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A Guide to Shoreline Management Planning For Virginia's Coastal Localities

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A Guide to Shoreline Management Planning For Virginia's Coastal Localities



Introduction

People who live along Virginia's shore enjoy a natural connection to the water. When erosion threatens their property, stabilizing the shoreline using methods that enhance that land-water connection is good for both the landowner and coastal waters. Landowners often look for guidance on appropriate management strategies; localities can provide a service to their citizens by having the necessary information on hand. Since actions taken by waterfront property owners to stabilize the shoreline can affect the health of the Bay as well as adjacent properties for decades, local decision-makers should have a say in how the shorelines are managed. The investment of effort and resources in producing a Shoreline Management Plan will yield substantial benefits in facilitating decision-making on a variety of potential issues.

Erosion control throughout Virginia's coastal regions has been characterized by inconsistent and isolated actions taken on a parcel-by-parcel basis primarily through interactions between waterfront property owners and agents, consultants, or contractors, not localities or managers. In this way, Virginia's shoreline management approach is typically response-structured and primarily involves review and permitting only after the project has been proposed by the owner. Therefore, natural resource managers generally are not provided opportunities to influence or educate waterfront property owners prior to a financial commitment. This can limit the authority for decision makers to suggest alternative approaches that may be more beneficial to the property owner and the local environment.



A living shoreline provides the natural connection between the upland and the water.

With approximately 85 percent of the Chesapeake Bay shoreline privately owned, a critical need exists to inform landowners of their options for controlling shoreline erosion. Improving awareness of the choices available for shore stabilization, considering cumulative consequences, and improving shoreline management planning are key to mitigating shore erosion on sheltered coasts in an environmentally-friendly way.

What is a Shoreline Management Plan?

Shoreline Management Plans (SMP) are tools developed by the Shoreline Studies Program of the Virginia Institute of Marine Science for evaluating, planning, and implementing appropriate management strategies for specific areas such as individual counties or watersheds. In many areas of the Virginia portion of Chesapeake Bay, its tidal tributaries and other coastal systems, scientific data critical for making knowledgeable decisions is neither coordinated nor comprehensive. A SMP incorporates scientific data and analyses to assist waterfront property owners, agents, marine contractors, natural resource managers, and local land-use planners with their decision-making process. The information in the SMP can be used during the development of a project to promote the most reasonable and beneficial approach to shoreline stabilization making it proactive as opposed to the more common reactive process.

In creating a SMP, information on the present state of the shoreline is gathered since each section, or *reach*, of shoreline has different land and water elements that make it unique. This knowledge allows each of the concerned parties to understand the conditions which are essential for determining site-specific recommendations. The SMP provides effective management strategies for each reach of shoreline so that landowners and managers can evaluate available options for individual properties. The SMP also addresses issues such as flooding, storm surge, and other coastal hazards and can be a useful component in a locality's comprehensive plan.

The goal of a SMP is to provide the tools for developing an optimal, balanced approach for shore stabilization and resource management. When the continuous connections between the vegetated upland, the marshes, and the aquatic vegetation are preserved, high quality ecosystems can be maintained. This benefits the fish, crabs, and other wildlife that make waterfront living desirable. The investment of effort and resources in producing a Shoreline Management Plan will yield substantial benefits in facilitating decision-making on a variety of potential issues.

A *reach* is a segment of shore in which modification of any one section has a real potential to impact other portions of the same segment.

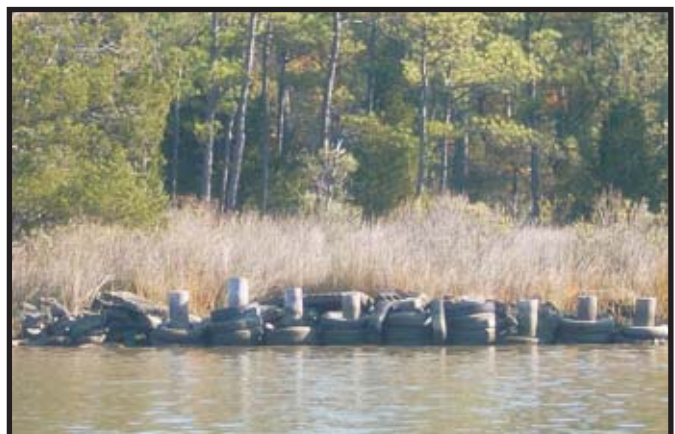
Why do Localities need a SMP?

All localities with tidal shoreline on Virginia's ocean, bays, rivers, and creeks would benefit from having a SMP. When a plan is supported by the locality, publicly presented, available in both printed and digital format, and used in zoning, planning, and permitting, it will provide a means for regulators and landowners to make informed shoreline management decisions. Localities that adopt a SMP can make their landowners aware of the options and incorporate it into the permitting process. When a shore-erosion problem needs to be addressed, the locality will be in a position to recommend a specific approach that will work for that particular site. Planners can use the SMP to assess the cumulative impacts of shore protection.

In this way, a SMP is a service for the people in the county. Waterfront landowners directly benefit, but everyone in the county wins when water quality is enhanced and health of coastal waters are improved with correctly designed and constructed systems that include habitat



A bulkhead provides shore protection for houses, but it does not provide the land-water connection that is healthy for the Bay.



In the absence of guidance, homeowners may use a variety of techniques that are both visually unappealing and often unsuccessful at long-term erosion control.

considerations. The Chesapeake Bay Preservation Act¹ (Bay Act) indicates that healthy state and local economies and a healthy Chesapeake Bay are integrally related; balanced economic development and water quality protection are not mutually exclusive. However, coastal development affects the amount of storm-water run-off and *nonpoint source pollution* released into local waters. These pollutants have harmful effects on recreation, fisheries, and wildlife. A vegetated buffer zone between development and the shore creates opportunities for the pollution to be absorbed rather than put directly into coastal waters. Promoting the land-water natural connection emphasized in a SMP may increase the health of Chesapeake Bay and other coastal waters.



A SMP also can serve as an effective element of a locality's comprehensive plan. Through the Bay Act, the Chesapeake Bay Local Assistance Program (CBLA) requires localities to address shoreline erosion issues in their comprehensive plans. The Bay Act established a cooperative relationship between the Commonwealth and local governments aimed at reducing and preventing *nonpoint source pollution*. The Bay Act, like many other environmental protection programs, supports the Commonwealth's public trust responsibilities by holding and managing the beds of Virginia's streams, rivers, and estuaries, and the waters above them for the benefit of all Virginians.

The Chesapeake Bay Preservation Act requires Tidewater local governments to review local land development ordinances, and if necessary, revise them in order to ensure they adequately address the protection of the quality of state waters. As it relates to shoreline management, local governments are required to have provisions in their ordinances, procedures, and processes to ensure, that as land development occurs, land disturbance is minimized and indigenous vegetation is preserved. Utilizing the science-based recommendations in a SMP can only enhance compliance with these local provisions. The Regulations pertaining to the Bay Act identify shoreline erosion control projects as one of several permitted modifications to the Chesapeake Bay Resource Protection Area (RPA) buffer, provided that the project is based on the best technical advice. The SMP can serve as an example of best available technical advice.

Nonpoint source pollution - Pollutants carried by water over or through the land that come from many, hard to identify sources. These are: excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas; oil, grease, and toxic chemicals from urban runoff; sediment from improperly managed construction sites, crop and forest lands, and eroding banks; and bacteria and nutrients from livestock, pet wastes, and faulty septic systems.

A SMP can bridge the permitting process. Agencies such as the Department of Conservation and Recreation (DCR), local Erosion and Sediment Control programs, Wetlands Boards, the Virginia Marine Resources Commission, Virginia's Department of Environmental Quality, U.S. Army Corps of Engineers, plus various advisory agencies including VIMS and U.S. Fish and Wildlife Service have regulatory roles regarding the kind of shoreline strategies that ultimately will be permitted. A plan will help streamline the permitting process by assuring each of these agencies has the same information.

What types of recommendations are made?



A breakwater system is effective shore stabilization on higher energy shorelines. The system can create or enhance a living shoreline with beach fill and dunes. Submerged aquatic vegetation (SAV) has taken root in the embayments and in the lee of the structures. Inset: The exposed bulkhead was hazardous before stabilization with a living shoreline strategy. Cape Charles, Northampton County, Virginia, May 2009 (Inset August 1999)

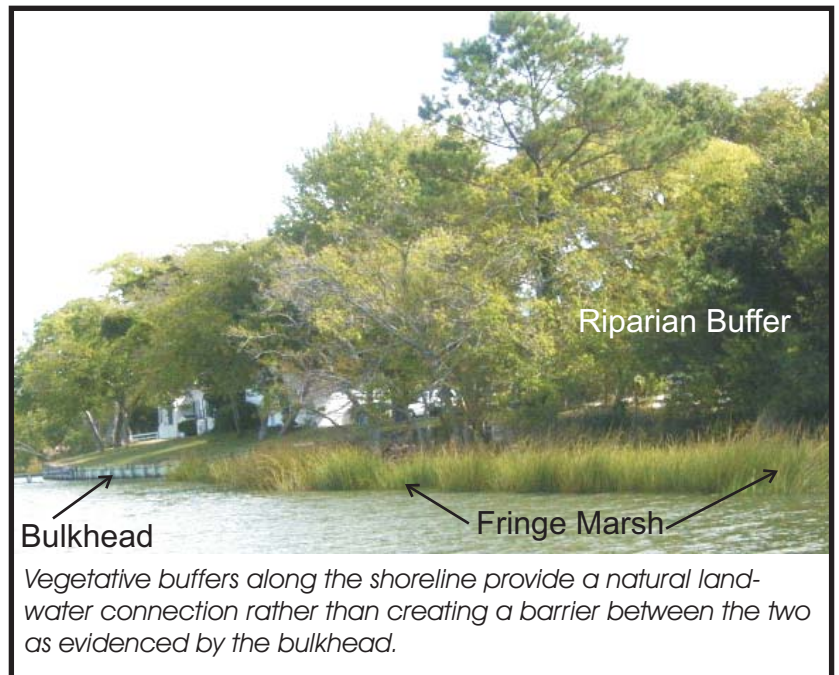
Effective stabilization of the shore combined with maintenance of habitat is the primary goal of VIMS's Shoreline Studies Program's SMP. In the past, bulkheads and revetments have been used to protect upland property, and while they are generally successful, they can interfere with the land-water connection thereby reducing habitat and the ability of the shore to act as a buffer. However, over the past 20 years, more habitat-friendly, shore-management strategies have been successfully implemented around the Bay. These strategies create an environmental edge using marshes and beaches for shore stabilization and are commonly referred to as "Living Shorelines."

*Living Shorelines*² stabilize the shore through long-term restoration or enhancement of vegetated and non-vegetated shoreline habitats. In more protected areas, a marsh fringe can be created by planting marsh grasses along the shore and by building stone sills to protect and stabilize them. On higher energy, open coasts, near shore breakwaters supplemented with beach fill can yield a sandy area of beach and dunes. These systems will, if properly designed

and constructed, stabilize the shore as well as create a viable vegetated fringe that restores and/or sustains natural resources, provides essential habitat, and creates a beneficial water-quality buffer.

In summary, where applicable, strategies, such as Living Shorelines, that do not interfere with the connections between the bank (riparian), intertidal and subaqueous areas and that maintain natural processes such as tidal exchange, sediment movement, plant community transitions, and groundwater flow are recommended in the SMP.

Living Shorelines - Shoreline management options that control erosion by enhancing natural shoreline habitats.



Vegetative buffers along the shoreline provide a natural land-water connection rather than creating a barrier between the two as evidenced by the bulkhead.

What is in the Shoreline Studies Program's SMP?

The Shoreline Management Plans developed by the Shoreline Studies Program, with cooperation from the Center for Coastal Resources Management, at the Virginia Institute of Marine Science provide a unique geological, physical, hydrodynamic, and biological view of a locality's shoreline. The best scientific data available are synthesized and new data are collected and analyzed to provide management options for the shoreline by a highly experienced team of researchers and regulatory advisors. The information in the SMP can vary depending on the scope of the project, but generally the *plan elements* listed below are included. Understanding the geology and the morphology (or shape) of the shore will determine what type of sediment is available to the alongshore transport system and how the shore has responded through time to the

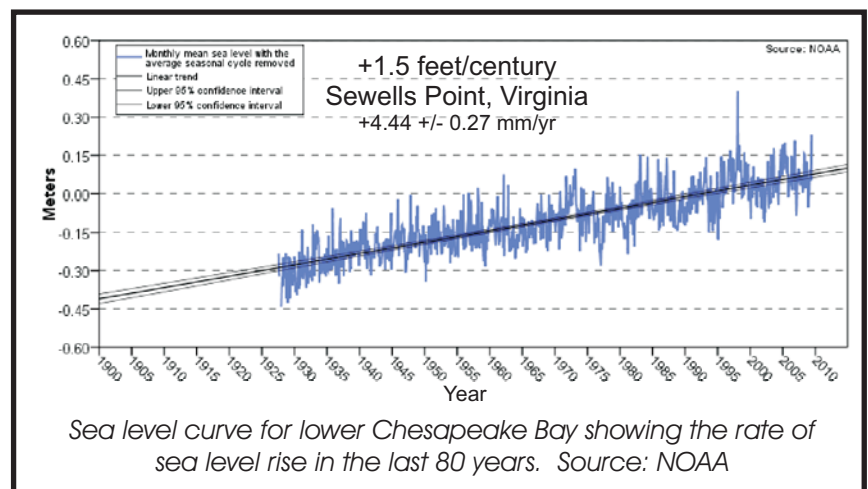
Plan Elements

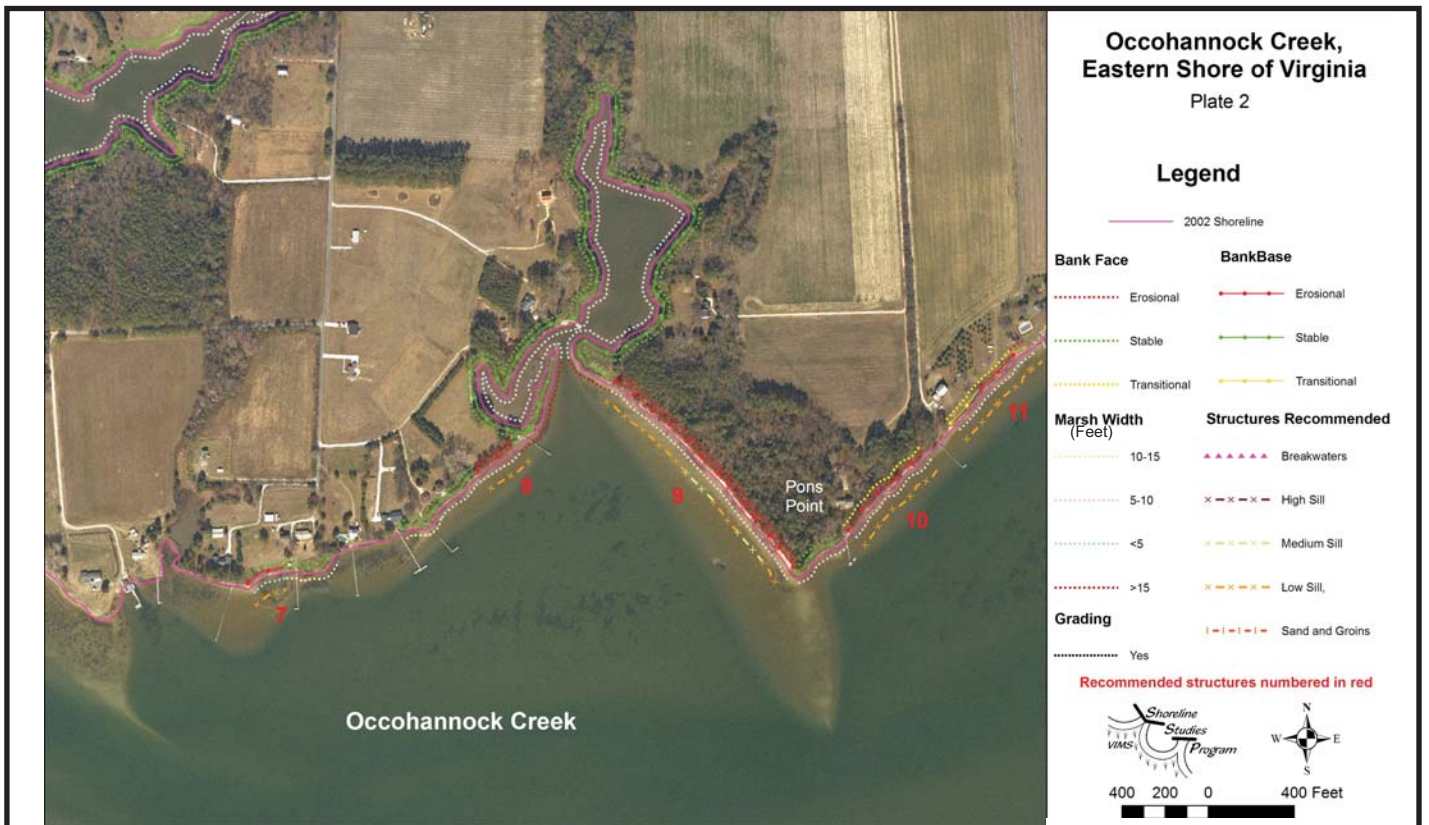
- Describe underlying geology and morphology;
- Quantify historic and recent shoreline change;
- Map existing structures and current bank and shore condition;
- Assess existing marine resources;
- Analyze the general wave climate, storm surge, and long-term sea level rise in order to assess the level of protection required and associated costs.
- Development of site-specific shore management strategies

forces acting on it. Quantifying the rate of shoreline change shows how the processes vary not only in different areas but also through time. A snapshot of existing structures and the condition of the bank and shore provides the basis for what type of strategies may be needed along each particular stretch of shore. Conflicting resource uses or the location of submerged aquatic vegetation are major considerations in the development of shore management strategies.

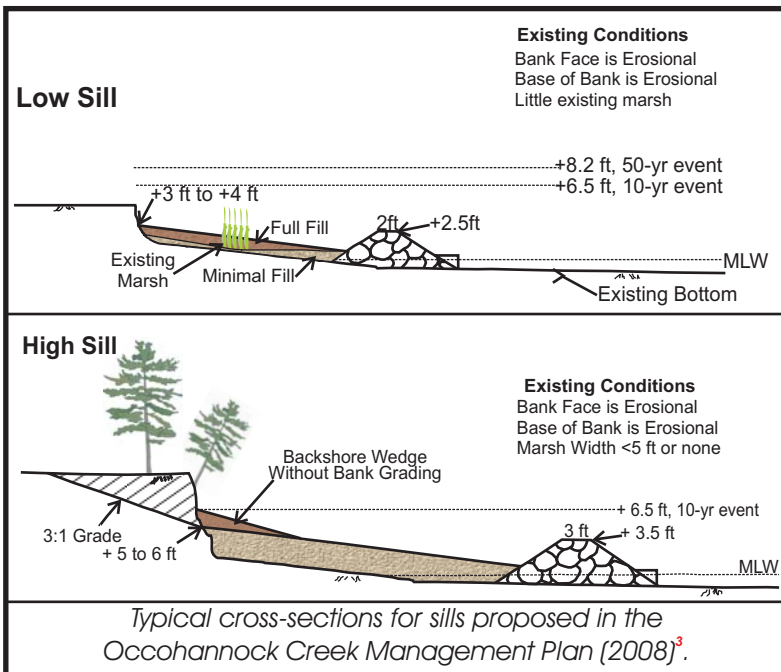
Coastal hazards, such as storms, and climate change planning are incorporated into the SMP. Knowing the potential water level and wave heights associated with specific storms and how they will effect the coast is essential to determining the level of protection needed at a site. In addition, sea level has been rising since the last glacial maximum, roughly 20,000 years ago, contributing to the erosion of the shoreline and inundating some coastal habitats. Presently, sea level in lower Chesapeake Bay is rising at about 1.5 feet per century. Understanding how this will affect the coastal zone is essential to management.

For all sites that have an eroding upland bank, a site-specific recommendation is made. By using the data collected through the Shoreline Management Planning process, an eroding site is characterized, and a structural or non-structural recommendation is made. For structural recommendations, the SMP includes typical cross-sections of the types of structures that will work in a specific area for a specific level of protection. This will allow the landowner, who is contemplating investing in a shore stabilization system, to understand how the system will work and approximately how much it will cost. In addition, the data are presented in such a way that a contractor working at a specific site will have most of the information they need to design a site specific system potentially resulting in a cost-savings to the landowner.





An example summary plate from a SMP³. The legend includes the existing site information, such as the condition of the base of the bank and the bank face, as well as the width of the existing marsh where present. Also shown are the types of recommended structures. Each structure has a number and is included in a table of all the attributes of that site.



What does a plan cost?

The cost of a SMP is locality-specific and generally depends on the amount of shoreline. Most of the plans developed by the Shoreline Studies Program have been funded by state and federal grants to localities. The grant applications were the result of collaboration between Shoreline Studies personnel and the locality. Some cost-sharing generally is needed, but the amount will vary depending on the source of the grant. Plans also can be developed for part of a locality, such as a specific watershed, waterway, or shoreline reach.

The SMP is an efficient, cost effective tool for the locality to use in its planning process. It will provide guidelines that the County and its landowners can use for many years to have the best management options for individual shore reaches. Additionally, grant funding for the locality or its citizens to build these living shoreline projects may be available.

The Shoreline Studies Program in the Department of Physical Sciences at the Virginia Institute of Marine Science has been developing Shoreline Management Plans for Virginia's Federal, State, Local governments, military bases, and private lands for 20 years. These plans have resulted in the construction of millions of dollars worth of shore zone systems that not only stabilize the shore and protect upland infrastructure but also provide very real environmental components. These systems create an environmental edge along that shore that can include marsh, beach, and dune creation while reducing the input of sediment to Chesapeake Bay and creating buffers for water quality.

For more information, please contact:

Shoreline Studies Program

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*Headland Control is a method of placing breakwaters far apart and allowing the shore between them to erode to a stable embayment. This long-term erosion control strategy is cost-effective for long stretches of shoreline such as farmland and woodlands.
(Jamestown Island, James City County, Virginia
January 2004)*

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September 2009

Cover Images

An eroding shoreline with a lawn to the shoreline and an existing concrete seawall was rehabilitated into a vegetated buffer with a sill that protects the marsh fringe (Hull Springs Farm, Longwood University, Westmoreland County, Virginia, October 2006, August 2008, June 2009).

¹The Bay Act: http://www.dcr.virginia.gov/chesapeake_bay_local_assistance/index.shtml

²More information on living shorelines: <http://ccrm.vims.edu/livingshorelines/index.html>

³Ocohanock Creek Erosion Assessment and Living Shoreline Option Report:
<http://web.vims.edu/physical/research/shoreline/docs/OcohanockCreek/OcohanockCreek.pdf>

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