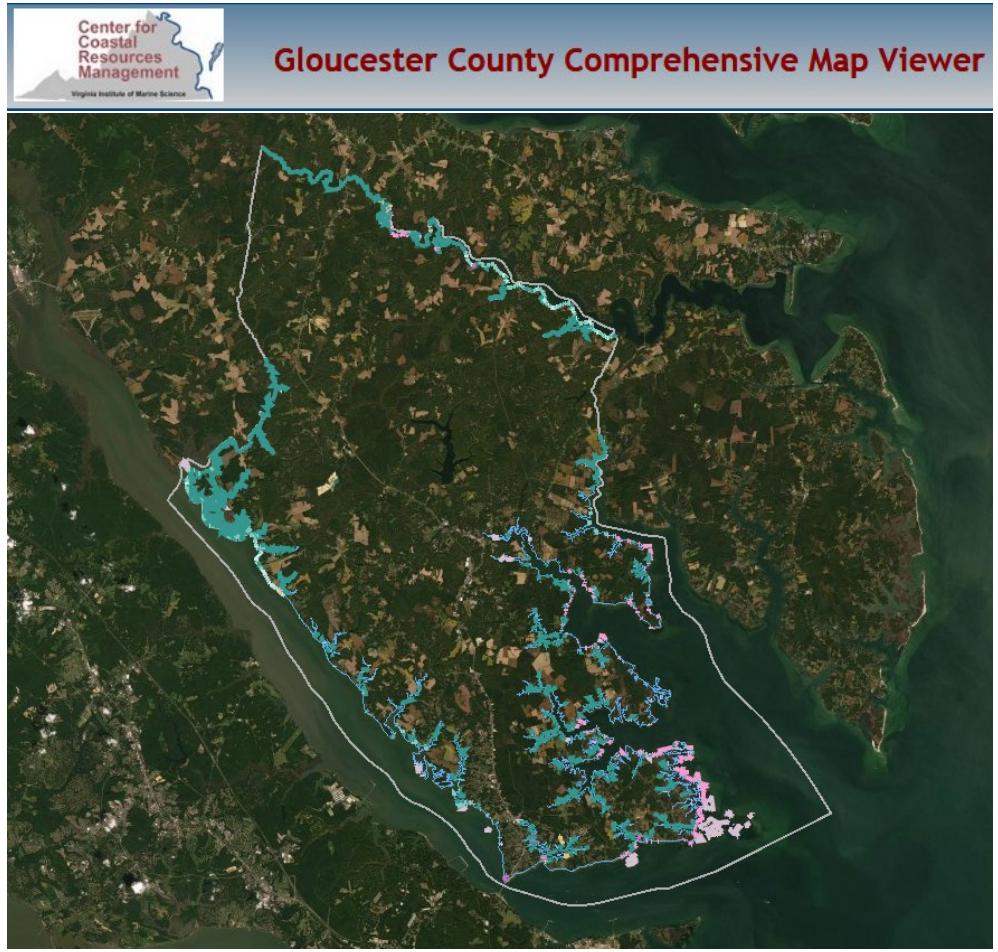
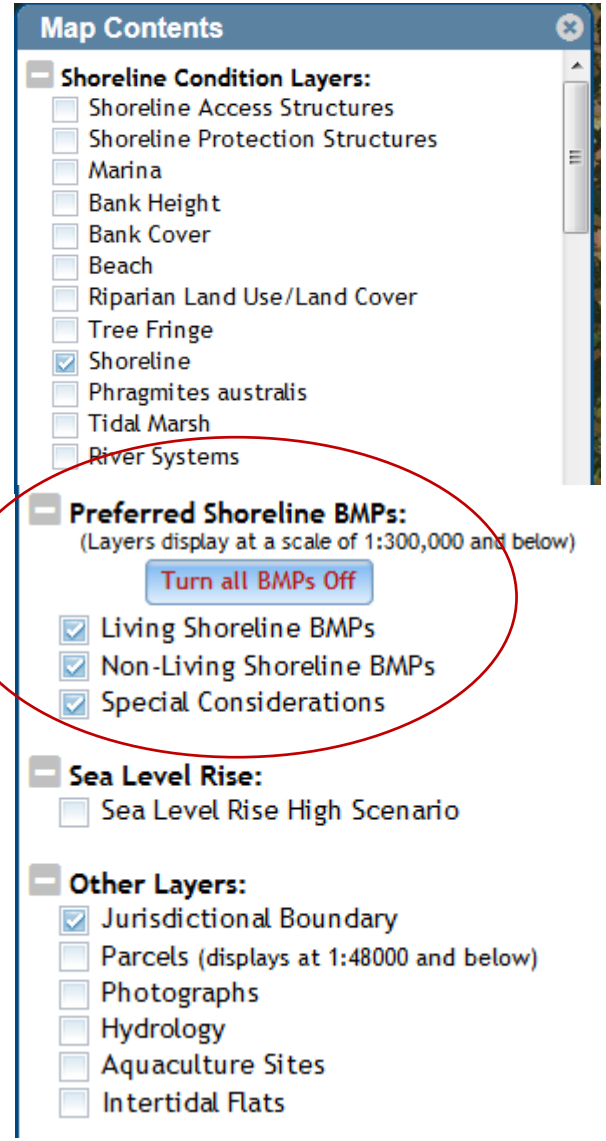
Shoreline Management Model Products

Virginia Locality Portals

Link





Shoreline Management Model Applications

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

Virginia

Maryland (in progress)

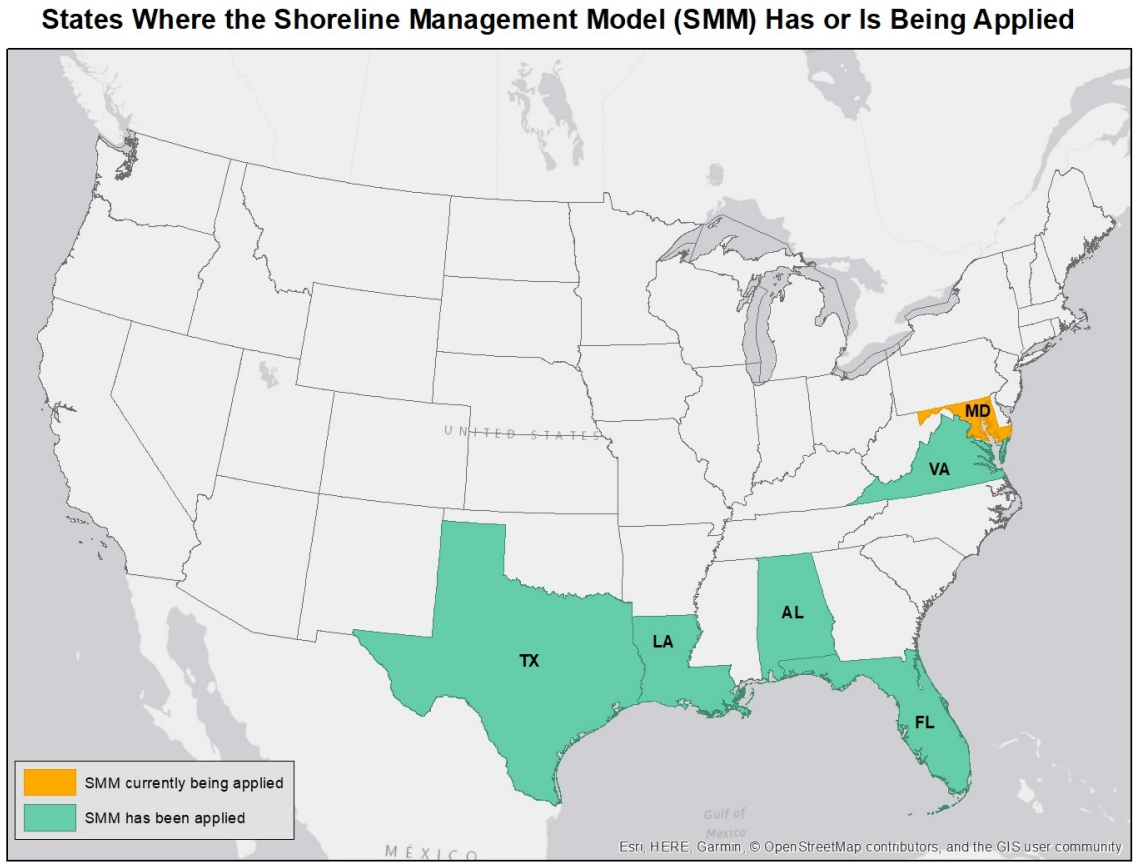
Texas

Florida – Tampa Bay

Louisiana – Lake Pontchartrain

Alabama – Mobile Bay

Alabama & Florida – Pensacola Bay



More Information

Regional Applications
Maryland Shoreline Inventory Update *in progress*

2005-2006 MD shoreline inventory completed

Updates in progress

2019	**2020-2021**	**2021-2022**
Anne Arundel	Charles	Baltimore
Calvert	Somerset	Kent
Dorchester	St. Marys	Queen Anne
Talbot	Worcester	Wicomico

GIS Data available in VIMS ScholarWorks digital archive

Customized version of Shoreline Management Model run

Regional Applications
Maryland Shoreline Stabilization Mapper *in progress*

Regulatory program application

4 submodels

Special Considerations + Undefended + Existing Bulkhead + Existing Revetment

Customized Special Considerations

Ecological Considerations
Seek Expert or Regulatory Advice
Flow Diagram continues after Seek Expert Advice

Additional Shoreline Management Recommendation

Undetermined: Complete a Waiver Request Form

Customized map viewer *coming soon*

Shoreline Management Model Manual for GIS professionals

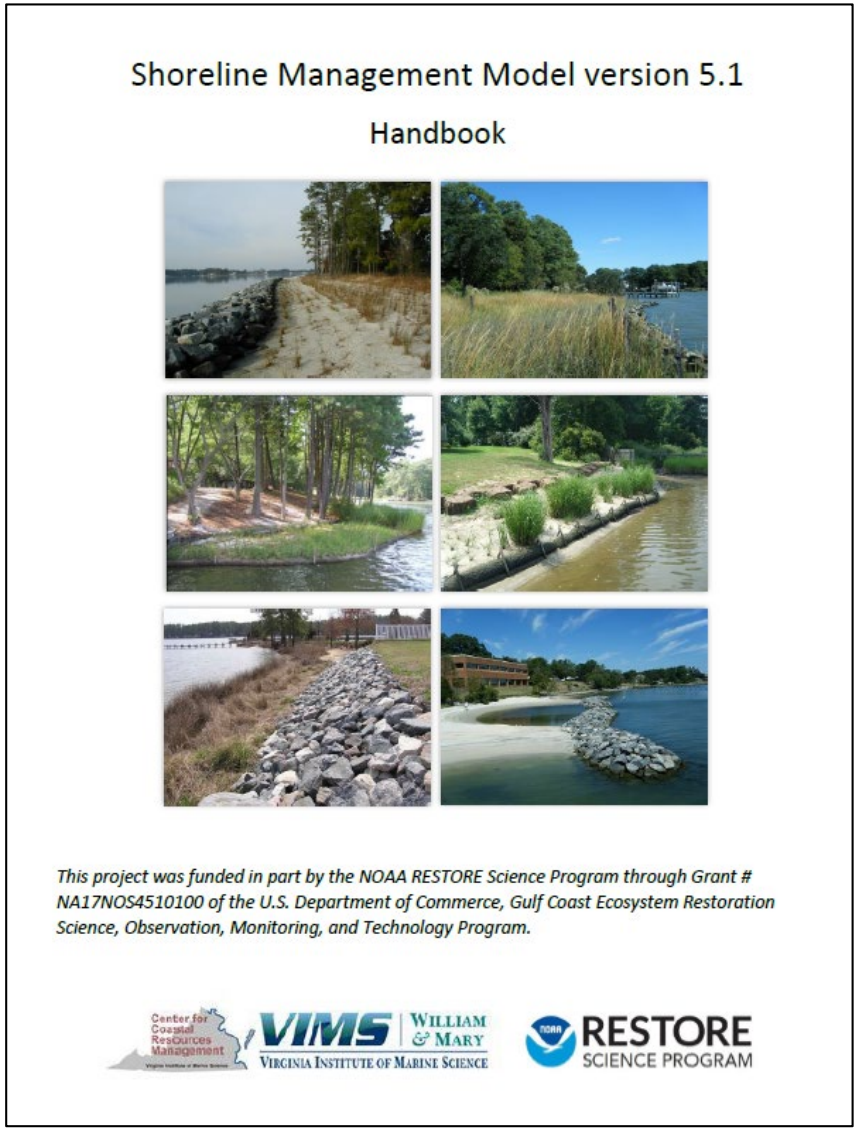
2020

Handbook

Definitions

GIS Toolbox

[Zip file link]



Rudnicky, Tamia and Berman, Marcia. 2020. Shoreline Management Model version 5.1 Handbook, Center for Coastal Resources Management, Virginia Institute of Marine Science, William & Mary, Gloucester Point, VA, pp54.

This project was funded in part by the NOAA RESTORE Science Program through Grant # NA17NOS4510100 of the U.S. Department of Commerce, Gulf Coast Ecosystem Restoration Science, Observation, Monitoring, and Technology Program.

Shoreline Decision Support Tool

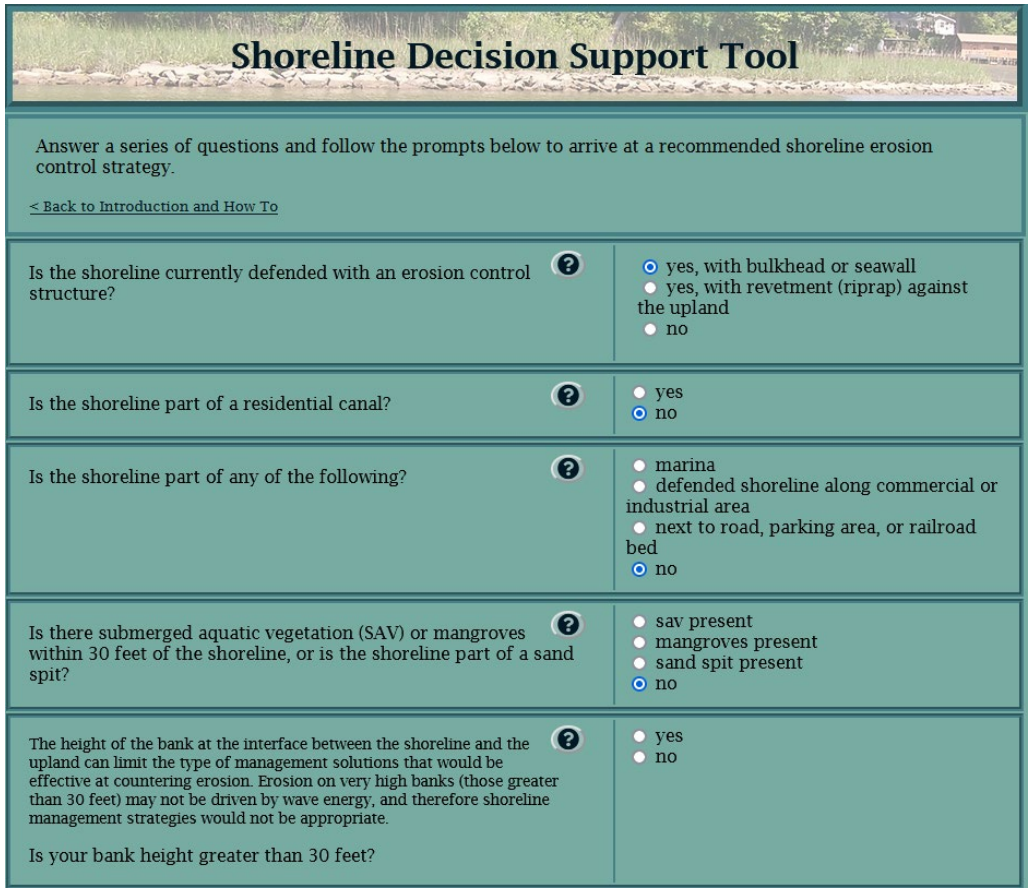
Trusted scientific foundation

On-site observations + model logic

Higher accuracy than model alone

Re-sizes for different screens

Tool Link



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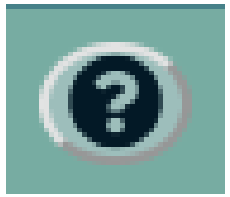
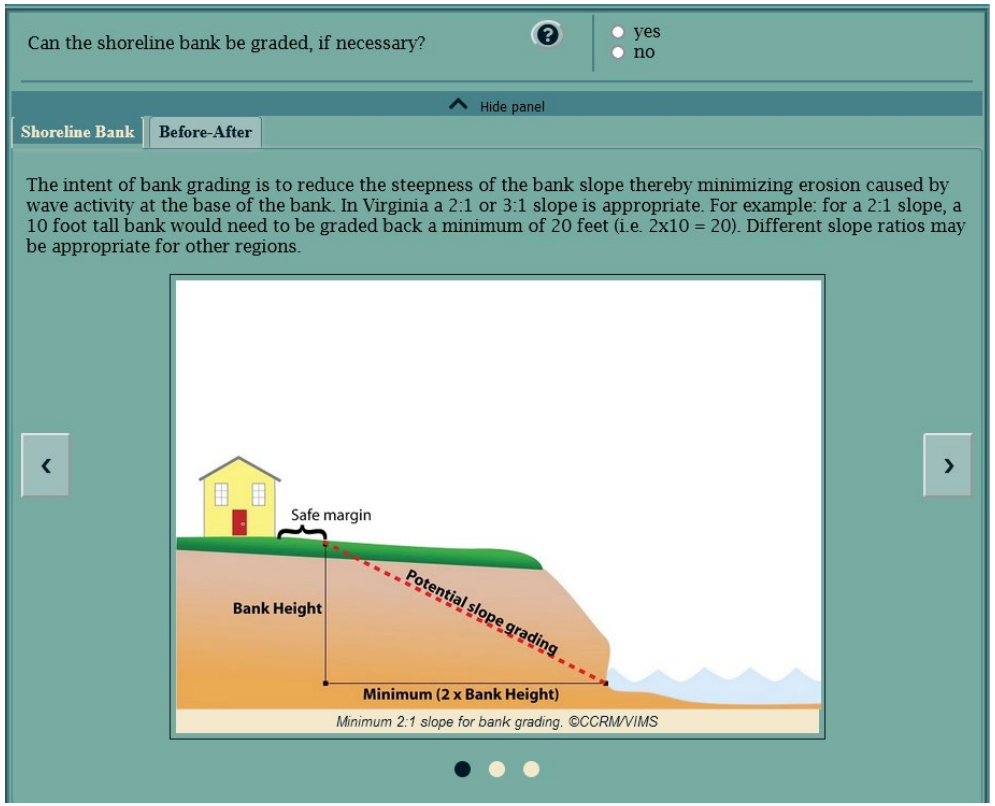
NOAA RESTORE SCIENCE PROGRAM

Troy University

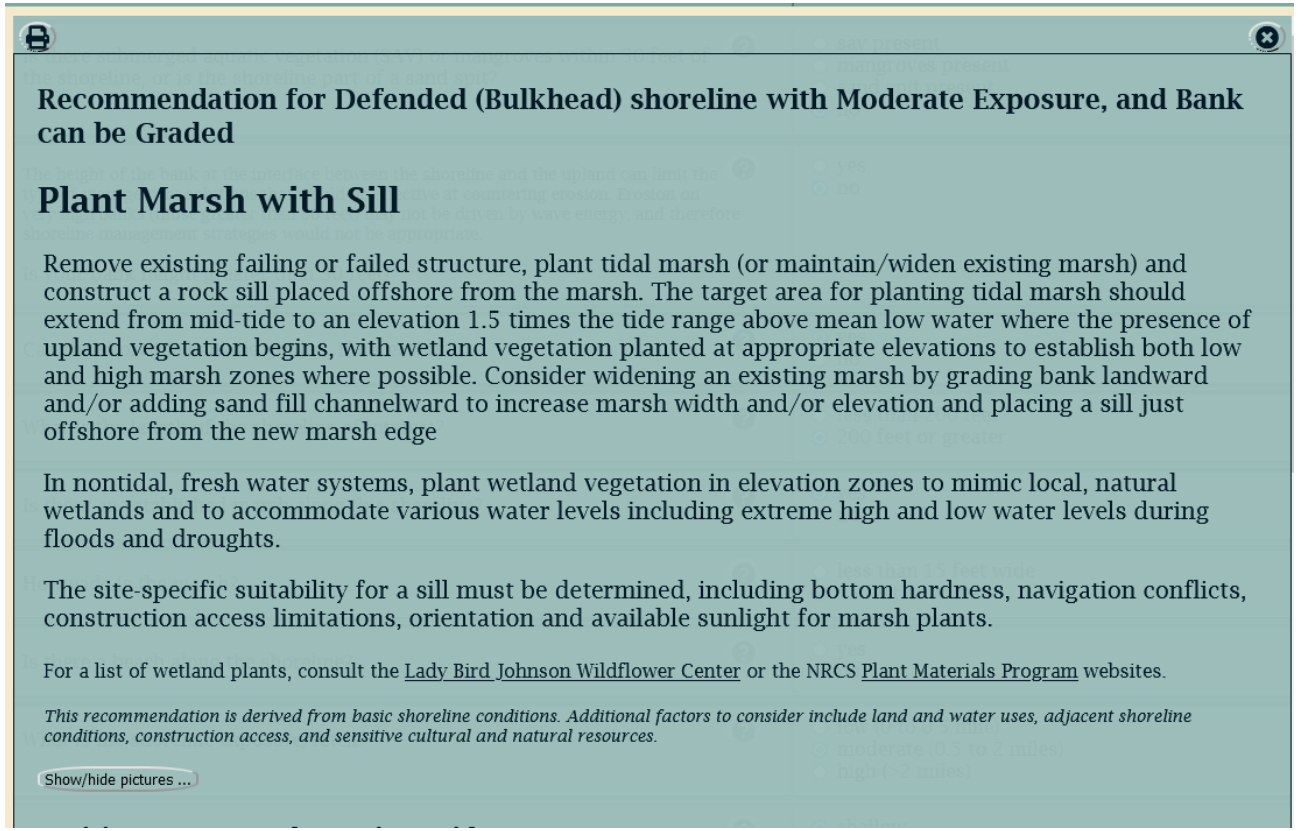
Shoreline Decision Support Tool



Interactive Help Information



Shoreline Management Recommendations



Embedded resource links

Questions & Comments about Shoreline Management Model

Contact Information

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