

Shoreline Decision Support Tools

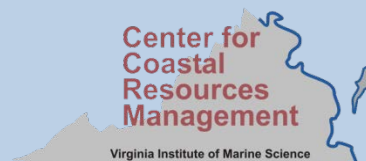
Shoreline Management Model Shoreline Decision Support Tool

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Gloucester Point, Virginia, USA



Decision Support Tools

- Decision Trees
- Shoreline Management Model (SMM)
- Shoreline Decision Support Tool (DST)

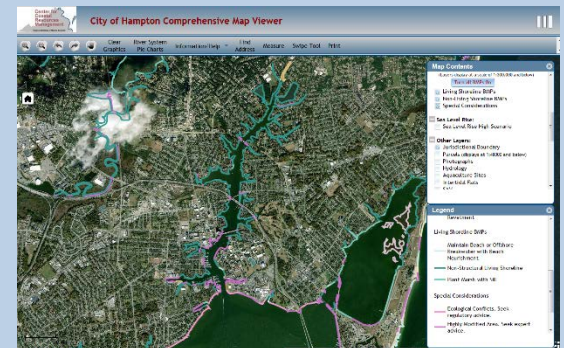
Decision Support Tools

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1. Shoreline Management Model

(aka Living Shoreline Suitability Model)

- Delineates shoreline BMPs with a preference for nature-based solutions for erosion control
- Developed to provide guidance for implementation of VA living shoreline policy adopted in 2011
- Geospatial model runs in ArcGIS and uses available GIS datasets
- Current version is 5.1



Model Development

- Requires a robust **geo-spatial database** that characterizes conditions on the coastal landscape
- Follows **decision tree** logic model(s) developed for improving on-site assessments for regulatory permit review of tidal shoreline
- Considers both defended and undefended shorelines



Photo by Karen Duhring

Living Shoreline Suitability Model (v5.1)

Shoreline Management Model version 5.1 for Undefended Shoreline



Classification (v.5.1)

- **Living Shoreline BMPs**
 - non-structural living shoreline
 - plant marsh with sill
 - maintain beach or offshore breakwater with nourishment
- **Non-Living Shoreline BMPs**
 - groin field with beach nourishment
 - revetment
 - revetment/bulkhead toe revetment
- **Special Considerations**
 - ecological conflicts (SAV, mangroves)
 - land use management (highly modified area)
 - geomorphic settings (spits, natural tombolos)
 - no action needed (marsh islands)

Product Delivery to the end user



The screenshot displays the website for the Center for Coastal Resources Management. The header features a photograph of a building with a red ramp and the text "Center for Coastal Resources Management". The main content area is titled "Comprehensive Coastal Resource Management Portals (CCRMPs)" and includes a breadcrumb trail: "Home > CCRM > Comprehensive Coastal Resource Management Portals". The page provides information on implementing Virginia's tidal shoreline laws and policies, and lists several key sections: "Locality Specific Portals", "Shoreline Best Management Practices", and "Wetlands Management". A sidebar on the left contains a navigation menu with categories like "About CCRM", "Outreach & Education", and "Research". A "RELATED LINKS" box on the right lists external resources such as "VIMS Living Shorelines" and "NOAA Living Shorelines".

Center for Coastal Resources Management

Home > CCRM > Comprehensive Coastal Resource Management Portals

Comprehensive Coastal Resource Management Portals (CCRMPs)

Information to help implement Virginia's tidal shoreline laws and policies including general guidance for the entire coastal area and locality specific information.

Locality Specific Portals

Gateways for each coastal locality to shoreline data, guidance, and tools

Shoreline Best Management Practices

Guidance for choosing the environmentally friendly practices based on surrounding shoreline conditions

CCRM

About CCRM

Comprehensive Coastal Resource Management Portals

- Locality Portals
- Shoreline Best Management Practices
- Comprehensive Plan Guidance
- Tidal Shoreline Laws & Policies
- CCRMP FAQ's
- CCRMP Progress Map

Outreach & Education

Research

Wetlands Management

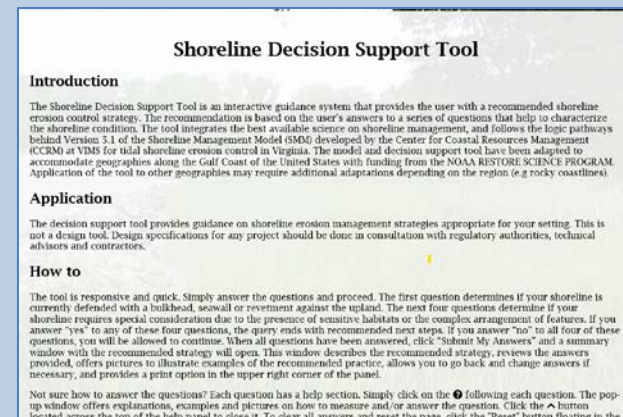
RELATED LINKS

- VIMS Living Shorelines
- Shoreline & Tidal Marsh Inventory
- Virginia Coastal Policy Center
- Adapt Virginia
- NOAA Living Shorelines

<http://ccrm.vims.edu/ccrmp/index.html>

2. Shoreline Decision Support Tool

- An on-the-fly decision making application that interacts directly with the user for data input
- Allows for more current and finer scale resolution of information
- Tool has the capacity to yield outputs that are more accurate than the model



DST Technical Development

- **SMM (v5.1)**: generates decision support pathways yielding a shoreline BMP action based on shoreline characteristics
- **Javascript**: creates the functionality on the webpage; interprets the user's response; and chooses the correct recommendation based on the model pathway
- **HTML**: basic building structure of the website
- **CSS**: design characteristics of the web pages

Goals of the Decision Support Tool

- Flexible and ADA Compliant
- Query-based
- Help support
- On-the-fly
- Broad stakeholder audience

The screenshot shows the user interface of the Shoreline Management Model Decision Support Tool. At the top, there is a title bar with the text "Shoreline Management Model Decision Support Tool". Below this is an "Introduction" section with a "PLEASE NOTE" message and a "Read More" button. The main content area contains two questions with radio button options and a "Continue" button. The first question is "Is the shoreline currently defended with an erosion control structure?" with options "yes, with bulkhead or seawall", "yes, with revetment against the upland", and "no". The second question is "Is the shoreline part of a residential canal?" with options "yes" and "no". At the bottom, there is a "Reset" button and the text "Center for Coastal Resources Management (CCRM)".

Shoreline Management Model
Decision Support Tool

Introduction

PLEASE NOTE: THIS IS A WORK IN PROGRESS! The Shoreline Management Model Decision Support Tool is based on the Center for Coastal Resources Management (CCRM) Shoreline Management Model (SMM) version 5. This tool will provide the user with a recommendation for shoreline erosion control based upon the answ... [Read More](#)

Is the shoreline currently defended with an erosion control structure? [?](#)

- yes, with bulkhead or seawall
- yes, with revetment against the upland
- no

Is the shoreline part of a residential canal? [?](#)

- yes
- no

[Continue](#)

[Reset](#) Center for Coastal Resources Management (CCRM)


<http://cmap2.vims.edu/LivingShoreline/DecisionSupportTool/index.html>

Responsive and Flexible


Shoreline Management Model Decision Support Tool

Introduction

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Is the shoreline currently defended with an erosion control structure? 

- yes, with bulkhead or seawall
- yes, with revetment against the upland
- no

Is the shoreline part of a residential canal? 

- yes
- no

[Continue](#)

Center for Coastal Resources Management (CCRM)


[Reset](#)

Desktop


Shoreline Management Model Decision Support Tool

Introduction

PLEASE NOTE: THIS IS A WORK IN PROGRESS! The Shoreline Management Model Decision Support Tool is based on the Center for Coastal Resources Management (CCRM) Shoreline Management Model (SMM) version 5. This tool will provide the user with a recommendation for shoreline erosion control based upon the answ... [Read More](#)

Is the shoreline currently defended with an erosion control structure? 

- yes, with bulkhead or seawall
- yes, with revetment against the upland
- no

Is the shoreline part of a residential canal? 

- yes
- no

[Continue](#)

Center for Coastal Resources Management (CCRM)

[Reset](#)

Mobile Phone

Query-Based

Shoreline Management Model Decision Support Tool

Introduction

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Is the shoreline currently defended with an erosion control structure?



- yes, with bulkhead or seawall
- yes, with revetment against the upland
- no

Is the shoreline part of a residential canal?



- yes
- no

Is the shoreline part of any of the following?



- marina
- defended shoreline along commercial or industrial area
- adjacent to road, parking area, or railroad bed
- no

Is there submerged aquatic vegetation (SAV) or mangroves within 30 feet of the shoreline, or is the shoreline part of a sand spit?



- sav present
- mangroves present
- sand spit present
- no

Is bank height greater than 30 feet?



- yes
- no

Can the shoreline bank be graded, if necessary?



- yes
- no

What is the length of the shoreline of interest?



- less than 200 feet
- 200 feet or greater

Is there an established marsh along this shoreline?



- yes
- no

Is there a beach along the shoreline?



- yes
- no

Reset

Is the shoreline part of any of the following?



- marina
- defended shoreline along commercial or industrial area
- adjacent to road, parking area, or railroad bed
- no

[Continue](#)

Is there submerged aquatic vegetation (SAV) or mangroves within 30 feet of the shoreline, or is the shoreline part of a sand spit?



- sav present
- mangroves present
- sand spit present
- no

[Continue](#)

Is bank height greater than 30 feet?



- yes
- no

[Continue](#)

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- yes
- no

What is the length of the shoreline of interest?



- less than 200 feet
- 200 feet or greater

Is there an established marsh along this shoreline?



- yes
- no

Is there a beach along the shoreline?



- yes
- no

What is the shoreline exposure/fetch?



- low (0 to 0.5 mile)
- moderate (0.5 to 2 miles)
- high (>2 miles)

What is the nearshore water depth?



- shallow
- deep

[Reset](#)

[Submit My Answers](#)

Interactive Help

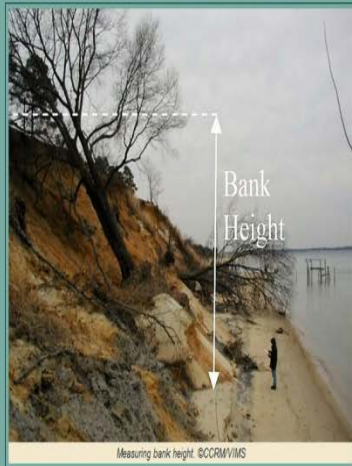
Is the shoreline part of a residential canal? yes no

Is the shoreline part of any of the following? marina defended shoreline adjacent to road, pa no

Is there submerged aquatic vegetation (SAV) or mangroves within 30 feet of the shoreline, or is the shoreline part of a sand spit? sav present mangroves present sand spit present no

Is bank height greater than 30 feet? yes no

Bank height is measured vertically from the foot of the bank to the top of the bank.



Is there a beach along the shoreline? yes no

What is the shoreline exposure/fetch? low (0 to 0.5 mile) moderate (0.5 to 2 miles) high (>2 miles)

Fetch is the distance across open water over which wind blows and waves are generated. (VIMS-CCRM Coastal Management Decision Tools. Center for Coastal Resources Management website, http://ccrm.vims.edu/decisiontree/decisiontree_manual.pdf, April 2010) Look for the longest fetch to answer this question.



What is the nearshore water depth? shallow deep

Submit My Answers

Reset

Center for Coastal Resources Management (CCRM)

On the Fly Recommendations

Recommendation for undefended shoreline with no beach or marsh, and high exposure

Maintain Beach or Offshore Breakwaters with Beach Nourishment

Add beach nourishment sand, consider offshore breakwaters or another type of wave attenuation device with beach nourishment; consider adding plantings to the nourished areas.

Show/hide pictures ...

Decision Support Tool Questions with Your Answers

Questions	Your Answers
Shoreline Defended?	no
Residential Canal?	no
Highly Modified Area?	no
SAV, Mangrove, Sand Spit?	no
Bank Height greater than 30 feet?	no
Can Bank be Graded?	no
Shoreline Length?	200 feet or more of shoreline
Marsh?	no
Beach?	no
Fetch?	high (>2 miles)
Nearshore Water Depth?	shallow

For more information consult with these [agencies](#) or other agencies within your state.

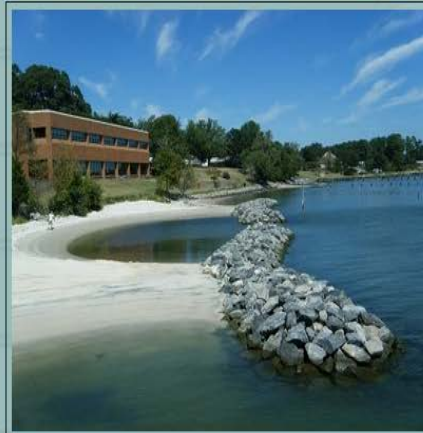


Recommendation for undefended shoreline with no beach or marsh, and high exposure

Maintain Beach or Offshore Breakwaters with Beach Nourishment

Add beach nourishment sand, consider offshore breakwaters or another type of wave attenuation device with beach nourishment; consider adding plantings to the nourished areas.

Show/hide pictures ...



Offshore breakwater and beach ©CCRM/IMS

Decision Support Tool Questions with Your Answers

On the Fly Recommendations

Recommendation for undefended shoreline with a narrow marsh and moderate or high exposure

Plant Marsh with Sill

Plant tidal marsh (or maintain/widen existing marsh) and construct a rock sill placed offshore from the marsh. The site-specific suitability for a sill must be determined, including bottom hardness, navigation conflicts, construction access limitations, orientation and available sunlight for marsh plants. Consider widening marsh by grading bank landward to accommodate sea level rise and/or providing sand fill channelward to increase marsh width and/or elevation and placing sill just offshore new marsh edge.

Can bank be graded, if necessary?

Decision Support Tool Questions with Your Answers

Questions	Your Answers
Is there an established marsh along this shore?	no
Shoreline Defended?	no
Residential Canal?	no
Highly Modified Area?	no
How wide is the marsh?	15 feet or wider
SAV, Mangrove, Sand Spit?	no
Bank Height greater than 30 feet?	no
Is there a beach along the shoreline?	no
Can Bank be Graded?	no
Shoreline Length?	less than 200 feet of shoreline
Marsh?	yes
What is the shoreline exposure, fetch?	less than 15 feet wide
Marsh Width?	less than 15 feet wide
Beach?	no
Fetch?	moderate (0.5 to 2 miles)
What is the nearshore water depth?	shallow
Nearshore Water Depth?	shallow

Recommendation for undefended shoreline with a narrow marsh and moderate or high exposure

Plant Marsh with Sill

Plant tidal marsh (or maintain/widen existing marsh) and construct a rock sill placed offshore from the marsh. The site-specific suitability for a sill must be determined, including bottom hardness, navigation conflicts, construction access limitations, orientation and available sunlight for marsh plants. Consider widening marsh by grading bank landward to accommodate sea level rise and/or providing sand fill channelward to increase marsh width and/or elevation and placing sill just offshore new marsh edge.

Show/hide pictures ... should be graded, if necessary?

What is the length of the shoreline of interest?

Is there an established marsh along this shoreline?

How wide is the marsh?

Is there a beach along the shoreline?

What is the shoreline exposure/touch?

What is the nearshore water depth?



Planting a marsh behind a rock sill ©CCRM/VIMS

- salt present
 - mangroves present
 - sand spit present
 - no
- Continue

- yes
- no

- less than 200 feet
- 200 feet or greater

- yes
- no

- less than 15 feet wide
- 15 feet or wider

- yes
- no

- low (0 to 0.5 miles)
- moderate (0.5 to 2 miles)
- high (>2 miles)

- shallow

Shoreline Management Model Shoreline Decision Support Tool Contact Information

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