

Shoreline Erosion Advisory Service

A Resource for Shoreline
Landowners and Communities

Mike Vanlandingham
Shoreline Engineer

SEAS

- Created by Virginia's General Assembly in 1980.
- Provides technical assistance to private landowners, state and federal agencies, localities experiencing shoreline erosion in tidal Virginia.

SEAS

- Site investigations
- Written reports
- Plan reviews
- Construction inspections
- Information

SEAS

- All SEAS services are **FREE!**

SEAS

- Service area is from Fairfax County south to North Carolina line and from fall line to ocean side of the Eastern Shore.
- Chesapeake Bay has over 5,000 miles of tidal shoreline.

Erosion rates

- Generally, lower sections of rivers and the bay experience the highest rates of erosion.

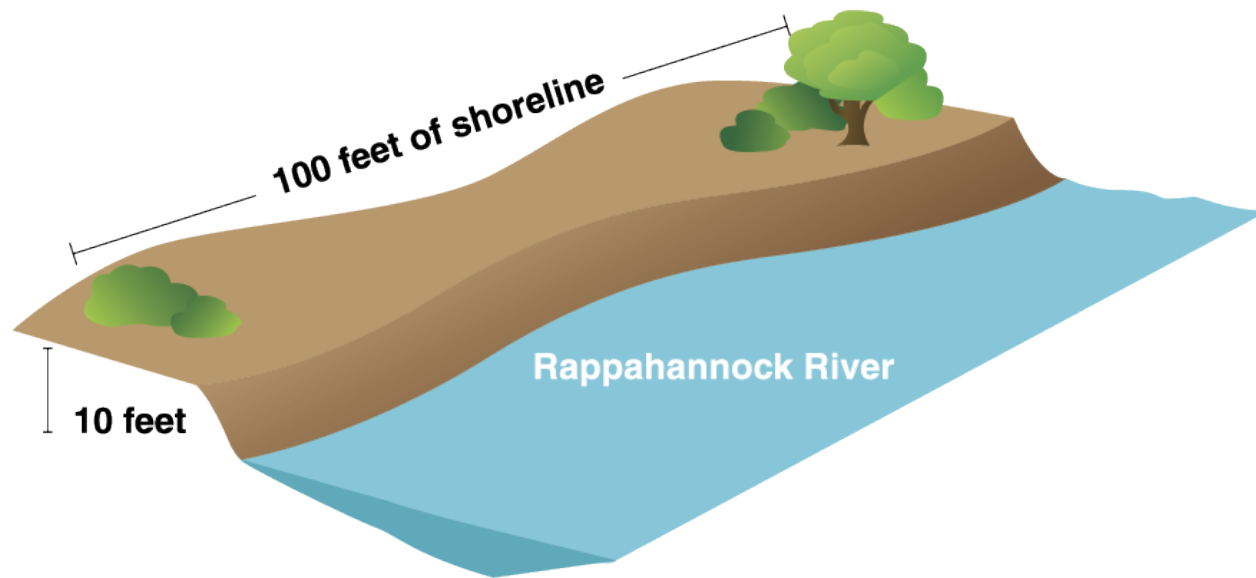
Erosion rates

- Some Virginia shorelines have a historic erosion rate of -30 feet per year.
- Some areas are accreting +10 feet per year.

Erosion rates

- A historical net loss of approximately 70 acres per year.
- Three-dimensional loss of 2.7 million cubic yards per year.

Example



Annual erosion rate = 1 foot

**46.8 tons of sediment
34 pounds of nitrogen
22.5 pounds of phosphorus**

Waves

- Storm waves - main cause of Shoreline erosion.
- Larger the potential wave the greater the erosion risk.

Fetch

- Also called the **fetch length**, this is the length of water over which a given wind has blown.
- The longer the fetch and the faster the wind speed, the more wind energy is imparted to the water surface and the larger the resulting waves will be.

Wave energy environments

- High energy
 - A fetch greater than 5 miles
 - Typical of the Chesapeake Bay and the mouths of major rivers

Wave energy environments

- Medium energy
 - A fetch between 1 and 5 miles
 - Typical of rivers

Wave energy environments

- Low energy
 - Fetch is less than 1 mile
 - Typical of creeks

Shoreline Erosion



Shoreline Erosion



Shoreline Erosion



Shoreline Erosion



Shoreline Erosion - Westmoreland State Park



Shoreline Erosion



Shoreline Erosion



Shoreline Erosion



Development



Development



Quick fixes

- People are willing to try anything to stop shoreline erosion.

Quick fixes



Quick fixes



Quick fixes



Quick fixes



Quick fixes



Quick fixes



Quick fixes



Main strategies

- Three main strategies to fix shoreline erosion in Virginia:
 - Soft
 - Hard
 - Combination

Main strategies

- Soft approach (living shoreline)
 - Vegetative
 - Pruning
 - Bank grading
 - Beach nourishment
 - Marsh sill

Main strategies

- Soft approach –Living Shoreline



Main strategies - Living Shoreline



Main strategies— Living Shoreline



Main strategies

- Hard approach
 - Bulkheads
 - Riprap revetments

Main strategies

- Hard approach

Bulkheads – Two main components

- Retaining wall – Typically constructed of treated wood.
- Anchor system – Typically consisting of a wooden piling and tieback rod.

Main strategies

- Hard approach

Bulkheads – Typical construction notes:

- Depth of bulkhead below bottom should be equal to height of wall above bottom.
- Pilings every 8' along wall.
- Anchor pilings for each wall piling.
- Wall pilings at least 3 feet longer than sheet pile.

Main strategies

- Bulkhead with terraced bank



Main strategies

- Bulkhead improper construction



Main strategies

- Bulkhead improper construction



Main strategies

- Is this a properly designed and constructed revetment?



Main strategies

- Failure of structure after modest storm event



Main strategies

- Hard approach

Riprap revetments – Rock structure that protects the shoreline from erosion.

Critical factors:

- Armor stone
- Toe or apron
- Filter cloth
- Slope

Main strategies

- Components of a properly constructed revetment



Main strategies

- Properly designed and constructed revetment



Main strategies

- Combination approach

- Living shorelines

- Groins
 - Breakwaters – sills

Both employ the use of structures that help protect the shoreline from storm waves. They also build wider and higher beaches that provide protection and create areas for the establishment of fringe marsh.

Main strategies



VIMS photo

Main strategies



Main strategies



Main strategies

- Groins
 - Installed perpendicular to the shoreline.
 - Constructed of wood or rock.
 - Traps sand moving along the shoreline. Creates new beaches and enlarges existing beaches.
 - Can have negative impact to adjacent properties. May cause accelerated erosion to shoreline immediately downdrift of project.

Main strategies

Groin field creates sand beach. Protects bank.



Main strategies

- Breakwaters
 - Rock structures constructed parallel to the shore.
 - Multiple breakwaters are built offshore with gaps between each unit.
 - The gaps between the breakwater create pocket or crescent-shaped beaches.

Main strategies

- Breakwaters with crescent-shaped beach



Main strategies

- Breakwaters with beach



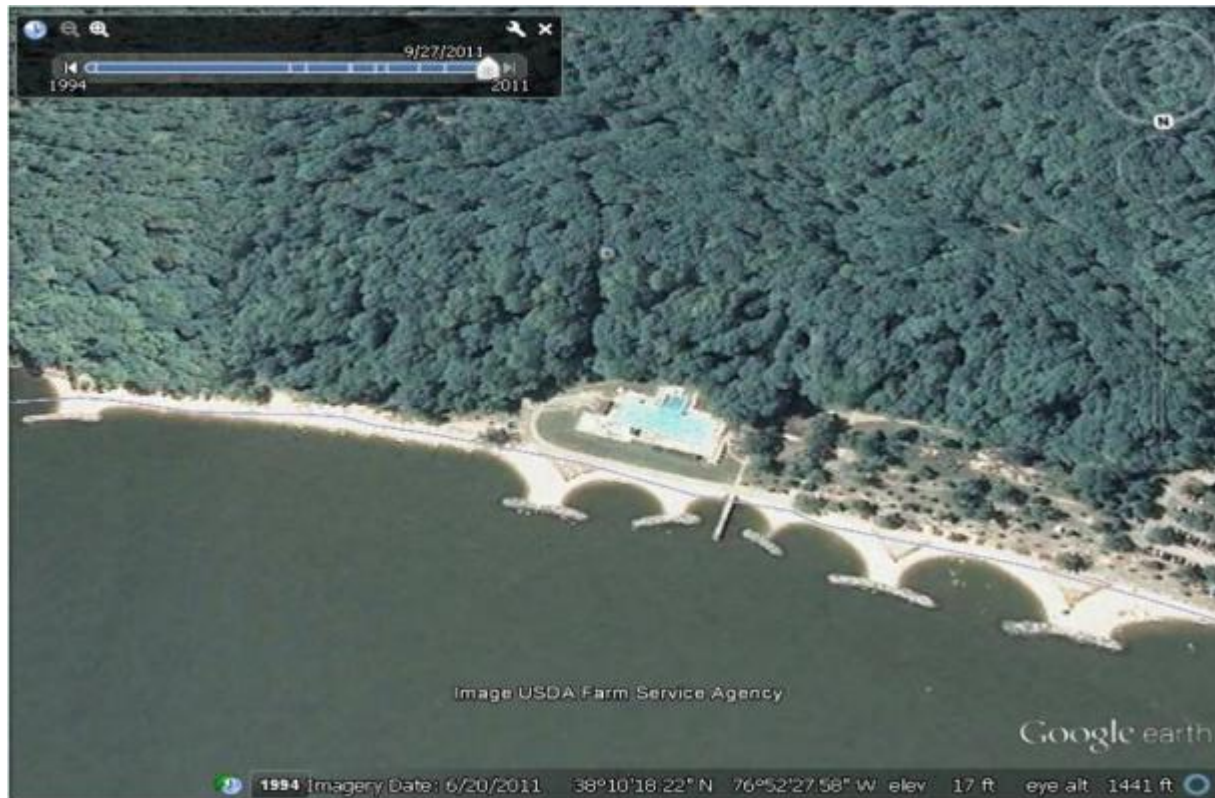
Main strategies

- Aerial view of breakwaters



Main strategies

- Westmoreland State Park breakwaters



Summary

- Site investigations
- Written reports
- Plan reviews
- Construction inspections
- Information
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Contact SEAS

Mike Vanlandingham, Shoreline Engineer

Virginia Department of Conservation and Recreation

772 Richmond Beach Road

P.O. Box 1425

Tappahannock, VA 22560

804-443-1494

804-466-2229 (cell)

mike.vanlandingham@dcr.virginia.gov

www.dcr.virginia.gov

SEAS webpage: <http://www.dcr.virginia.gov/soil-and-water/seas>

Questions?

