

**A STUDY TO DETERMINE THE EFFICACY OF INCENTIVIZING THE USE OF LIVING SHORELINES IN
VIRGINIA THROUGH THE ESTABLISHMENT OF A REVOLVING LOAN FUND**



Final Report | September 2013

Middle Peninsula Planning District Commission

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The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies.

EXECUTIVE SUMMARY

On April 29, 2011 legislation was approved directing the Virginia Marine Resource Commission, in cooperation with the Virginia Department of Conservation and Recreation and with technical assistance from the Virginia Institute of Marine Science), to establish and implement a general permit regulation that authorizes and encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines in the Commonwealth. "Living shoreline" means a shoreline management practice that provides erosion control and water quality benefits; protects, restores or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials. This project was undertaken as a feasibility study to offer a potential design for a publicly sponsored water quality improvement-living shoreline revolving loan construction program. This program would include offering grants and/or loans at below market rates to encourage the financing of living shoreline projects to advance the Commonwealth's water quality and coastal habitat goals.

A contractual partnership was established with the National Sea Grant Law Center for a review and assessment of examples of existing revolving loan programs to promote living shorelines or similar coastal erosion control methods. Of the seventeen programs reviewed two were identified that could be utilized as models for a Virginia program. The Center for Coastal Resource Management at the Virginia Institute of Marine Science was contracted to assess the preferences of permit holders to consider using a local revolving loan program to finance a living shoreline project, as opposed to installing a conventional shoreline hardening approach, if more favorable lending terms were available for the preferred method. Forty-eight percent of respondents who installed conventional hardening stabilizations indicated that they would have considered a living shoreline approach had they been offered better financing options.

Discussions with Virginia Department of Environmental Quality Virginia Clean Water Financing & Assistance Program staff regarding utilization of the Virginia Clean Water Revolving Loan (VCWRL) program to fund a living shoreline revolving loan program were held and determination made that this may be an acceptable use of these funds. MPPDC currently administers several revolving loan programs, one of which, the Middle Peninsula Septic Repair Assistance Program, has utilized funding from the VCWRL. MPPDC has in place an approved program design utilizing DEQ revolving loan funds to repair failing septic systems. The Middle Peninsula Planning District Commission Regional On-Site Wastewater Treatment and Disposal Funding Program FY 1997 Virginia Revolving Loan Fund Program Design And Guidelines dated May 1997 (Revised June 1998, August 2000, and May 2002, November 2005, October 2008, February 2011) will be used as the model for establishing a living shoreline revolving loan program should the MPPDC Commission direct staff to establish a living shoreline revolving loan program.

The Middle Peninsula Planning District Commission will review the study and determine if the establishment of a Middle Peninsula Living Shoreline Revolving Loan Funding Program should be established. If the Commission decides to offer an RLF for this purpose, MPPDC staff will enter into discussions with DEQ and VRA to explore funding from the VCWRL and acceptable program design parameters.

APPENDIX A

Product #2

Middle Peninsula Planning District Commission
Regional On-Site Wastewater Treatment and Disposal Funding Program
FY 1997 Virginia Revolving Loan Fund Program Design
And Guidelines – May 1997
(Revised June 1998, August 2000, and May 2002, November 2005, October 2008,
February 2011)

OVERVIEW

The Program Design and Guidelines for the Middle Peninsula Regional On-Site Wastewater Treatment Funding Program (Program) will delineate the marketing strategies, loan application and review process, environmental review, funds management and administration, and loan agreements with property owners.

This program will address malfunctioning, failing, on-site wastewater treatment systems by making loans and grants available for the purpose of repair or replacement of on-site systems.

I. Marketing Strategy

- A. Geographic Area of Program: The Program will be available to homeowners of property located in the Middle Peninsula Planning District of Virginia. The localities of the Middle Peninsula are the counties of Essex, Gloucester, King and Queen, King William, Mathews, and Middlesex; and the towns of Tappahannock, Urbanna, and West Point.
- B. Solicitation of Applications: Loan applications will be sought through the following means, in the following order:
 - 1. Health Department Referrals-The Virginia Department of Health, through the Division of Shellfish Sanitation and the local Health Departments, issues Sanitary Notices to property owners whose on-site systems are in violation of health and environmental regulations. Property owners with uncorrected Sanitary Notices may submit application for funding assistance.
 - 2. Referrals from Local Governments or other agencies-Homeowners often contact the locality when they have a malfunctioning on-site system. Localities and other local, state, and federal agencies serving the region will be notified of the Program and will be able to refer clients to the Program.

3. News releases, Public Information Notices-Newspapers, fliers at public locations.
- C. Income Guideline - Grant participation will be based on the household income and ability to pay.

D. Terms of Loan:

1. All loans in excess of \$3000 will be secured with a deed of trust granted to the Middle Peninsula Planning District Commission. The owner of the approved property must agree that, if the property is sold, transferred, or otherwise conveyed voluntarily, when the owner is living, or if the real estate ceases for any reason to be the owner's principal place of residence, then the principal amount must be paid back to the Middle Peninsula Planning District Commission.

2. These provision do not apply under the following circumstances:

- a. Death of the owner: in the event of the death of the owner the Project Management Committee may review the specific conditions to determine if the lien is to be removed.
- b. Catastrophic illness: in the event of an illness which necessitates special or continuous treatment of the property owner the Project Management Committee may review the specific conditions to determine if the lien is to be removed.

- E. All beneficiaries must make monthly loan payments based upon their ability to pay. Ability to Pay will be calculated using a standard Department of Housing and Community Development ability to pay methodology. Below are the guidelines for grant fund distributions.

1. Grant awards, if grant funds are currently available, will be awarded based on program requirements of the source of the grant funds. If no specific requirements for the grant funds exist, grant funds, if available, will be awarded based on current median family income as published by the U.S. Department of Housing and Urban Development. Applications below median income levels will receive priority status for grant funding:

Income Level	Loan	Grant Funds
Extremely Low (30% median)	0-10%	90-100%
Very Low	25%	75%

(50% median)		
Low	50%	50%
(80% median)		
All others	100%	0%

2. Applicants will be offered a line of credit to use for system repairs. Interest and principal payments will commence as soon as funds are released. Final payment will not be released until after issuance of an operation permit by the local health department.

3. Loan interest rates will be based on income level:

Income Level	Interest Rate
Below 30% median	2%
Very Low (31% - 50% med)	2.5%
Low (51%-80%)	3%
All others	prime + 2%

F. Loans shall be amortized by monthly installment payments.

G. Loan term:

1. Loans of \$5,000 or less will be financed for up to 60 months.
2. Loans more than \$5,000 will have the option of financing for up to 119 months.
3. Loans over \$10,000 will have the option of financing for up to 180 months.

H. Property transfer criteria:

1. Balance of the principal of the loan shall be due and payable to The Middle Peninsula Planning District Commission upon sale or transfer of property.
2. If beneficiary incurs a reduction or loss of income to repay loan, then the MPPDC may conduct an interim certification and recalculate "ability to pay" upon request of the property owner with proper documentation of loss of ability to pay.

I. Identification of Prior Existing Debt:

1. No subordination of loan shall be done for equity mortgage requests by beneficiary, however, MPPDC, may, at its option, subordinate a loan if beneficiary has documented catastrophic medical expenses.

2. Applications found to carry a delinquent or defaulted first mortgage shall be ineligible for assistance. Applicants whose property is financed must carry a current first mortgage in good standing. This mortgage must have been current for at least the 12-month period prior to application or since inception of mortgage if in existence less than 12 months.

J. Size of Loan: Loans shall not be less than \$500 nor greater than \$25000.00.

K. Fees and Service Charges:

1. Application Fee-\$25 required at time of application

2. Administrative Fee – To be determined based on cost of necessary documentation and closing costs. May be amortized with loan funds.

3. Late Fee-5% charged on unpaid payment due applies when 7 days past due date of payment.

L. Security: Individual property owners receiving loans will sign a promissory note for the term of the loan. Loans in excess of \$3000 are to be secured by a Deed of Trust.

M. Scope of Work:

1. The Middle Peninsula Planning District Commission On-Site Wastewater Loan Program will consider any repair or replacement system approved by the Virginia Department of Health, and not prohibited by any local ordinance to be suited for funding under this program.

2. Examples of on-site systems that may be funded under the MPPDC program include septic tank-soil absorption, sand filters, mounds, constructed wetlands, peat filters, and individual wastewater treatment plants. Land or easement purchases for remote siting may also be considered when on-site conditions are

not suited for treatment options. The following are estimates of costs for each type of system:

<u>System</u>	<u>Cost</u>
Septic Tank/Drainfield	Up to \$7500
Sand Filters, Mounds	\$5,000-\$8,000
Constructed Wetlands	\$6,000-\$15,000
Peat Filters	\$8,000-\$15,000
Individual Wastewater Treatment System	\$10,000-\$25,000
Land or Easement Purchase + System	\$4,000-\$25,000
Vault Privy	\$2,000-\$3,000

II. Loan Application and Review

A. Application Guidelines:

1. **Income Eligibility:** An applicant shall complete an Income Eligibility worksheet to determine income qualification for grant funding when available and ability to repay loan. If applicant is found ineligible, any application fees assessed will be returned.
2. **Application Fee:** A \$25 application fee shall be charged at the time of application. The fee shall be nonrefundable, unless applicant is found to be ineligible or system is not installed through no fault of applicant and applicant withdraws application.
3. **Place and Time of Application:** Applications are available at the offices of the Middle Peninsula Planning District Commission, P O Box 286, Saluda Professional Center, 125 Bowden Street, Saluda, Virginia between the hours of 8:30 a.m. to 12 noon and 1:00 p.m. to 4:30 p.m., Monday through Friday, except holidays, by mail request, by phone at (804) 758-2311. A downloadable application is also available at www.mppdc.com.

B. Review and Approval of Applications:

1. **Staff Review-** The staff of the Middle Peninsula Planning District Commission will review each application for completeness. Staff will verify income eligibility by contacting employers of persons in the household and requesting proof of monthly expenses if necessary. Applicant will provide a copy of the notice of deficiency or violation from the local health department to verify that the on-site system is in need of deficiency correction.

2. Project Management Committee- The Middle Peninsula Planning District Commission will designate a committee to review and approve each application. If grant funds are available the Committee will determine eligibility for grant funding following the criteria outlined in Sec I:E -1 above. The Committee shall consider the following in determining loan project priorities:

- a. Correction of sanitary deficiency impacting water quality and/or health.
- b. Applicant's ability to pay, the Program's amortization schedule for repayment of the VRA loan and availability of grant funding shall be considered.
- c. Method of correcting on-site deficiency-probability of functioning system, including ease of maintenance.
- d. Cost of correcting on-site deficiency/size of loan- practicality of loan repayment and benefit related to costs of system.
- e. Recommendation of the Health Department.
- f. Regional distribution of projects.

3. The MPPDC Board may authorize the Executive Director to complete all loan agreements and notes pursuant to approved loans.

III. Closing the Loan From the VRLF/DEQ to the MPPDC

- A. Investment Strategy: The MPPDC may invest the funds from the VRLF in Certificates of Deposit at banks serving and located in the region or with the Commonwealth of Virginia Department or the Treasury Local Government Investment Pool.
- B. Local Accounts: The MPPDC may issue a request for proposals to local banks to receive the highest interest return for the investment. No more than \$100,000 will be invested in any one bank.
- C. Internal Controls: The MPPDC Board will form a Project Management Committee to review the investment strategies, loan closings, loan repayments, and cash flow. The Committee will monitor Program financial status and recommend changes in Program Design as warranted to maintain fiscal stability.
- D. Monitoring, Reporting, and Records: All financial records will be maintained at the offices of the MPPDC. Loan account payments and

balances will be entered and tracked using an automated revolving loan fund software program. Program progress reports will be made available to the Department of Environmental Quality and the Virginia Resources Authority as requested, in conjunction with debt payments to the VRA.

- E.** Debt Service on the 1997 Loan: Debt payments on the loan will be made on a semi-annual basis to the VRA. The Loan shall be for a term of twenty years at a zero percent interest rate.
- F.** Debt Service on the 2010 Loan: Debt payments on the loan will be made on a semi-annual basis to the VRA. The Loan shall be for a term of ten years at a zero percent interest rate.

IV. Loan Agreements with Individual Property Owners

- A.** Execution of the Loan Agreement: After loan application is approved, the Executive Director and the Property Owner will sign a loan agreement stating the scope of on-site wastewater treatment system repairs or replacement, a maximum line of credit amount, and interest rate. An amortization schedule will be provided to applicant at loan closing.
- B.** Security: The line of credit will be secured with a Deed of Trust granted to the Middle Peninsula Planning District Commission, if applicable.
- C.** Responsibilities of Property Owners:
 - 1. It will be the responsibility of the property owner to obtain contractor(s) with the following qualifications:
 - a. Experience – certification, if required, for the type of system to be installed
 - b. References (2)
 - c. Insurance – liability and workman's compensation insurance certificates will be required
 - 2. On-Site Wastewater Treatment System Repair/Replacement Specifications
 - a. The homeowner shall be responsible for obtaining a Health Department permit for repairs and replacement of the onsite system.
 - b. The homeowner shall be responsible for obtaining any other permit as required for construction of the onsite system.
 - c. The homeowner shall be responsible for obtaining and complying with any engineering

designs as required in the Health Department permit.

- D.** Permits, Inspections, and Sign-Off: The Health Department will issue the on-site system repair/replacement permit, and conduct the final inspection of the system. The final sign-off on a project will be given by the MPPDC once a completion statement and/or operational permit have been obtained free of any conditions.
- E.** Disbursement of Loan Funds: The MPPDC will disburse loan funds based on a negotiated payment schedule directly to the homeowner. Payment of 50% of the installation amount will be held back until the project is complete. Final payment will be made following the final sign-off on the project.
- F.** Loan Payment Schedules: Loan payments including principal and interest will commence thirty days loan closing. Payments are due on the fifteenth day of the month. Late fees of 5% of the uncollected past due payments(s) will be assessed if the payment is not received by the seventh day after the payment is due. Payments will be by ACH.

V. Administration of 2010 VCWRLF Financing Funds

- A.** Security: The Regional On-Site Wastewater Treatment and Disposal Funding Program will secure the loan with the Virginia Revolving Loan Fund through the revenues generated through interest-only payments and loan payments made by individual property owners and through investment of capital funds.
 - 1. Interest Security- The Program may offer lines of credit at a sliding scale determined by household income with a minimum interest rate of 2% and a maximum of prime +2%.
 - Loan interest rates:
 - Below 30% med - 2% interest rate on loan funds
 - Very Low (31% - 50% med) 2.5%
 - Low (51%-80%) 3%**
 - All others – prime + 2%
 - 2. Principal Security- The MPPDC Program will borrow \$125,000 for a period of 10 years at a zero interest rate (Loan Proceeds) and receive an additional \$125,000 as a principal forgiveness loan (Funding Proceeds). No more than \$80,000 of Funding Proceeds and Loan Proceeds will be disbursed to Property Owners as grants

and no less than \$170,000 of Funding Proceeds and Loan Proceeds will be loaned to Property Owners under the Plan.

3. Total Annual Security/Annual Debt Payments- Annual debt payments will be \$12,500, to be paid in semi-annual payments of \$6,250. By disbursing a minimum of \$170,000 as loans, MPPDC will provide annual total security. The net \$25,000 will be available for recapitalizing the regional loan fund. MPPDC will manage the loan fund and portfolio to ensure repayment of indebtedness.
4. MPPDC will establish a Loan Loss Reserve in the amount of \$12,500 or an amount equal to one (1) year debt service payments. These funds will be designated as “Restricted Cash – VRA Loan Loss Reserve” on the MPPDC balance sheet until such time as the loan is repaid in full.

B. Administration:

1. The Middle Peninsula Planning District Commission will dedicate staff personnel to administer the Program. The Executive Director will provide supervisory guidance to the program.
2. The MPPDC will work closely with the State agencies involved in the protection of water quality and public health. The Department of Environmental Quality and the Department of Health will provide project guidance and assist through the on-site wastewater treatment permitting process.
3. The MPPDC Board will designate a Project Management Committee to provide input into the loan review and financial management aspects of the Program. The Board will also be involved in oversight of the entire program.
4. Fund Administration- The Program will invest any undisbursed portion of the loan proceeds with banks operating in the region or the Commonwealth of Virginia Department of the Treasury Local Government Investment Pool. Revenues from loan payments will be invested in said accounts providing liquidity to coincide with debt payments to the VRLF. Interest earnings from the Program will be available for administration costs and loan security to the VRLF. All revenues available after debt payments and administration costs may be utilized to provide additional assistance through the form of additional loans and/or grants to qualified applicants.

VI. Notification of Changes to the Local Program

The MPPDC will notify the Department of Environmental Quality and the Virginia Resources Authority of any anticipated changes to the Program Design at least 60 days prior to the effective date of such changes.

APPENDIX B

Product #3

INCENTIVIZING THE USE OF LIVING SHORELINES IN VIRGINIA THROUGH A REVOLVING LOAN FUND



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The Middle Peninsula Planning District Commission commissioned this white paper to assist the MPPDC in its efforts to assess the feasibility of developing a living shoreline revolving loan program. This research was funded by a grant from the Virginia Coastal Zone Management Program with additional support provided by the National Sea Grant Law Center under award number NA09OAR4170200 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.



Executive Summary

In April 2011, the Virginia Legislature directed the Virginia Marine Resource Commission, in cooperation with the Virginia Department of Conservation and Recreation and with technical assistance from the Virginia Institute of Marine Science, to “establish and implement a general permit regulation that authorizes and encourages the use of living shorelines as the preferred alternative for establishing tidal shorelines in the Commonwealth.”¹ The identification of living shorelines as the preferred alternative is an important policy signal which should guide permitting decisions and increase the use of living shoreline structures in the state. But, even with an improved permitting process, coastal property owners may be reluctant to install living shorelines due to the cost of such projects.

In 2013, the Middle Peninsula Planning District Commission (MPPDC) received funding to assess the feasibility of incentivizing the use of living shorelines through a revolving loan fund (RLF). Once capitalized, revolving loan funds are a self-replenishing pool of money, where principal and interest payments from old loans are used to issue new ones. Publicly funded revolving loan programs usually issue loans with more favorable terms for borrowers, such as below market interest rates, than private lenders.

To gain an understanding of existing programs that could serve as models, the MPPDC partnered with the National Sea Grant Law Center to review national and state examples of revolving loan programs to promote living shorelines or similar coastal erosion control methods. The National Sea Grant Law Center examined four federally funded revolving loan funds; seven state-funded programs, including four in the state of Virginia; and two non-governmental programs. The Law Center reviewed each program’s legal structure and financial details, such as number of loans, where publically available. Personal interviews with program managers were also conducted to obtain additional information of the operation and use of the revolving loan funds.

Revolving loan funds, when structured properly and implemented effectively, can reduce borrowing costs and provide financial assistance to borrowers who may not have access to other capital. If high borrowing costs are identified as a significant barrier to the installation of living shoreline structures in Virginia, a Living Shorelines Revolving Loan Fund could potentially help interested landowners choose living shorelines over other shoreline stabilization options. Of the RLF programs examined, Maryland’s Shore Erosion Control Construction Loan Program is the most promising model. In addition to focusing on nonstructural erosion control, which includes living shoreline-type programs, the RLF has been operating for more than 40 years with steady demand for financing assistance. In Virginia, the most promising model is the Agricultural Best Management Practices Loan Program. This RLF facilitates a significant number of projects by providing financial assistance to individual property owners and many of the eligible BMPs, like streambank stabilization, are similar to living shoreline projects.

¹ 2011 Virginia Laws Ch. 885 (S.B. 964), codified in part at VA. CODE ANN. § 28.2-104.1.

I. Introduction

In April 2011, the Virginia Legislature directed the Virginia Marine Resource Commission, in cooperation with the Virginia Department of Conservation and Recreation and with technical assistance from the Virginia Institute of Marine Science, to “establish and implement a general permit regulation that authorizes and encourages the use of living shorelines as the preferred alternative for establishing tidal shorelines in the Commonwealth.”² As defined in Virginia, a living shoreline is “a shoreline management practice that provides erosion control and water quality benefits; protects, restores, or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials.”³ In many geographic areas, living shorelines are preferable to harden structures, such as concrete seawalls, that can increase coastal erosion rates, interfere with natural shoreline processes, and eliminate habitat for estuarine species.

The identification of living shorelines as the preferred alternative is an important policy signal which should guide decision-making and increase their use in the state. But, even with an improved permitting process, coastal property owners may be reluctant to install living shorelines due to the cost of such projects. According to the Center for Coastal Resource Management, “The construction costs for living shoreline projects and other stabilization methods vary widely depending on the shoreline length, level of protection needed, and the costs for materials and labor. Non-structural methods cost an average \$50 - \$100 per foot, such as beach nourishment and planted marshes. Projects with sand fill and/or stone structures typically cost \$150 - \$500 per foot. This does not include permitting costs. Upfront construction cost is only one factor to consider. The value of ecosystem services provided by living shorelines help offset these costs indirectly over time.”⁴ For illustration purposes, a one-acre coastal lot if perfectly square would be a little more than 200 feet wide. The costs of a non-structural project in that scenario might range from \$10,000 - \$100,000. A similar hardening project would likely result in a greater expense to the property owner, as hardening costs per square foot generally exceed that of living shorelines.

Beginning in 2013, local governments in Virginia must include this new living shoreline policy and guidance prepared by VIMS regarding the appropriate selection of living shoreline management practices in their comprehensive plans. In addition to this guidance, VIMS recommends that local governments consider undertaking additional activities as part of a comprehensive approach to shoreline erosion control. One of those recommendations is that local governments “evaluate and consider cost share opportunities for construction of living shorelines.”⁵

One potential cost share mechanism is a revolving loan fund (RLF). Once capitalized, revolving loan funds are a self-replenishing pool of money, where principal and interest payments from old loans are used to issue new ones. Publicly funded revolving loan programs usually issue loans with more favorable terms for borrowers, such as below market interest rates, than private lenders. In 2013, the Middle Peninsula Planning District Commission (MPPDC) received funding to assess the feasibility of

² 2011 Virginia Laws Ch. 885 (S.B. 964), codified in part at VA. CODE ANN. § 28.2-104.1.

³ VA. CODE ANN. § 28.2-104.1(A).

⁴ Center for Coastal Resource Management, Living Shoreline – Frequently Asked Questions, <http://ccrm.vims.edu/livingshorelines/faq.html>.

⁵ CENTER FOR COASTAL RESOURCE MANAGEMENT, COMPREHENSIVE COASTAL RESOURCE MANAGEMENT FOR TIDEWATER VIRGINIA LOCALITIES, available at http://ccrm.vims.edu/ccrmp/Comp%20Plan%20Language/CRMP_Language_Short.pdf.

incentivizing the use of living shorelines through a revolving loan fund. MPPDC has over a decade of revolving loan administration experience. Currently, MPPDC administers a water quality improvement septic repair program funded by the Virginia Resource Authority and the Virginia Department of Environmental Quality. Additionally, MPPDC staff administers a housing repair revolving loan program and a small business revolving loan program.

To gain an understanding of existing programs that could serve as models, the MPPDC partnered with the National Sea Grant Law Center to review national and state examples of revolving loan fund programs to promote living shorelines or similar coastal erosion control methods. The National Sea Grant Law Center examined four federally funded revolving loan funds; seven state-funded programs, including four in the state of Virginia; and two non-governmental programs. The Law Center reviewed each program's legal structure and financial details, such as number of loans, where publicly available. Personal interviews with program managers were also conducted to obtain additional information on the operation and use of the RLF.

This white paper begins in Section II with an overview of four federally funded revolving loan programs: Clean Water State Revolving Funds, Drinking Water State Revolving Funds, Brownfields Revolving Loan Funds, and Energy Efficiency and Conservation Revolving Loan Funds. In Section III, four revolving loan funds established by the state of Virginia are examined. These programs are the Virginia Airports Revolving Fund; Virginia Dam Safety, Flood Prevention and Protection Fund; Virginia Fish Passage Grant and Revolving Loan Fund; and Preservation Virginia Revolving Loan Fund. Section IV discusses revolving loan programs established by other states to assist with shoreline erosion projects. These programs are Ohio's Lake Erie Coastal Erosion Loan Program, Maryland's Shore Erosion Control Construction Loan Fund, and North Carolina's Hurricane Flood Protection and Beach Erosion Control Project Revolving Fund. Section V briefly highlights two non-governmental revolving loan funds: the Great Lakes Revolving Fund and University Green Revolving Funds.

II. Federally Funded RLF Programs

A. Clean Water State Revolving Fund Program

In 1987, Congress authorized the Clean Water State Revolving Fund (CWSRF) through amendments to the Clean Water Act. The Environmental Protection Agency (EPA) distributes funds from the CWSRF to states, which in turn use the funds to provide low-cost financing for wastewater infrastructure, nonpoint source pollution, and estuary projects that will improve water quality. By 2009, the CWSRF Program had provided over \$74 billion in grant, loan, and refinancing assistance to communities, homeowners, and other eligible entities.⁶

The American Recovery and Reinvestment Act of 2009, commonly known as the stimulus bill, appropriated \$4 billion into the CWSRF as part of Congress's effort to create jobs by funding state and local "shovel ready" projects.⁷ To increase the states' funding of "green" projects, Congress required that 20% of the ARRA capitalization funds be allocated "for projects to address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities."⁸ This mandate, referred to as the Green Project Reserve, has continued beyond the ARRA funding through its inclusion

⁶ ENVIRONMENTAL PROTECTION AGENCY, CLEAN WATER STATE REVOLVING FUND PROGRAMS: 2009 ANNUAL REPORT 2-3 (2010).

⁷ *Id.* at 4.

⁸ *Id.* at 5.

in the FY10, FY11, and FY12 CWSRF appropriations, although the requirement was reduced to 10% in FY12.⁹

Maryland

Maryland decided to focus its Green Project Reserve funds to encourage the installation of living shorelines. According to the EPA, “green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintain and restore natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater.”¹⁰ Living shoreline projects that reduce nutrient pollution and sediment loads are potentially eligible for financing assistance through state CWSRF programs. The Maryland Department of Environment (MDE) has awarded over \$9 million for fifteen living shoreline projects in seven Maryland counties (Baltimore, Anne Arundel, Talbot, Dorchester, Howard, Kent, and Washington).¹¹

These projects were not funded through loans, however. Although the CWSRF is commonly thought of as a revolving loan fund, funds may also be used for grants. In addition to mandating the Green Project Reserve, the ARRA also required states to use at least 50% of the ARRA funds to provide “additional subsidization” to loan recipients, which could take the form of grants, principal forgiveness, or negative interest rate loans.¹² The “additional subsidization” requirement enabled MDE to provide 100% of the funding for the selected projects through a combination of traditional grants and loan forgiveness.¹³

The Maryland CWSRF is not currently funding any shoreline projects. Unlike the Green Project Reserve mandate, the additional subsidization requirement did not continue at the same level in the fiscal years following the ARRA. Maryland therefore has less funding available for grants and loan forgiveness. This has decreased interest in the CWSRF as a funding source for shoreline projects as few applicants are interested in low-interest loans or have the ability to repay.¹⁴

Virginia

The Virginia Clean Water Revolving Loan Fund was created in 1987 and is managed by the Virginia Department of Environmental Quality (VDEQ). The Fund is an umbrella funding source through which a number of loan programs are implemented, including a Wastewater Loan Program, Brownfield Loan Program (mentioned below), and Stormwater Management Loan Program. Virginia also funded a number of green infrastructure projects utilizing its ARRA Green Project Reserve, although none

⁹ EPA, Green Project Reserve, http://water.epa.gov/grants_funding/cwsrf/Green-Project-Reserve.cfm.

¹⁰ EPA, PROCEDURES FOR IMPLEMENTING CERTAIN PROVISIONS OF EPA’S FISCAL YEAR 2012 APPROPRIATIONS AFFECTING THE CLEAN WATER AND DRINKING WATER STATE REVOLVING FUND PROGRAMS 5 (2012), *available at* http://water.epa.gov/grants_funding/cwsrf/upload/FY-2012-SRF-Procedures-and-Attachments.pdf.

¹¹ Maryland Department of the Environment, ARRA – Maryland Shoreline Projects (on file with author).

¹² CWSRF 2009 ANNUAL REPORT, *supra* note 6, at 5.

¹³ Email from Jag Khuman, Director, Maryland Water Quality Financing Administration, to author, April 19, 2013.

¹⁴ *Id.*

involved the installation of living shorelines. VDEQ awarded over \$11 million in funding for five stormwater projects and three land conservation projects.¹⁵

Most of the funding available under the Virginia Clean Water Revolving Loan Fund is limited to local governments or other eligible public entities. However, through the Agricultural BMPs Loan Program authorized in 1999, Virginia farmers can receive low-interest loans to assist with implementation of specified Best Management Practices (BMP) designed to improve water quality in the state.¹⁶ The Agricultural BMP Loan Program was initially capitalized by a \$5 million set-aside from the Virginia Clean Water Revolving Loan Fund in FY 2000, with \$10 million in additional capitalization authorized in later years.¹⁷ As of June 2010, 409 farmers have received over \$34 million in low interest loans through this program.¹⁸

Any Virginia agricultural producer desiring to implement one of 22 structural BMP to reduce the amount of polluted agricultural runoff entering state waters is eligible to apply for financing assistance. Eligible BMPs include such activities as wetland restoration, streambank stabilization, and stormwater retention ponds. The minimum loan amount is \$5,000, and no maximum amount is specified.¹⁹ Farmers may request loan assistance to finance the total costs of BMP implementation or, if the applicant is also receiving grant funding, just their portion of the implementation expenses.²⁰ Interest is charged at an effective rate of 3% per year with repayment periods generally ranging from 1 to 10 years.²¹

The VDEQ originates approximately 30-40 loans per year under the Agricultural BMP Loan Program. Almost all loan recipients are receiving other state and federal funding assistance. However, because grant funding is usually not disbursed until the project is complete (installed), farmers often need to finance the full cost of the project to cover upfront contractor and other costs. Any grant funding received is assigned to the VDEQ as partial repayment of the loan. The remaining long-term debt is usually the farmer's (local) cost-share portion of the project.²²

B. Drinking Water State Revolving Funds

In 1996, Congress amended the Safe Drinking Water Act to establish the Drinking Water State Revolving Fund (DWSRF). The DWSRF's structure is very similar to the CWSRF's discussed above. Federal funds, distributed by the EPA, are used to capitalize state revolving loan funds which are used to provide financial assistance to public water systems to ensure safe drinking water.²³ DWSRF loans have

¹⁵ Clean Water Financing and the Green Project Reserve, Presentation by Walter Gills, Program Manager, Clean Water Financing and Assistance Program, Virginia Department of Environmental Quality, Slide 13 (May 17, 2012), available at http://www.vwea.org/storage/documents/edcomm_12/Gills_VWEA_Presentation.pdf.

¹⁶ VA. CODE ANN. § 62.1-229.1.

¹⁷ VIRGINIA STATE WATER CONTROL BOARD, VIRGINIA'S AGRICULTURAL BMP LOAN PROGRAM GUIDELINES 1 (2012), available at http://www.deq.state.va.us/Portals/0/DEQ/Water/ConstructionAssistanceProgram/AG_BMP_5-9-2012_PDF_Guidelines_ALL.pdf.

¹⁸ Virginia DEQ, Low Interest Loans for Agricultural Best Management Practices, <http://www.deq.state.va.us/Programs/Water/CleanWaterFinancingAssistance/AgriculturalBMP.aspx>.

¹⁹ BMP Loan Program Guidelines, *supra* note 17, at 2-3.

²⁰ *Id.* at 3.

²¹ *Id.* at 4.

²² Phone Interview with Walter Gills, Walter Gills, Program Manager, Clean Water Financing and Assistance Program, Virginia Department of Environmental Quality, April 19, 2013.

²³ See 42 U.S.C. § 300j.12.

repayment terms of up to 20 years and the interest rates range from zero percent to market rate.²⁴ As with the CWSRF, the ARRA provided additional capitalization funds to the DWSRF and imposed additional subsidization (50%) and green infrastructure (20%) mandates.²⁵

Virginia's DWSRF is referred to as the Virginia Water Supply Revolving Fund, and is managed by the Virginia Resources Authority under the direction of the Virginia Department of Health.²⁶ The Fund is used primarily to make loans or loans subsidies to local governments or other eligible entities, but grants are also authorized in some situations.²⁷ In issuing loans, the Legislature directed the VDH to give preference to projects "that will (i) utilize private industry in operation and maintenance of such projects where a material savings in cost can be shown over public operation and maintenance or (ii) serve two or more local governments or other entities to encourage regional cooperation or (iii) both."²⁸

C. Brownfields Revolving Loan Funds

To encourage clean up activities at brownfields sites, which are parcels of property where redevelopment or reuse is complicated by the presence of hazardous substances or other contaminants, the EPA provides funding to states and other eligible governmental entities to capitalize revolving loan funds. Neither non-profit corporations nor for-profit entities may apply for RLF funds directly from the EPA. The maximum amount of funding available under the Brownfields Revolving Loan Fund Grants is \$1 million per entity with the option to apply for subsequent grants. Sixty percent of the awarded funds must be used to implement the RLF. The loans originated under the Brownfield RLFs may take a variety of forms including standard loans, low or zero interest loans, loan guarantees, and bridge loans. Grants from RLFs are also permitted and grantees must perform RLF grant activities within five years.

In Virginia, the Legislature established a Brownfield Remediation Loan Program in 2002 by expanding the funding activities of the Virginia Water Facilities (Wastewater) Revolving Loan Fund. The Virginia Department of Environmental Quality is authorized to make loans from the Water Facilities RLF "to local governments, public authorities, partnerships or corporations for necessary remediation activities undertaken at a brownfield site ... for the purpose of reducing ground water contamination or reducing risk to public health."²⁹ Because funding is restricted to properties afflicted with groundwater contamination, Virginia's program is narrower in scope than other state programs established pursuant to EPA's Brownfield RLF Grants. Both short-term (up to 10 years) and long-term (10-20 year) loans are available, ranging from \$10,000 (minimum) to \$1,000,000 (maximum).³⁰ Loans can be used to cover the costs associated with remediation of a contaminated site, reimbursement of outside services (i.e., engineering services) to facilitate remediation of the site, and costs associated with title searches and related title work.³¹

D. Energy Efficiency and Conservation Revolving Loan Funds

²⁴ ENVIRONMENTAL PROTECTION AGENCY, DRINKING WATER STATE REVOLVING FUND: 2009 ANNUAL REPORT 4 (2010).

²⁵ *Id.*

²⁶ VA. CODE ANN. § 62.1-234.

²⁷ *Id.* §§ 62.1-238 and 62.1-239.

²⁸ *Id.* § 62.1-239.1.

²⁹ VA. CODE ANN. § 62.1-229.2.

³⁰ Virginia's Brownfield Remediation Loan Program, Virginia DEQ, <http://www.deq.state.va.us/Programs/Water/CleanWaterFinancingAssistance/Brownfield.aspx>.

³¹ *Id.*

The Energy Efficiency and Conservation Block Grant (EECBG) program is authorized under Title V, Subtitle E of the Energy Independence and Security Act of 2007. The EECBG program is modeled after the Department of Housing and Urban Development's Community Development Block Grant program and is intended to assist states, Indian tribes, and local governments in developing, implementing, and managing energy efficiency and conservation projects.³² The EECBG program was first funded by Congress through the American Recovery and Reinvestment Act of 2009 (ARRA), which appropriated \$3.2 billion for block grants to states, local governments, and Indian Tribes.³³ To extend the impact of the ARRA funds, the ARRA encouraged block grant recipients to establish long-term funding mechanism such as RLFs.³⁴

Local governments and Indian tribes seeking to capitalize RLFs were limited to either 20% of their Department of Energy funding allocations or \$250,000, whichever was greater.³⁵ RLFs established by states were not subject to this limitation. Administrative costs were capped at 10% for states and the greater of 10% or \$75,000 for eligible local governments and tribes.³⁶ The ARRA required that the initial capitalization funds be loaned within three years of the effective date of the award but no later than September 30, 2015.³⁷ Money recaptured from the repayments on these initial loans could be used for future loans.³⁸

Virginia did not use its ARRA funds to establish a RLF. Rather, the state's Energy Efficiency and Conservation Strategy directed "all of the state's allocation of \$16.1 million in Energy Efficiency and Conservation Block Grant funds to benefit localities and devotes two-thirds of the funds to create and encourage enduring, self-sustaining programs to improve energy efficiency in public and private buildings."³⁹ The remaining EECBG funds were allocated to financing renewable energy systems for local public facilities.⁴⁰

III. Virginia RLF Programs

A. Virginia Airports Revolving Fund

The Virginia Airports Revolving Fund was established in 2000 and was the nation's first loan fund devoted exclusively to airport financing.⁴¹ The Virginia Resources Authority (VRA) manages the Fund in partnership with the Virginia Aviation Board and the Virginia Department of Aviation. The General Assembly capitalized the Fund with a \$25 million state appropriation.⁴² The Fund is used to make loans

³² U.S. Department of Energy, Weatherization & Intergovernmental Program, Energy Efficiency and Conservation Block Grant Program, <http://www1.eere.energy.gov/wip/eeecbg.html>.

³³ *Id.*

³⁴ Sam Booth, National Renewable Energy Laboratory, Revolving Loan Funds 1 (2009).

³⁵ *Id.* § 17155(b)(3)(B).

³⁶ *Id.* § 17155(b)(3)(A).

³⁷ Energy Efficiency and Conservation Block Grant Program Notice 10-002, Dept. of Energy, Dec. 7, 2009, *available at* http://www1.eere.energy.gov/wip/solutioncenter/pdfs/eeecbg_rlf_program_120709.pdf.

³⁸ Revolving Loan Funds and the State Energy Program 1 (2009), http://www1.eere.energy.gov/wip/pdfs/sep_rlf.pdf.

³⁹ Virginia Department of Mines, Minerals, and Energy, Energy Efficiency and Conservation Strategy for States, Attachment E (2009), *available at* <http://www.dmme.virginia.gov/de/arra-public/EECS.pdf>.

⁴⁰ *Id.*

⁴¹ Matthew Vadum, *Virginia Gears Up for Nation's First Airport Revolving Fund*, 334 BOND BUYER 26 (2000).

⁴² *Id.*

to local governments to finance or refinance the cost of airport projects.⁴³ The interest rate and terms and conditions are set by the VRA, on a case-by-case basis.⁴⁴ Loans may not exceed the costs of the proposed project.⁴⁵ To date, the VRA has originated over \$87 million in below market interest rate loans to assist with more than 30 projects across 20 airports.⁴⁶

B. Virginia Dam Safety, Flood Prevention and Protection Fund

The Virginia Dam Safety, Flood Prevention and Protection Assistance Fund⁴⁷ was established in 1989 to improve dam safety and assist with flood prevention and protection projects. The VRA, in cooperation with the Virginia Department of Conservation and Recreation (VDCR), manages the Fund which was capitalized through a state appropriation. The VRA administers the program, but project eligibility, criteria, and selection is directed by the VDCR.⁴⁸

Both grants and loans are authorized. Grants and loans are available to local governments for dam repair, dam hazard classification studies, and the implementation of flood prevention projects.⁴⁹ Loans are available to private owners of impoundment structures for the design, repair, and safety modifications of dams identified in VRA safety reports (i.e., with deficiencies that could threaten life or property).⁵⁰

Despite a legislative directive that “Priority shall be given to making loans for high hazard dams,”⁵¹ it does not appear that any loans have originated under the Fund. According to historic VDCR regulations in effect until 2006, loans were to be the primary means for providing assistance and loans would be made for 20-year terms at 3% interest.⁵² However, in 2006, the Virginia General Assembly transferred administrative authority to the VRA and removed the authority of the VDCR to promulgate regulations with respect to the Fund. The VRA website does not contain information or guidance with respect to dam safety loans. The VDCR website provides a link to the 2013 Grant Manual for the Virginia Dam Safety, Flood Prevention, and Protection Assistance Fund, but no information on the availability of loans.⁵³ The only other reference found with respect to loan funding is a brief summary on the website of the Association of State Dam Safety Officials that indicates two dam owners applied for loans in early 2008, both requesting \$300,000, but ultimately declined to participate.⁵⁴

C. Virginia Fish Passage Grant and Revolving Loan Fund

⁴³ VA. CODE ANN. § 5.1-30.5.

⁴⁴ *Id.* §5.1-30.5.

⁴⁵ *Id.*

⁴⁶ Virginia Resources Authority, Virginia Airports Revolving Fund, <http://www.virginiareources.org/airports.shtml> (last visited June 10, 2013).

⁴⁷ VA CODE ANN. § 10.1-603.17.

⁴⁸ *Id.* § 10.1-603.18.

⁴⁹ *Id.* §§ 10.1-603.19(A) and (C).

⁵⁰ *Id.* § 10.1-603.19(c)(i).

⁵¹ *Id.* § 10.1-603.20(B).

⁵² 4 VA. ADMIN. CODE § 5-50-80 (2006).

⁵³ Virginia Department of Conservation and Recreation, Dam Safety, Floodplain Management, http://www.dcr.virginia.gov/dam_safety_and_floodplains/ (last visited June 11, 2013).

⁵⁴ Association of State Dam Safety Officials, Virginia Dam Safety Program <http://www.damsafety.org/map/state.aspx?s=47> (last visited June 11, 2013).

The Virginia Fish Passage Grant and Revolving Loan Fund was established in 1989. The Virginia Department of Game and Inland Fisheries, in consultation with the Virginia Marine Resources Commission, is authorized to provide financing assistance for the construction of fishways. Eligible applicants include local governments and private entities that own a dam or other artificial impediment to the free passage of anadromous fish.⁵⁵ For local government projects, the Fund may be used to cover 75% of the entire cost of the fishway with the balance of the cost lent to the local government.⁵⁶ The loans may be repaid over ten years at no interest or over 20 years at an annual interest rate “which shall be two percentage points below the rate for municipal bonds given in the latest Bond Buyer Twenty Bond Index appearing before the loan is made.”⁵⁷ The DNR must approve the fishway design before making a loan for a particular project.

For private borrowers, the loan terms may not exceed 20 years and the interest rates vary based on the percentage of project costs borrowed.⁵⁸ If the loan exceeds 50% of the estimated project cost, “the interest rate shall be the prime rate for major money center banks, as reported by the latest edition of The Wall Street Journal appearing before the loan is made.”⁵⁹ If the loan is less than 50% of the estimated costs, the interest rate “shall not be less than three percentage points below such prime rate.”⁶⁰

D. Preservation Virginia Revolving Loan Fund

Preservation Virginia administers a revolving loan fund to acquire endangered significant historic properties to save them from demolition or severe neglect.⁶¹ Properties acquired through this program are placed under protective easement with the Virginia Department of Historic Resources and then sold to new owners who must agree to take on rehabilitation of the property. Proceeds from the sale of the properties are used to replenish the fund. The program was capitalized by the Commonwealth of Virginia in 1989 and transferred to Preservation Virginia in 1999.⁶² The Fund is currently valued at approximately \$1.5 million.⁶³

Although recapitalization of the fund has been impeded due to fluctuations in the real estate market which have required Preservation Virginia to hold on to properties for extended periods of time, the director views the program as a success.⁶⁴ The existence of the fund enables Preservation Virginia staff to build awareness for saving historic properties when meeting with property owners in the field. According to program director, the fund is a starting point for talking about solutions for the property owners even if they end up not participating in the program. In some instances, the staff of Preservation Virginia have been able to act as a “matchmaker,” finding buyers for these threatened properties.⁶⁵

⁵⁵ VA. CODE ANN. §§ 29.1-101.5 and 29.1-101.6.

⁵⁶ *Id.* § 29.1-101.5.

⁵⁷ *Id.*

⁵⁸ *Id.* § 29.1-101.6.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ <http://preservationvirginia.org/programs/revolving-fund-program>.

⁶² Preservation Virginia, Revolving Fund Program, Frequently Asked Questions, <http://www.apva.org/revolvingfund/>. See also, VA. CODE ANN. § 10.1-2404.1.

⁶³ Preservation Virginia, Revolving Fund Program, Frequently Asked Questions, <http://www.apva.org/revolvingfund/>.

⁶⁴ Phone interview with Elizabeth Kostelny, Executive Director, Preservation Virginia, May 21, 2013.

⁶⁵ *Id.*

Preservation Virginia currently is looking into options to partner with local governments when purchasing homes, but they have not pursued anything to date.⁶⁶

IV. Other States

A. Lake Erie Coastal Erosion Loan

In 1999, the Ohio Legislature authorized the Coastal Erosion Control Loan Program. Through this program, the Ohio Water Development Authority (OWDA) is authorized to issue a loan to a county to provide financial assistance to property owners in designated coastal erosion areas seeking to construct erosion control structures.⁶⁷ Demand for this loan program has been almost non-existent.⁶⁸ Although the program was capitalized through a \$10,000,000 transfer of state funds,⁶⁹ only three loans totaling less than \$1 million have been made through one participating county (Lorain). According to the loan information available on OWDA's website, as of December 31, 2012, Lorain County has two loans currently outstanding (totaling \$661,000) with unpaid balances of \$279,296.14. The 15-year loans were originated in 2003 and 2008 with interest rates of 5.34% and 4.67% respectively.

Two factors may account for the lack of demand: high construction costs and program complexity. The Coastal Erosion Control Loan Program made financing available for "erosion control structures," which are defined as structures "designed solely and specifically to reduce or control erosion of the shore along or near Lake Erie, including, without limitation, revetments, seawalls, bulkheads, certain breakwaters, and similar structures."⁷⁰ These projects can be quite expensive. In addition to the costs of labor and materials, the services of coastal engineers and surveyors are needed to prepare construction plans and obtain necessary permits. Even with financing, shoreline property owners may have been reluctant or unable to incur the costs associated with engineered projects.

In addition, the loan program's structure is complex and dependent on the willingness of county governments to participate. Of the eight counties eligible to participate in the program, Ohio's Office of Coastal Management website identifies only five as participants.⁷¹ Of those five, only Lorain County has actually utilized the program. Like property owners, county governments may have been unwilling or unable to assume financial and administrative authority for a new loan program.

Loans are not made directly to the property owner. Nor does the money actually flow through the county. The county applies for the loan, but the law requires ODWA to make payments to the contractor hired by the property owner to construct the erosion control structure pursuant to terms specified in a written agreement between the property owner and county.⁷² The county repays the loan through the collection of payments from the property owner pursuant to a schedule set forth in the written agreement. If the property owner fails to abide by the terms of the agreement (i.e., make the payments on the county's loan), the county remains responsible for loan repayment. Although the law

⁶⁶ *Id.*

⁶⁷ OHIO REV. CODE § 1506.44(A).

⁶⁸ Phone call with Steven Grossman, Executive Director, Ohio Water Development Authority, April 24, 2013.

⁶⁹ Ohio Water Development Authority, Audited Financial Statements For the Fiscal Year Ended December 31, 2012, at 18.

⁷⁰ OHIO REV. CODE § 1506.40(L).

⁷¹ http://ohiodnr.com/Ohio_Coast/RegulatoryHome/ErosionControlLoansGuide7/tabid/9292/Default.aspx.

⁷² *Id.* § 1506.44(2).

allows the county to place a lien on the property for any unpaid amounts under the agreement and collect through property taxes,⁷³ the county is prohibited from obligating funds raised by taxation for repayment of the loan.⁷⁴

B. Maryland Shore Erosion Control Construction Loan Fund

The Maryland General Assembly created the Shore Erosion Control Construction Loan Fund in 1971 to provide interest-free loans or grants to property owners and local governments for shore erosion control projects.⁷⁵ Shore erosion control projects include both structural projects, such as bulkheads or groins, and nonstructural projects, such as measures required to stabilize waterside, shorelines, and streambanks.⁷⁶ However, since 1997, the Maryland Department of Natural Resources (DNR) has focused its resources on nonstructural erosion control.⁷⁷ Any individual owning property abutting a state water may request the DNR's assistance in the design, construction, and financing of a shore erosion control project for the property.⁷⁸

Financial assistance for non-structural projects may be awarded as 5-, 15-, or 20-year interest-free loans.⁷⁹ According to DNR, 15-year private loans are rare. The majority of DNR's loans are 20-year loans issued to a community or group of landowners collectively seeking financial assistance.⁸⁰ The amount of the loan is determined in accordance with the loan formula of the Shore Erosion Control Law, which provides that property owners may "receive an interest-free loan covering 100% of the first \$60,000 of project construction cost, 50% of the next \$20,000 of project construction cost, 25% of the next \$20,000 of project construction cost, and 10% of the part of construction cost exceeding \$100,000."⁸¹ Local governments may borrow the full costs of approved projects, as they are not subject to the project construction cost limitation applicable to private borrowers.⁸² Financial assistance, in the form of either grants or loans, is not available for structural projects.⁸³

The loans issued pursuant to the Fund are not loans in the traditional sense, where the borrower receives funds, incurs expenses, and repays the loan. Rather, the state enters into an agreement with the property owner regarding the specifics of the project.⁸⁴ The DNR's Chesapeake and Coastal Service Shoreline Conservation Service helps guides the property owners through the award and construction

⁷³ *Id.* § 1506(B)(3).

⁷⁴ *Id.* § 1506(C).

⁷⁵ MD. CODE ANN, NAT. RES. § 8-1005(a)(1).

⁷⁶ *Id.* § 8-1001(g).

⁷⁷ Maryland General Assembly, Department of Legislative Services, Fiscal Note for H.B. 200 (Shore Erosion Control Construction Loan Fund) (Jan. 25, 2001).

⁷⁸ MD. CODE ANN, NAT. RES. § 8-1003(a).

⁷⁹ Maryland Department of Natural Resources, Introduction – Shore Erosion Control, <http://dnr.maryland.gov/ccp/sec/secintro.asp> (last visited June 11, 2013).

⁸⁰ Phone interview with Bhaskaran Subramanian, Ph.D., Program Manager, Habitat Restoration and Conservation, Maryland Department of Natural Resources, June 12, 2013.

⁸¹ MD. CODE ANN., NAT. RES. § 8-1005(a)(3). In practice, this loan formula is only applied to 15- and 20- year loans. For 5-year loans involving marsh creation/protection using natural/living materials, referred to by DNR as Type 1 projects, the DNR limits loans to 75% of project costs. MARYLAND DEPARTMENT OF NATURAL RESOURCES, FINANCIAL ASSISTANCE FOR SHORE EROSION CONTROL PROJECTS MATRIX (2008) (on file with authors).

⁸² *Id.* § 8-1005(a)(f).

⁸³ Maryland Department of Natural Resources, *supra* note 79.

⁸⁴ MD. CODE ANN., NAT. RES. § 8-1005(d).

process.⁸⁵ The state then recoups its costs through a benefit charge on the benefited property levied by the Maryland Board of Public Works.⁸⁶ The benefit charge, which is calculated to return to the state the net project construction costs, is payable in annual installments over a period of up to 25 years.⁸⁷ In practice, the repayment period for the benefit charge matches the loan term (i.e., 5, 15, or 20 years). On average, the program receives about \$600,000 to \$700,000 in loan repayments annually and funds 15-20 projects each year.⁸⁸

C. North Carolina Hurricane Flood Protection and Beach Erosion Control Project Revolving Fund

To assist local governments in meeting their nonfederal cost-share requirements for hurricane protection and beach erosion projects (i.e., beach renourishment projects), the North Carolina Legislature established the Hurricane Flood Protection and Beach Erosion Control Project Revolving Fund.⁸⁹ The law authorizes the Department of Environment and Natural Resources to advance funds to county and municipal governments for planning and engineering work, construction costs, acquisition or relocation costs, and maintenance.⁹⁰ Repayment is authorized in equal installments or lump sum, but the term may not exceed 10 years.⁹¹

The legislation authorizing this program was passed in 1971. The Fund was capitalized, but only one community ever borrowed money from it.⁹² The Town of Carolina Beach took advantage of the program to cover its share of a federal storm damage reduction project, and subsequently repaid the loan.⁹³ Not surprisingly, given the lack of use, the State eventually reallocated the money from the Fund to another purpose during a tight budget year.⁹⁴ The authority to operate the Fund remains, but currently there is no funding from which to make any loans.

V. Non-governmental Revolving Loan Funds

A. Great Lakes Revolving Fund

The Conservation Fund, a nonprofit land conservation organization headquartered in Arlington, Virginia, manages the Great Lakes Revolving Fund. The Fund was established in 2002 and capitalized through a \$7.3 million gift from the Charles Stewart Mott Foundation.⁹⁵ The Conservation Fund uses the Great Lakes Revolving Fund to provide “technical assistance and bridge financing to nonprofit land trusts working to preserve resources within the Great Lakes Basin.”⁹⁶ Short-term loans are available for two primary types of transactions: (1) direct loans to land trusts and (2) advance purchase of land on behalf

⁸⁵ Subramanian, *supra* note 80.

⁸⁶ *Id.* §§ 8-1005(d)(7) and 8-1006.

⁸⁷ *Id.* § 8-1006(a).

⁸⁸ Subramanian, *supra* note 80.

⁸⁹ N.C. GEN. STAT. § 143-215.62.

⁹⁰ *Id.* § 143-215.62(a).

⁹¹ *Id.* § 143-215.62(c).

⁹² Email from John Sutherland to Darren England, North Carolina Division of Water Resources, May 23, 2013.

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ The Conservation Fund, Great Lakes Revolving Fund, <http://www.conservationfund.org/our-conservation-strategy/focus-areas/conservation-finance/great-lakes-revolving-fund/> (last visited June 11, 2013).

⁹⁶ *Id.*

of a public agency or nonprofit.⁹⁷ The Conservation Fund has, on average, used the revolving funds three times every five years to support a variety of land conservation projects in the Great Lakes.⁹⁸ The Conservation Fund generally lends up to \$2 million per project, with a two-year repayment period and interest rates at 70% of the prime rate.⁹⁹

B. University Green Funds

A number of Universities across the country, struggling with how to finance energy efficiency projects on campus in the face of budget cuts and other challenges, have established “green revolving funds” (GRF). GRFs “invest in energy efficiency upgrades and projects that decrease resource use, thereby lowering operating expenses. These operational savings are returned to the fund and then reinvested in additional projects.”¹⁰⁰ Although not always revolving loan programs in the traditional sense, these funds do enable institutions to invest in a revolving set of projects on their campuses.

According to the Sustainable Endowments Institute, the oldest GRF was founded in 1980 at Western Michigan University.¹⁰¹ As of 2011, 47 institutions had GRFs with about an even split between public and private institutions.¹⁰² The initial capital for the GRFs has come from a range of sources including University administration, donors, endowments, and student fees.¹⁰³ Harvard’s Green Loan Fund, for example, is a \$12 million revolving loan fund that provides up-front capital for projects that reduce Harvard’s environmental impact.¹⁰⁴ The recipient (university departments) “agree to repay the fund via savings achieved by project-related reductions in utility consumption, waste removal, or operating costs.”¹⁰⁵ There is a \$500,000 limit per conservation measure with a payback period of 5 years or less.¹⁰⁶ Payback schedules are based on annual savings, and an annual 3% administrative fee is added to the loan.¹⁰⁷ To date, Harvard’s Green Loan Fund has invested \$15.1 million in more than 192 projects generating more than \$4.8 million in savings.¹⁰⁸

VI. Conclusion

Revolving loan funds, when structured properly and implemented effectively, can reduce borrowing costs and provide financial assistance to borrowers who may not have access to other capital. Despite the benefits offered, however, many RLF programs examined during the course of this study appear underutilized as applicants prefer to apply for grants when available. Of the RLF programs examined, Maryland’s Shore Erosion Control Construction Loan Program is the most promising model. In addition to focusing on nonstructural erosion control, which includes living shoreline-type programs, the RLF has

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ Press Release, Charles Steward Mott Foundation, Revolving Loan Fund Strengthens Great Lakes Land Conservation, Nov. 4, 2008, available at <http://www.mott.org/news/news/2008/GLRLF>.

¹⁰⁰ SUSTAINABLE ENDOWMENTS INSTITUTE, GREENING THE BOTTOM LINE 7 (2011), available at <http://greenbillion.org/wp-content/uploads/2011/10/GreeningTheBottomLine.pdf>.

¹⁰¹ *Id.* at 10.

¹⁰² *Id.* at 10-11.

¹⁰³ *Id.* at 17-18.

¹⁰⁴ Sustainability at Harvard, Green Loan Fund, <http://green.harvard.edu/loan-fund> (last visited June 11, 2013).

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

been operating for more than 40 years with steady demand for financing assistance. In Virginia, the most promising model is the Agricultural BMP Loan Program. This RLF facilitates a significant number of projects by providing financial assistance to individual property owners and many of the eligible BMPs, like streambank stabilization, are similar to living shoreline projects.

Before implementing an RLF, proponents need to consider a range of issues and develop various policies, procedures, and systems. In general, proponents are encouraged to:

- Review information provided on existing programs;
- Establish the purposes and goals of the RLF;
- Identify allowed and prohibited uses of funds;
- Set requirements for borrowers, including eligibility, reporting, insurance or collateral;
- Set the loan terms, including maximum length, maximum and minimum loan amounts, administrative fees, interest rates, repayment, default and delinquency;
- Set up a committee to review loan applications;
- Identify administrative duties and staffing needs for the program;
- Develop forms for the program, such as loan application, loan disbursement, and reporting;
- Define a matrix for selecting projects;
- Promote the RLF and capitalize with funds;
- Provide loans and technical assistance; and
- Track and monitor existing loans.¹⁰⁹

Regardless of an RLF's scale and reach, these programs can engender positive change in communities by raising awareness of alternative solutions to local problems. For example, in addition to preserving historic properties through its RLF program, Preservation Virginia has also been able to use its program as a platform to discuss solutions with homeowners. Similarly, a Living Shorelines RLF in Virginia could provide loans to qualified and interested borrowers and, at a minimum, raise the visibility of living shorelines as an option for others looking into shoreline rehabilitation.

A Living Shorelines RLF could potentially be accomplished through VA. CODE ANN. § 62.1-229.3, which authorizes the issuance of low-interest loans from the Virginia Water Facilities Revolving Fund for land acquisition to protect or improve water quality or protect natural or open space values. Because of the water quality benefits of living shorelines, financing might be available under § 62.1-229.3 to acquire conservation easements over a living shoreline to protect the water quality investment. Although this mechanism would not directly provide funds for the installation of a living shoreline, it could possibly provide an incentive and indirect source of funding to a property owner through the transfer of a conservation easement.

¹⁰⁹ SAM BOOTH, NATIONAL RENEWABLE ENERGY LABORATORY, REVOLVING LOAN FUNDS 5-9 (2009).

APPENDIX C

Product #4

COLLEGE OF WILLIAM AND MARY
CENTER FOR COASTAL RESOURCES MANAGEMENT RESOURCES MANAGEMENT
VIRGINIA INSTITUTE OF MARINE SCIENCE

Living Shoreline Funding Questionnaire

Pam Mason and Christine Tombleson

7/24/2013

Introduction

Many shoreline managers and practitioners have looked for options to create incentives which would promote the use of living shorelines. Most have suggested that financial incentives could be helpful. One possible incentive would be the availability of low-interest loans.

The Middle Peninsula Planning District Commission received funding from the Virginia Coastal Zone Management Program under Grant NA12NOS4190168 Task 54 to assess the feasibility of incentivizing the use of living shorelines through a revolving loan fund program. To gauge the extent to which access to low-interest loans might influence a homeowner's decision as to whether to install a living shoreline as opposed to a more conventional erosion control system, MPPDC partnered with VIMS, CCRM to survey property owners who had recently installed shoreline erosion control measures. The Center for Coastal Resources Management, Virginia Institute of Marine Science gathered information on property owners' interest in low-interest loans for living shorelines projects. The information was gathered via a questionnaire.

Identification of property owners to receive a questionnaire was done using a permit database. Property owners were selected from Joint Permit Applications submitted from years 2009-2011. In the process of application review, CCRM/ VIMS assessed the environmental parameters of the applicants' shoreline to determine the preferable management approach. All those applications for which VIMS had determined that a living shoreline approach would be feasible and provide the desired erosion protection for their property were selected. This included those applications that were for living shorelines projects and those that requested a more "conventional" form of shoreline erosion control. In each instance the preference for the use of a living shoreline had been identified via a VIMS report as part of the permit review process.

We sent questionnaires to all 430 property owners who received a recommendation for a living shoreline from VIMS. Of these, 316 questionnaires were sent to property owners who applied for a conventional structure and 114 were sent to those who applied for a living shoreline. We got a 36% return on the questionnaires sent to those requesting conventional structures (114) and a 36% return from the living shoreline group (41). Results are presented for each question, by group, except for the one question asked of both groups presented at the end.

Conventional Structures Questionnaire Responses

Almost half of those property owners requesting conventional structures were familiar with living shorelines while almost 40% were not familiar. Of those respondents not familiar, only 20 percent indicated that better understanding would have increased the likelihood of their using living shorelines. However, an additional 40% responded that better understanding might increase the likelihood of using that approach. This means that there are still opportunities to promote the use of living shorelines through education.

As to why property owners choose conventional structures, about 40% indicated they were not aware of a living shoreline option. Of the other responses, uncertainty of effectiveness was given as the reason in 22% of the responses. Seven percent thought it wouldn't work in their situation. It may be appropriate to include these in the "uncertainty of effectiveness" category. A few responded that they had previously tried a living shoreline that failed. This raises the question as to the proper approach and design used by/ for the applicants' property. There were also a small percentage of shoreline property owners that did not like the aesthetics of a living shoreline.

It does appear that the option of a below-market loan would provide incentive for use of living shorelines. In response to whether a below-market loan would have influenced a choice for a living shoreline almost half (49%) responded "no", however 25% responded "yes" and "maybe" represented 23% of responses. Based on this response rate, half of the property owners indicated that a low interest loan would, or might, influence their selection of a living shoreline approach to erosion control on their property.

1. Property owners familiar with living shorelines:

- 55 (48%) were familiar with living shoreline practices and their benefits when they developed their application
- 14 (12%) were maybe/sort of familiar with living shorelines
- 45 (39%) were not familiar with living shorelines

2. Reasons property owners chose conventional structures over living shorelines?

- a. 38% were not aware of living shoreline option
- b. 22% had concerns regarding the adequacy of the living shoreline practice to control erosion.
- c. 12% had concerns over cost
- d. 7% did not think it would work for their situation
- e. 6% previously tried grass/living shoreline and they failed
- f. 5% had concerns over the aesthetics of a living shoreline
- g. Other reasons given:
 - replacing or repairing an existing structure
 - concerns over time to implement
 - wanted to be consistent with their neighbors
 - wanted to control upland runoff
 - living shoreline would require the loss of trees
 - felt their proposal provided enough natural resource benefits
 - the rest of the shoreline was natural and they were not stabilizing the entire shoreline
 - wanted to maintain the ability to operate boats from the property
 - other advisors that said they needed something other than a living shoreline

3. For those not familiar with living shorelines: Would familiarity (understanding) have increased your likelihood of using a living shoreline?

- Yes - 20%
- No - 36%
- Maybe - 40%
- No comment - less than 1%

4. For property owners who installed conventional structures: Would a below market loan have influenced your decision to construct a living shoreline if one had been available?

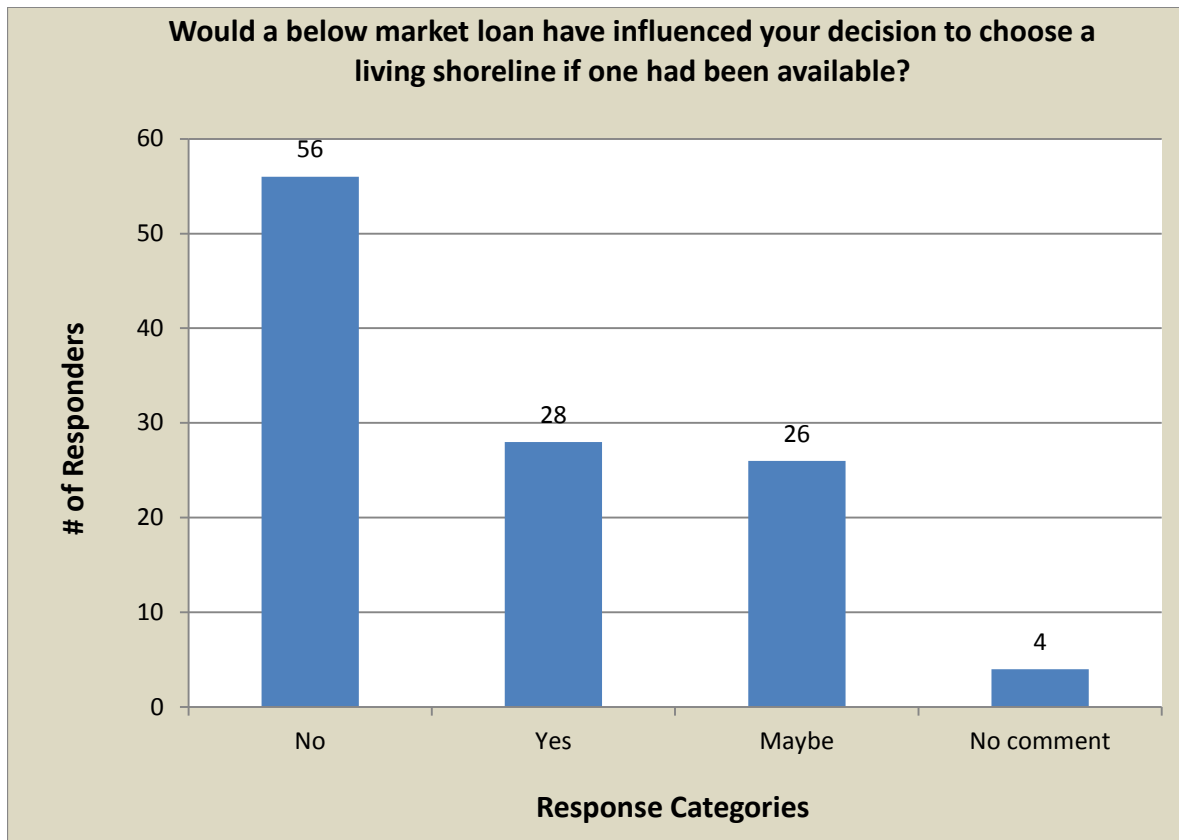


Figure 1 Below market loan for living shoreline in place of conventional structure

Select Responses:

- A. **No**, not interested in the loan (49%):
- No, I have the money
 - No, I prefer to pay in full
 - No, finances had nothing to do with the decision
 - This is a business I think the government should stay out of
 - No, the cost was way out of ability to pay

- The loan is not attractive to me as I have been able to cover the costs of the endeavor and would be daunted by the associated paperwork particularly if a government agency became involved in the transaction
 - No, the main concern was preventing erosion of the bank by installing riprap.
 - Not in our case. Almost all waterfront landowners have the resources to pay for shoreline improvement. I suggest you forget this “Loan Program” and work on something more important. The last thing we need is another highly paid bureaucracy to administer another unnecessary government program.
 - I would have liked the loan for the bulkhead. The government should provide a tax credit for stopping erosion.
 - No (with an exclamation point!)
 - Needed protection more than anything else
 - I prefer to pay in full for jobs like this so they cost the least.
 - No. We did what was needed to stop erosion of the bank
 - I self-financed the seawall. It was very expensive. It was that or lose my property. I did not want to take out a loan for this -- I used my savings.
 - No, a living shoreline would not have worked in my situation so the loan would not have made a difference.
 - Money was not an issue. Cost effectiveness was.
 - Not a money issue. An erosion issue. Retaining wall only viable method.
- B. **Yes:** interested in the loan (25%):
- Current implementation of the act financially penalizes homeowners while subsidies are available to commercial land owners
 - Needed financial assistance to stabilize the slope
 - Yes, I have a 5 year loan that is expensive
 - Free money is always good
- C. **Maybe:** (23%):
- This is always a helpful alternative
 - I am all for keeping the shoreline natural
 - If I was not just replacing an existing structure
 - There are many other considerations beyond out of pocket expenses
 - Cost was not an issue
 - Depends on method proposed
 - If the cost of the living shoreline was equal to riprap

Living Shoreline Questionnaire Responses

Almost half of the respondents indicated that they chose to install a living shoreline for environmental reasons. About a third stated erosion control was the primary reason. As the question was written to require a choice, and did not indicate multiple choices were acceptable, some respondents provided only one reason, while others answered more than one. It is difficult to determine whether more respondents may have provided multiple reasons (such as environment and erosion control), if the

question had more clearly made multiple responses acceptable. Nevertheless, environmental consideration is obviously an important part of the living shoreline decision making process. Also a third of the respondents indicated that aesthetics of living shorelines was a primary reason for their choice.

While very few respondents obtained a loan for their projects (22%), over half indicated that they would be interested in the loan if available (56%) and another 24% thought they might be interested.

1. Reasons why property owners installed living shorelines:

- a. Habitat/Water Quality/Environmental benefits - 49%
- b. Aesthetics - 33%
- c. Shoreline erosion control - 30%
- d. Wetlands Board or staff required it (didn't necessarily want a living shoreline) - 10%
- e. No comment - 5%
- f. Least invasive approach 2.5%
- g. Right thing to do 2.5%
- h. Education 2.5%
- i. Restoration 2.5%

2. Did you obtain a loan to construct your living shoreline project?

- a. Yes – 9 (22%)
- b. No – 32 (78%)

3. For property owners who installed living shorelines: Would you be interested in a below market loan if available for construction of a living shoreline?

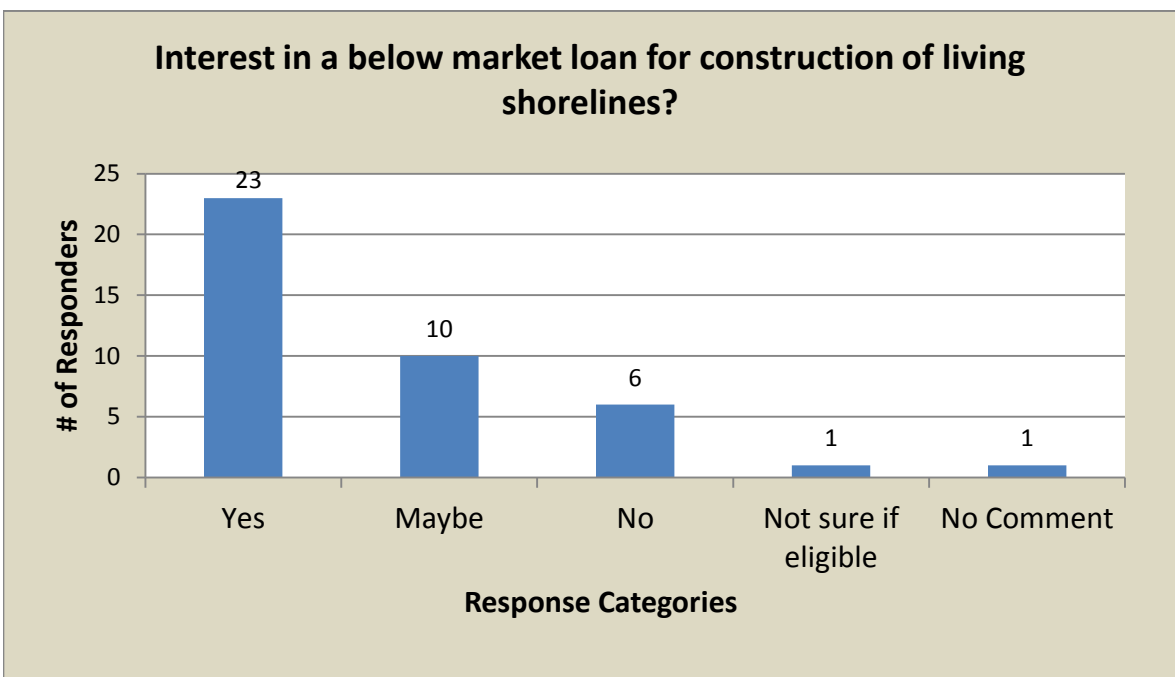


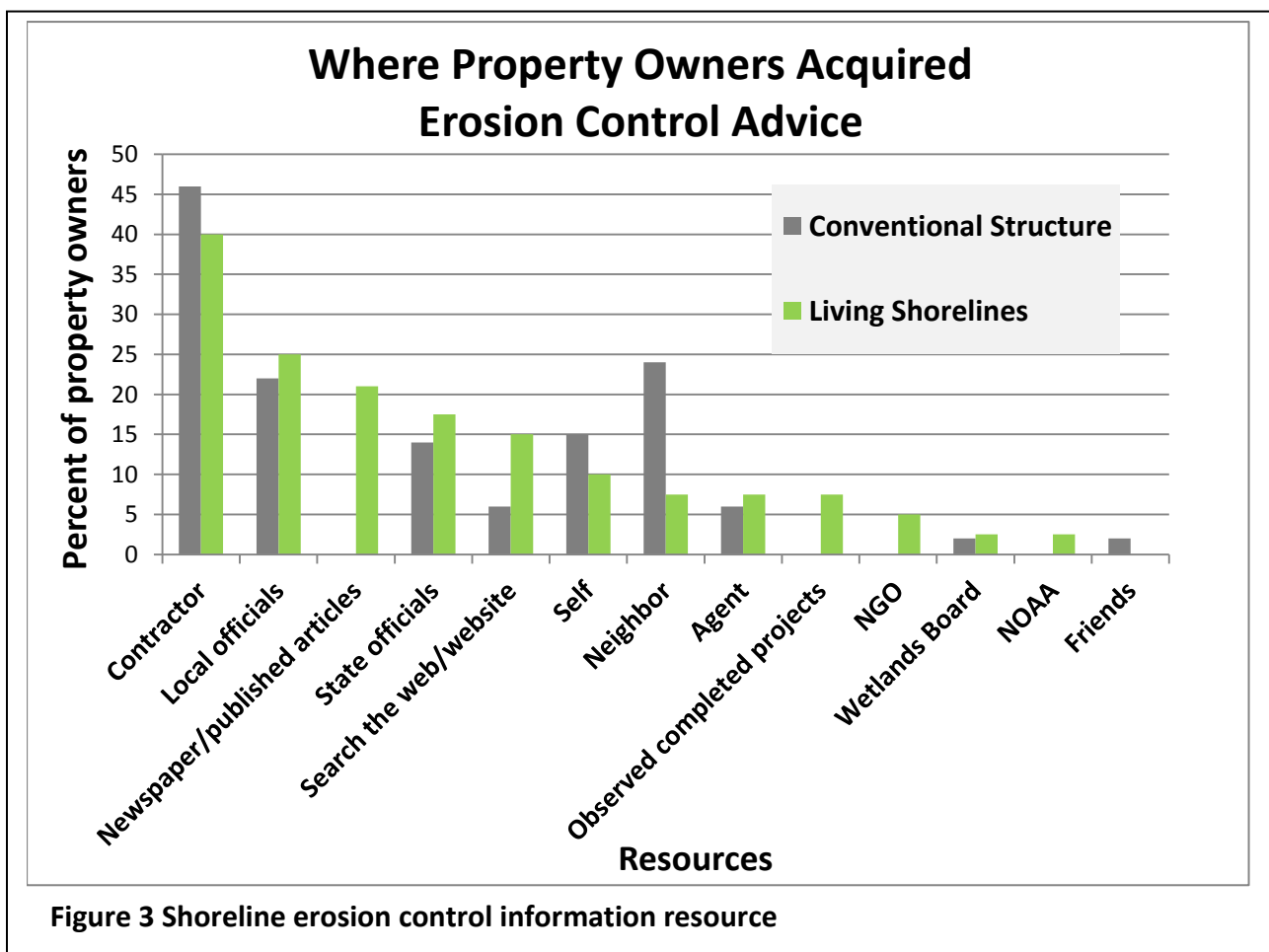
Figure 2 Below market loan to finance living shorelines

Select Responses:

- A. **Yes:** interested in the loan (56%):
- We could build larger projects
 - Yes, most definitely
 - May have done additional shoreline facing
 - Absolutely
 - Would have built sill higher
 - What we really wanted was insurance
 - Absolutely, especially if tax deductible
 - Living shorelines are expensive. It is a lot to ask of a landowner to install one without some support.
- B. **Maybe** (24%):
- Depending on terms
 - Maybe, but we don't necessarily need it
 - Maybe, but not the deciding factor (loan or cost)
 - Would prefer a grant
- C. **No** (15%):
- No, we do not need financing
 - We are retired and would not take on the debt
 - We prefer to pay for this out of savings

Where property owners acquired erosion control advice

One question was asked of both groups- “where did you get your advice?”. The results are shown in Figure 3. Several sources were used by both groups comparably; contractors, state and local officials. The conventional structure group relied more heavily on neighbors (more than 3 to 1) and self-opinion (3 to 2) than the living shoreline group. This finding appears to support common opinion among shoreline managers that folks seek approval for what their neighbors already have or are planning. Published articles, observation of projects, NGOs, and NOAA were identified as information sources exclusively by the living shorelines group. This group also identified the use of websites as a resource (15% of responses) compared to 6% of the conventional structures group. These numbers support outreach efforts as a method of communicating living shorelines information.



Appendix A

Questionnaire to Property Owners - Living Shorelines

The Center for Coastal Resources Management at VIMS is working on a collaborative project to assess interest in the possibility of low-interest financing for certain shoreline management activities that could be categorized as “living shorelines”. These activities include projects such as marsh planting, sills placed on the water side of existing or created marsh, and bank grading with buffer and marsh planting.

You may have recently received approval for, or installed a shoreline project that could be categorized as a “living shoreline”. Please take a few moments and answer a few questions about you project and return to us. The information you provide will be used only collectively with all other responses to assess the potential interest in a loan program. Answers may be returned via mail, e-mail or fax (see below).

You may also request a form to answer via email by contacting Christine@vims.edu or calling 804-684-7912 or if you have any questions regarding this questionnaire.

Thank you for your time and input!

1. How did you learn about living shoreline techniques? (contractor/agent, neighbor, newspaper article, website, state official, local official, NGO, etc.)

2. What was the primary reason you chose to install a living shoreline? (water quality/habitat benefits, aesthetics, cost, etc.)

3. Did you obtain a loan to construct your living shoreline project? (yes, no, maybe, no comments)

4. If a below market rate loan had been available for construction through a government agency, would you have been interested? (yes, no, maybe, no comments)

Please return answers to:

E-mail: Christine@vims.edu

Mail: CCRM VIMS Wetlands Program
P.O. Box 1346
Gloucester Point, VA 23062

Fax: (804) 694-7179

Thank you!

Questionnaire to Property Owners – Conventional structures

The Center for Coastal Resources Management at VIMS is working on a collaborative project to assess interest in the possibility of low-interest financing for certain shoreline management activities that could be categorized as “living shorelines”. These activities include projects such as marsh planting, sills placed on the water side of existing or created marsh, and bank grading with buffer and marsh planting.

You may have recently received approval for, or installed a shoreline project that could be categorized as a conventional structure such as a bulkhead or riprap revetment and we are interested in your opinion. Would you please take a few moments to answer the five following questions about your project? The information you provide will be used only collectively with all other responses to assess the potential interest in a loan program. Answers may be returned via mail, e-mail or fax (see below).

You may also request a form to answer via email by contacting Christine@vims.edu or calling 804-684-7912 or if you have any questions regarding this questionnaire.

Thank you for your time and input!

1. Where did you obtain your initial advice about erosion control on your property? (contractor/agent, neighbor, newspaper article, website, state official, local official, NGO, etc.)

2. At the time you developed your application, were you familiar with living shoreline practices and their benefits? (yes, no, maybe, no comment)

3. If you answered yes to question #2, what was the primary reason you decided not to use these practices? (concerns over costs, adequate control of erosion, aesthetics, neighbors opinions, etc.)

4. If you answered no to question #2, do you think you might have considered a living shoreline if you were more familiar with the concept? (yes, no, maybe, no comment)

5. If a below market rate loan had been available for construction through a government agency, do you think this might have influenced your decision? (yes, no, maybe, no comment)
-
-

Please return answers to:

E-mail: Christine@vims.edu

Mail: CCRM VIMS Wetlands Program
P.O. Box 1346
Gloucester Point, VA 23062

Fax: (804) 694-7179

Thank you!

**COLLEGE OF WILLIAM AND MARY
CENTER FOR COASTAL RESOURCES MANAGEMENT
VIRGINIA INSTITUTE OF MARINE SCIENCE**

Research on

Water Quality Benefits of Living Shorelines

Studies specific to water quality services of living shorelines are lacking in the scientific literature. There are however, studies on the water quality role of natural tidal marshes which can serve as a reference to the anticipated functions of created “living shoreline” marshes. The studies attribute tidal marshes with sediment trapping and the reduction of total suspended solids as a result of drag produced by vegetation which slow water velocity allowing deposition (Leonard, L. and A. Croft, 2006; Leonard, L.A. 1997). Fringing marshes typically constructed as part of living shoreline projects may have comparable sediment retention capacity as extensive marshes if they have similar edge habitat where the highest rates of deposition occur (Christiansen, T., et al. 2000; Neubauer, S., et al., 2002). On the other hand, there is less available literature on nutrient removal by tidal marshes and what is available indicates temporal and landscape variability on nutrient uptake and retention by marshes. Fisher and Acreman (2004) did a review of nutrient load reduction by wetlands and found that most studies show a reduction.

Christiansen, T., P. L. Wiberg, T. G. Milligan, Flow and Sediment Transport on a Tidal Salt Marsh Surface. 2000. *Estuarine, Coastal and Shelf Science*, 50(3):315-331.

Fisher, J. and M.C. Acreman. 2004. Wetland nutrient removal: a review of the evidence. *Hydrol Earth Sys Sci* 8(4): 673-685.

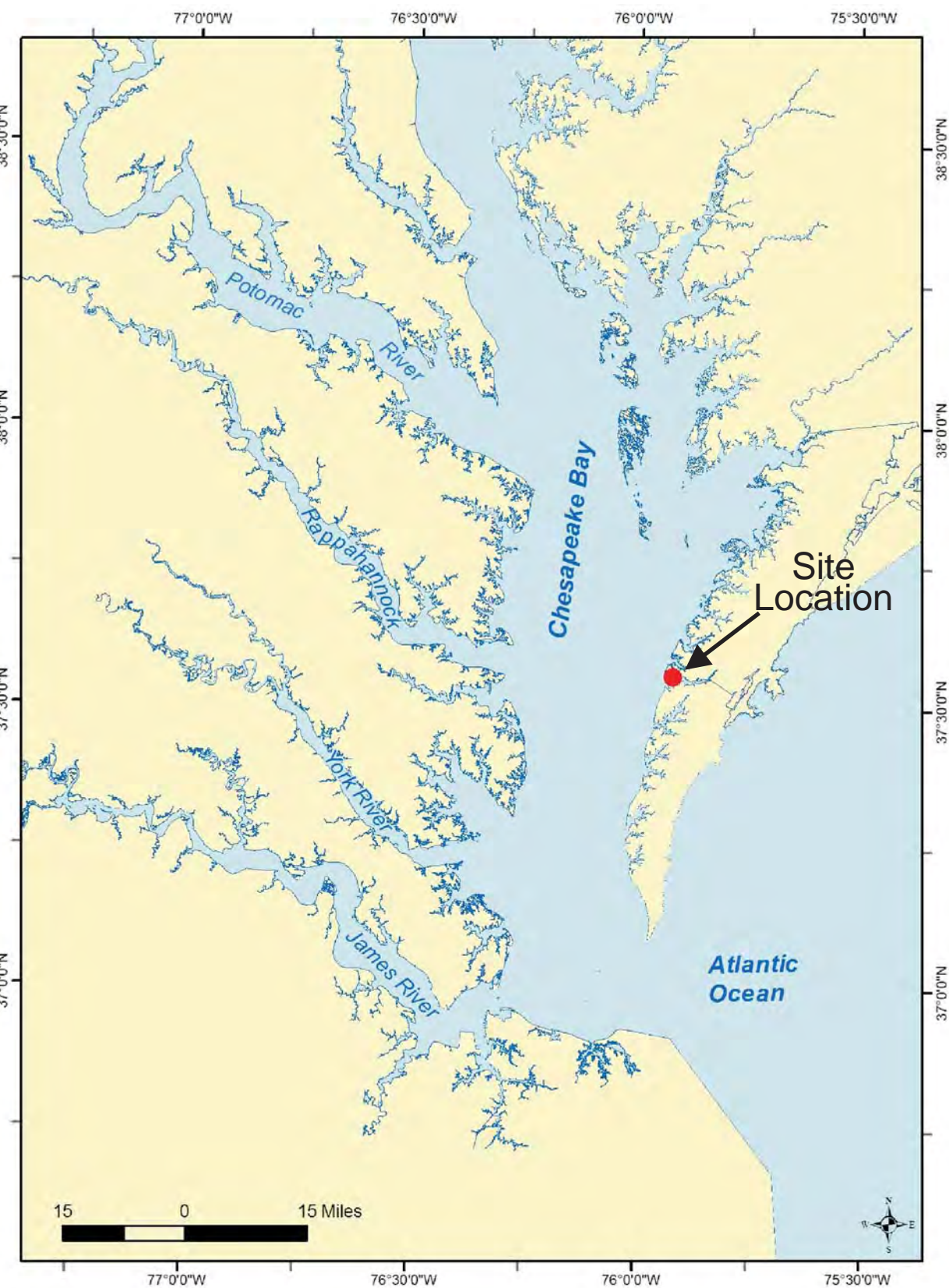
Leonard, L. and A. Croft. 2006. The effect of standing biomass on flow velocity and turbulence in *Spartina alterniflora* canopies. *Estuarine, Coastal and Shelf Science* 69:325-336.

Leonard, L.A. 1997. Controls of sediment transport and deposition in an incised mainland marsh basin, southeastern North Carolina. *Wetlands* 17: 263-274.

Neubauer, S., I.C. Anderson, J.A. Constantine, and S.A. Kuehl. 2002. Sediment deposition and accretion in a mid-Atlantic (U.S.A.) tidal freshwater marsh. *Estuar. Coast. Shelf Sci.* 54: 713-727

**COLLEGE OF WILLIAM AND MARY
CENTER FOR COASTAL RESOURCES MANAGEMENT
VIRGINIA INSTITUTE OF MARINE SCIENCE**

Living Shoreline Design Engineering Design Example: *Occohannock on the Bay Living Shoreline
Project*



Occohannock on the Bay Camp and Retreat Center Living Shoreline Project

Accomack County
Virginia



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VIRGINIA INSTITUTE OF MARINE SCIENCE

Project Title
Occohannock on the Bay
Living Shoreline Project

Issued for
Preliminary Design -
Not for Construction

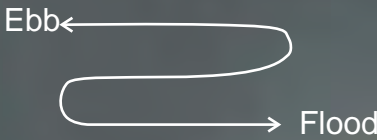
Drawing Title

Date
May 2012

Sheet
Cover



Occohannock Creek



Sheet 2

Sheet 3

Access

Access

2009 VGIN Image

Occohannock on the Bay
Camp and Retreat Center
Living Shoreline Project

Accomack County
Virginia

Legend

- ↔ Cross Sections
- Sand
- Rock
- SP = StockPile
- Index



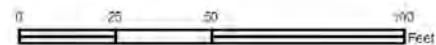
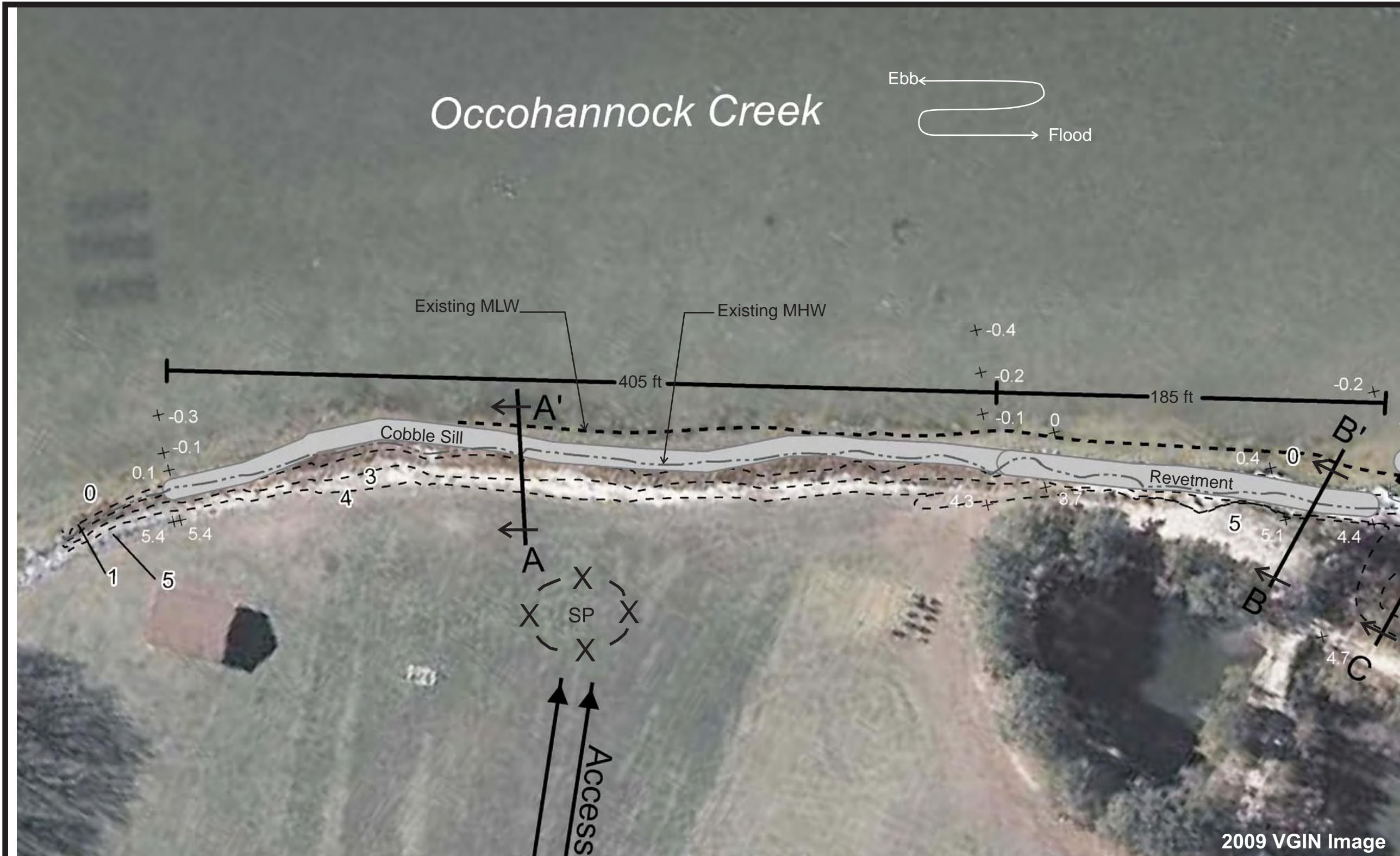
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Project Title
**Occohannock on the Bay
Living Shoreline Project**

Issued for
**Preliminary Design -
Not for Construction**

Drawing Title

Date **May 2012** Scale **1"=150'**
Sheet **1** of 4



Occohannock on the Bay Camp and Retreat Center Living Shoreline Project

Accomack County
Virginia

Legend

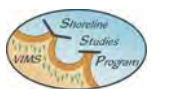
↔ Cross Sections

Sand

Rock

SP = StockPile

- - - - - Contours



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Project Title
Occohannock on the Bay
Living Shoreline Project

Issued for
Preliminary Design -
Not for Construction

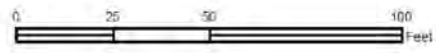
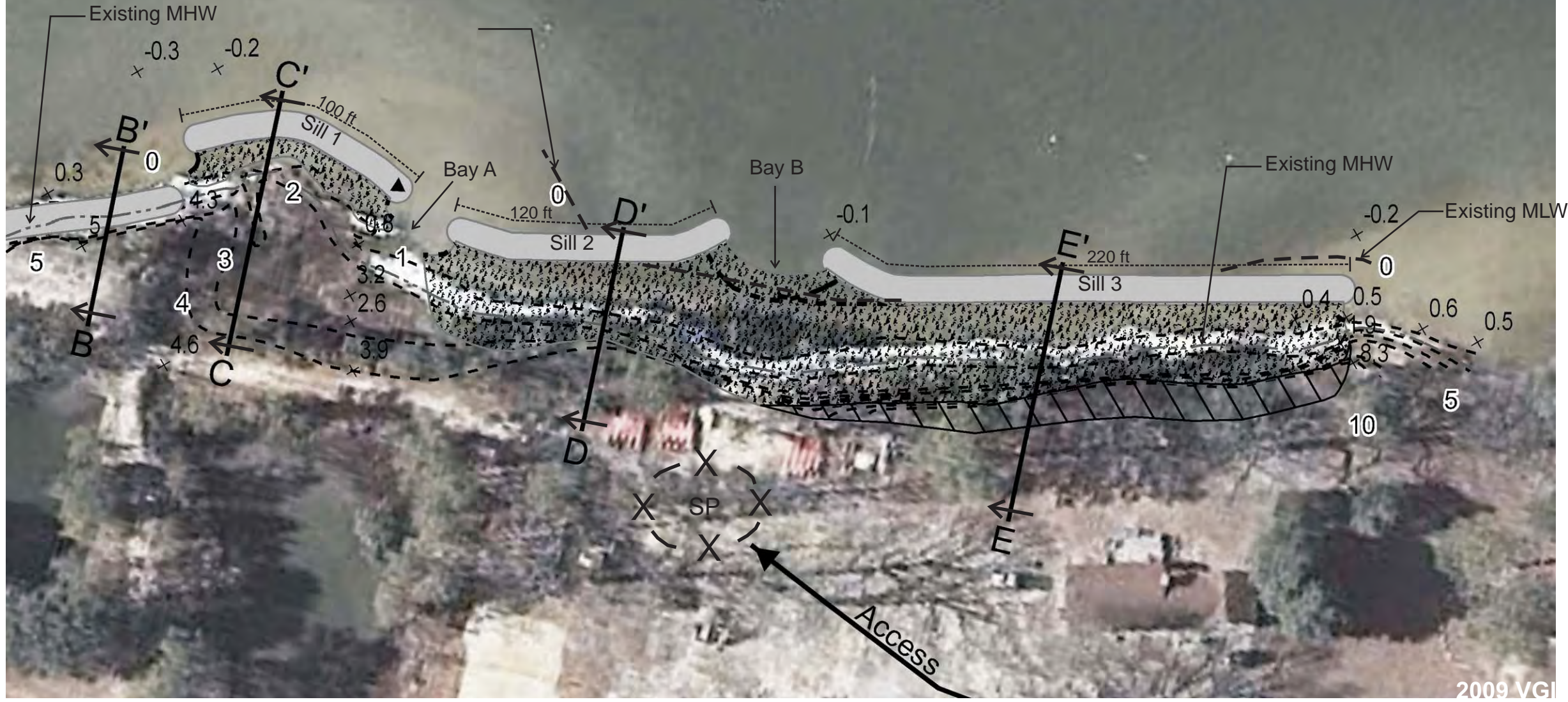
Drawing Title

Date May 2012 Scale 1"=50'

Sheet 2 of 4

Occohannock Creek

Ebb ←
→ Flood



Occohannock on the Bay
Camp and Retreat Center
Living Shoreline Project

Accomack County
Virginia

Legend

- ↔ Cross Sections
- Sand
- Rock
- Grading
- SP = StockPile
- - Contours



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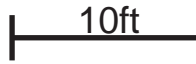
Project Title	
Occohannock on the Bay Living Shoreline Project	
Issued for	
Preliminary Design - Not for Construction	
Drawing Title	
Date	May 2012
Scale	1"=50'
Sheet	3 of 4

Accomack County
Virginia

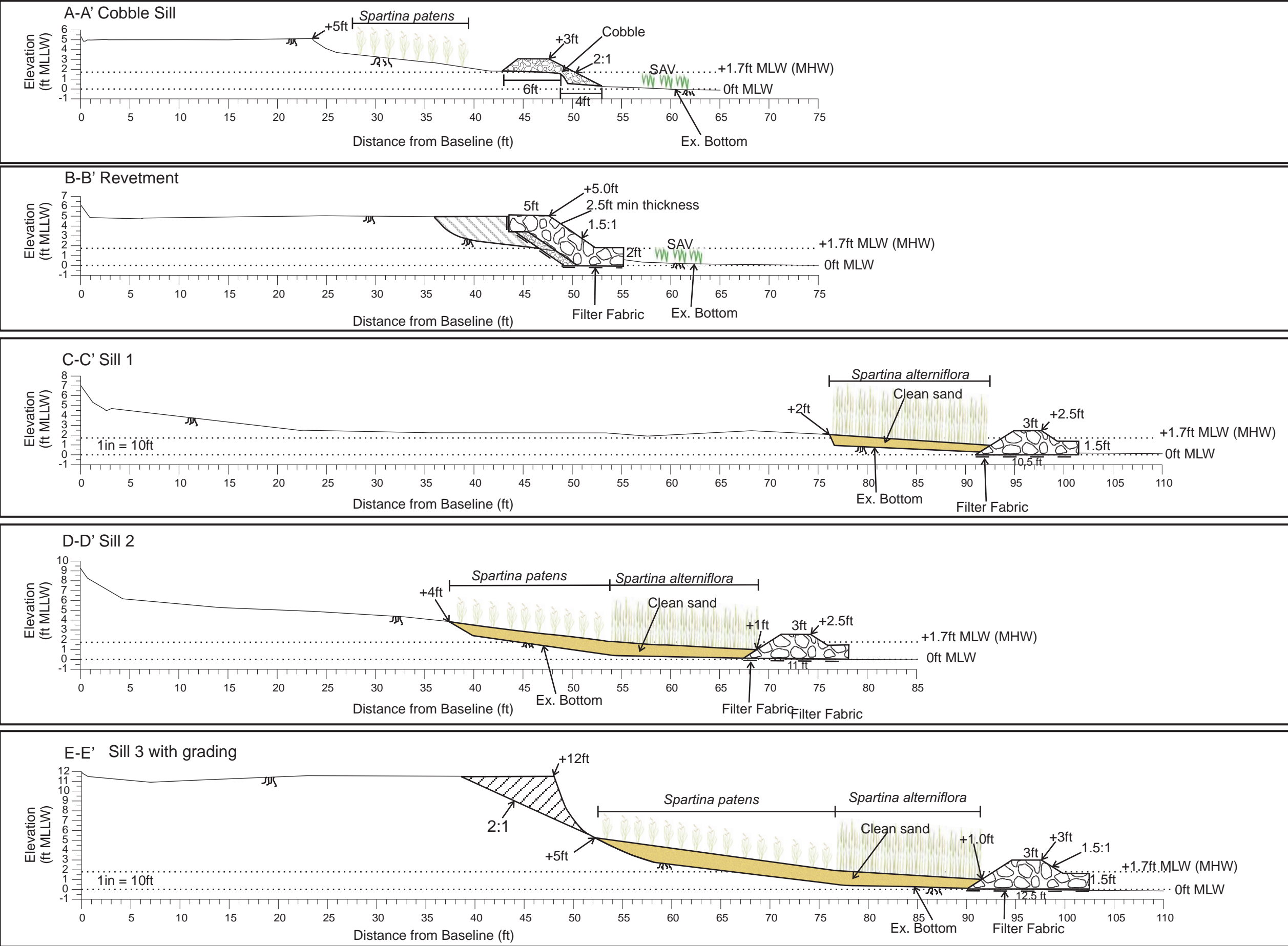


Legend

- Fill
- Grading
- Rock
- Cobble
- Sand



Project Title	Occohannock on the Bay Living Shoreline Project
Issued for	Preliminary Design - Not for Construction
Drawing Title	
Date	May 2012
Scale	1"=10'
Sheet	4 of 4



**Virginia Institute of Marine Science
College of William and Mary**

Shoreline Studies Program

Living Shoreline Cost estimates

An aerial photograph of a large body of water, likely a reservoir or lake, with numerous forested islands and peninsulas. The water is a deep blue-green color, and the surrounding land is covered in dense green trees. The title "Mathews County Shoreline Management Plan" is overlaid in a large, black, sans-serif font at the top of the image.

Mathews County Shoreline Management Plan

Shoreline Studies Program
Virginia Institute of Marine Science
College of William & Mary

March 2010

Mathews County Shoreline Management Plan

Prepared for
Mathews County
and the
National Fish and Wildlife Foundation

C. Scott Hardaway, Jr.*
Donna A. Milligan*
Carl H. Hobbs, III
Christine A. Wilcox*
Kevin P. O'Brien*
Lyle Varnell

*Shoreline Studies Program

Virginia Institute of Marine Science
College of William & Mary
Gloucester Point, Virginia

Special Report in Applied Marine Science and Ocean Engineering No. 417 of the
Virginia Institute of Marine Science

*This project was funded by the National Fish and Wildlife Foundation through
Grant Number 2007-0081-014*



March 2010

The strategies recommended for each reach in the Mathews County Shoreline Management Plan and their approximate cost.

Reach	Strategy	Cost per Linear Foot of Shoreline*
1	marsh management	<\$50
<i>Piankatank River, Hills Bay</i>	small low sill	\$125-\$175
<i>and Queens Creek</i>	low sill	\$150-\$195
	medium sill	\$190-\$240
2 - Lower energy areas	marsh management	<\$50
<i>Milford Haven and</i>	small low sill	\$125-\$175
<i>associated creeks</i>	low sill, narrow-crest	\$200-\$275
2 - Higher energy Bay Shoreline	breakwaters and beach fill	\$500-\$1,000
3	marsh management	<\$50
<i>Mobjack Bay, East River</i>	small low sill	\$125-\$175
<i>and North River</i>	low sill, narrow-crest	\$200-\$275
	low sill, wide-crest	\$250-\$350

*Costs are approximate and were determined in Spring 2010. They typically include the materials and installation of rocks, sand, and plants. Other work, such as permitting, gaining access, and other site work can vary considerably by site and is not included in the estimated cost.

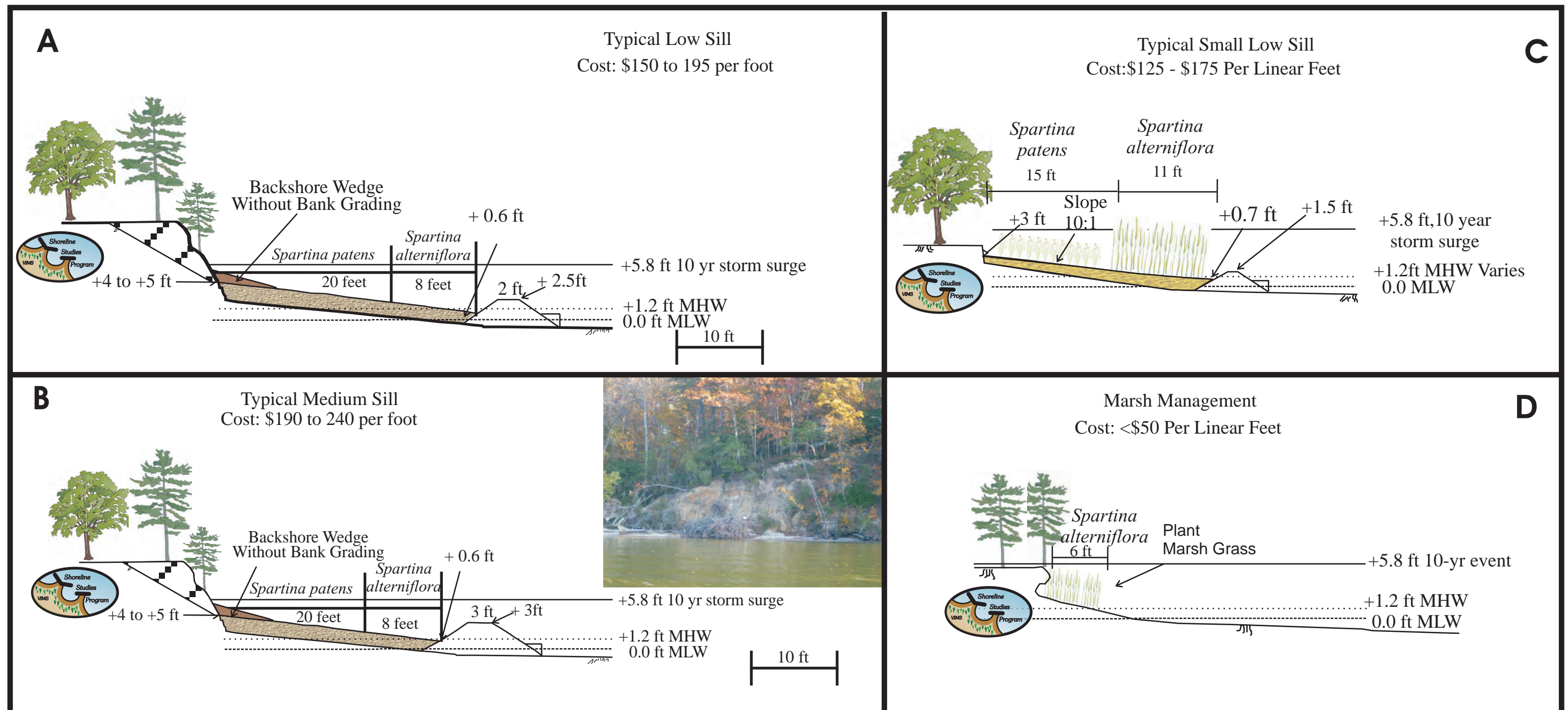
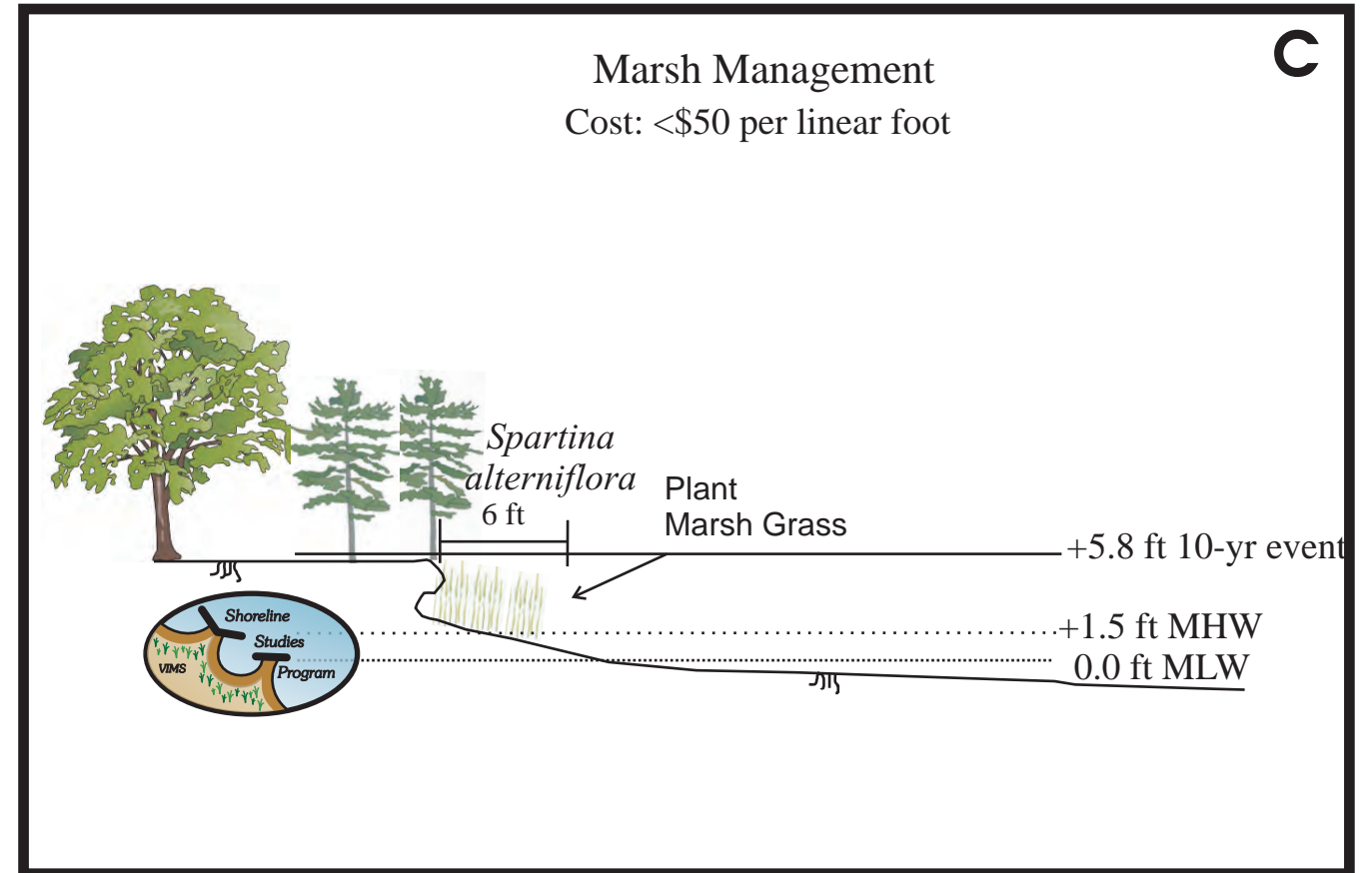
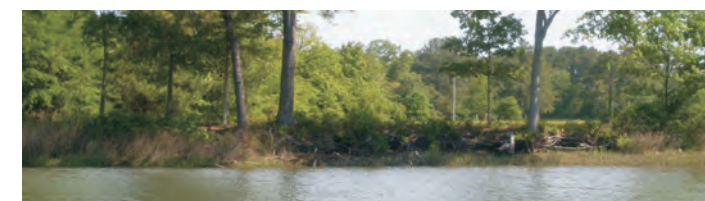
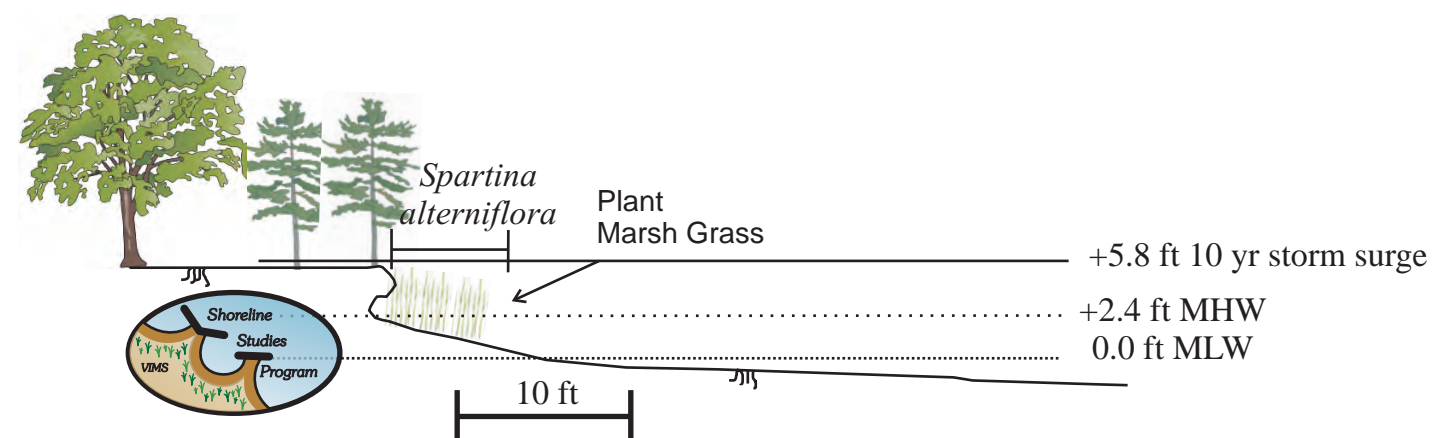


Figure 5-3. Typical cross-sections for Reach 1, Piankatank River, Hills Bay, and Queens Creek of A) a low sill, B) a medium sill, C) a small low sill, and D) Marsh Management proposed for Reach 1. Costs are estimated and typically include the materials and installation of rocks, sand, and plants. Other work, such as permitting, gaining access, etc, can vary considerable by site and is not included in the estimated cost.

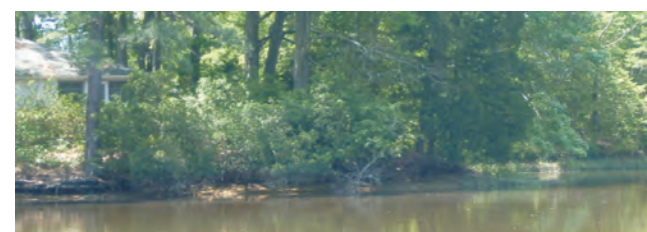
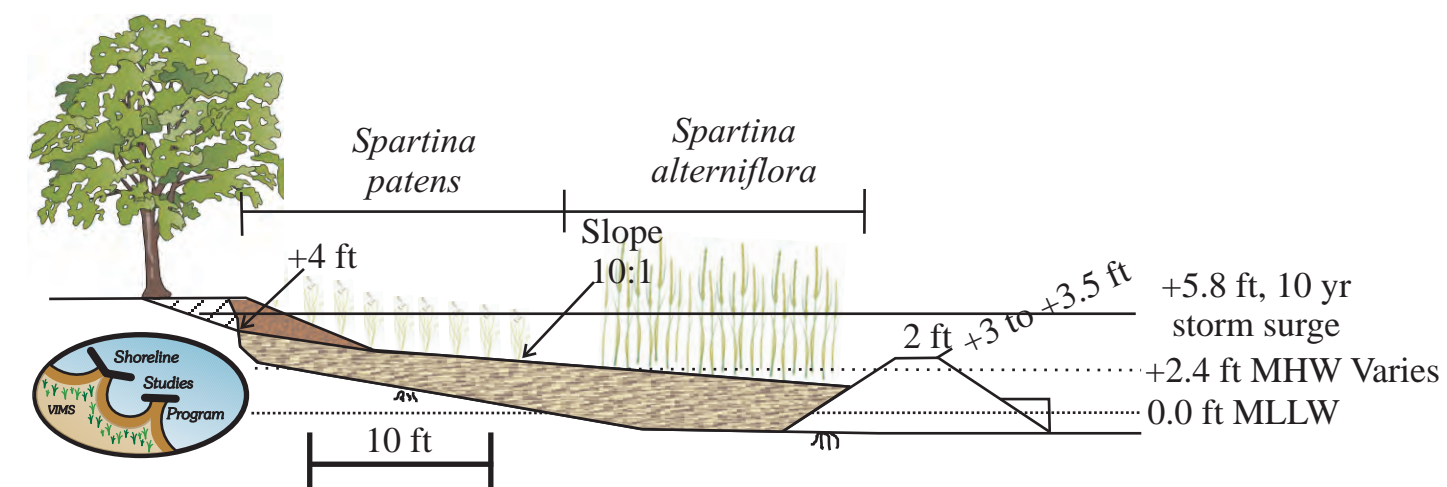




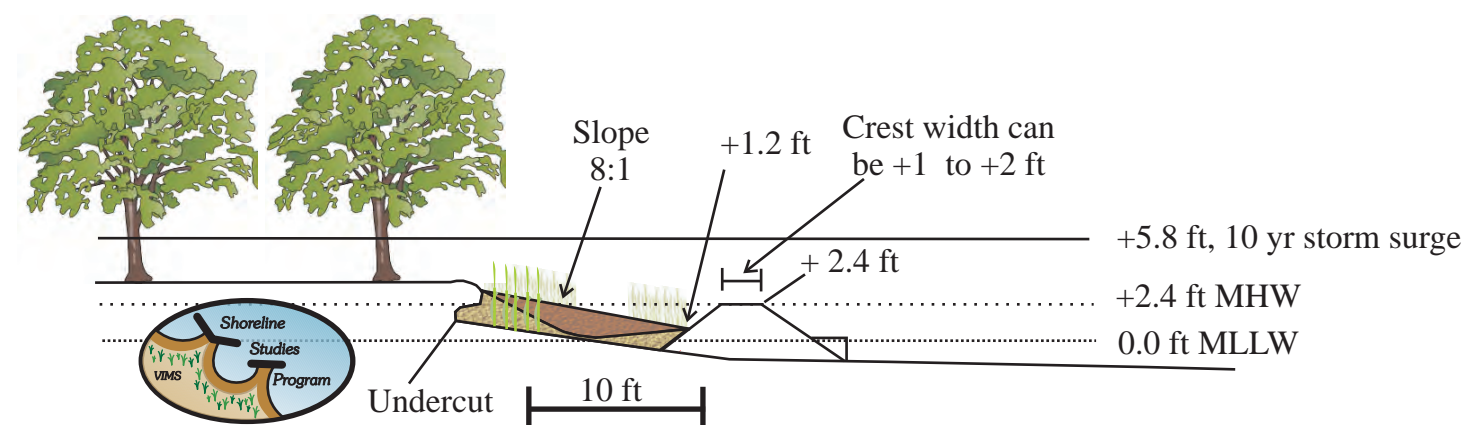
A
Marsh Management
Cost: <\$50 Per Linear Foot



C
Typical Low Sill- Narrow Crest
Cost: \$200 - \$275 Per Linear Foot



B
Typical Small Low Sill
Cost: \$125 - \$175 Per Linear Foot



D
Typical Low Sill - Wide Crest
Cost: \$250 - \$350 Per Linear Fot

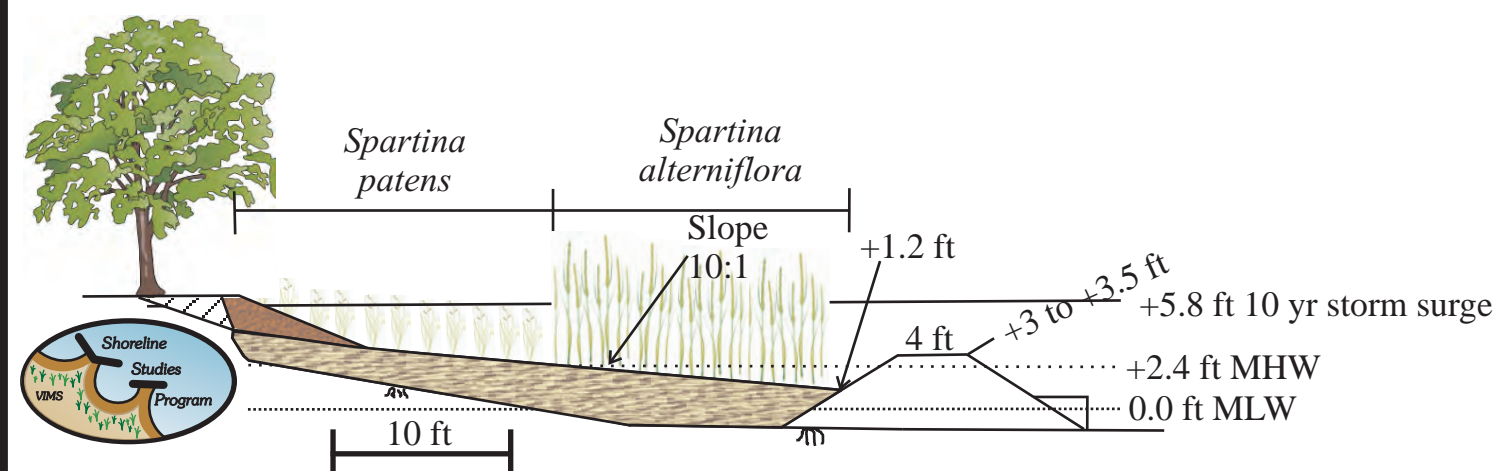


Figure 7-6. Typical cross-sections for Reach 3 along the North and East Rivers. Costs are estimated and typically include the materials and installation of rocks, sand, and plants. Other work, such as permitting, gaining access, etc, can vary considerable by site and is not included in the estimated cost.