Increasing Living Shoreline Implementation in Virginia:
Legal and Policy Recommendations

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About the Author

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About the Virginia Coastal Policy Center

The Virginia Coastal Policy Center (VCPC) at the College of William & Mary Law School provides science-based legal and policy analysis of ecological issues affecting the state's coastal resources, by offering education and advice to a host of Virginia's decision-makers, from government officials and legal scholars to non-profit and business leaders.

With two nationally prominent science partners – the Virginia Institute of Marine Science and Virginia Sea Grant – VCPC works with scientists, local and state political figures, community leaders, the military, and others to integrate the latest science with legal and policy analysis to solve coastal resource management issues. VCPC activities are inherently interdisciplinary, drawing on scientific, economic, public policy, sociological, and other expertise from within the University and across the country. With access to internationally recognized scientists at VIMS, to Sea Grant's national network of legal and science scholars, and to elected and appointed officials across the nation, VCPC engages in a host of information exchanges and collaborative partnerships.

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VCPC grounds its pedagogical goals in the law school's philosophy of the citizen lawyer. VCPC students' highly diverse interactions beyond the borders of the legal community provide the framework for their efforts in solving the complex coastal resource management issues that currently face Virginia and the nation.

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I. INTRODUCTION

When living shorelines are correctly implemented, they can provide a number of benefits to landowners, localities, and the state.[1] Based on that knowledge, in 2011, the Virginia General Assembly codified a preference for the use of living shorelines in tidal shoreline stabilization projects to facilitate a greater realization of those benefits.[2] Despite the statutory preference, much of Virginia's tidal shoreline may not be realizing the benefits associated with living shorelines. A recent report from the Center for Coastal Resources Management (CCRM) at the Virginia Institute of Marine Science indicated that, in a sample of coastal Virginia localities from 2014-2016, as many as 74% of projects permitted on unaltered shorelines were not living shorelines.[3] Instead, traditional shoreline armoring structures, such as bulkheads and revetments, were implemented.[4]

This paper will examine the benefits and challenges of implementing living shorelines, as well as Virginia's current legal framework for living shorelines and its limitations. The paper will then consider ways to maximize the implementation of living shorelines in appropriate areas of Virginia, examine strategies adopted by other states, and what lessons Virginia can learn from these strategies.

II. SHORELINE STABILIZATION PRACTICES

Shoreline stabilization practices are often divided into three categories: non-structural, hybrid, and structural.[5] Non-structural shoreline practices are traditional living shorelines and involve the grading of the bank and planting of vegetation to create or enhance a riparian buffer, tidal wetland, or combination thereof.[6] Hybrid practices include the placement of structures like segmented groins to change the shoreline environment to allow planted vegetation to grow.[7] Structural shoreline practices include the use of breakwaters, revetments, bulkheads, and other non-natural features.[8] It is important to realize that the optimal type of shoreline stabilization practice (including living shorelines) is dependent on the site-specific characteristics of the shoreline being considered.[9] Further, there are situations where any living shoreline practice at all may be inappropriate based on any number of factors including the uses of the land and water, the erosion risk, the fetch of water at that site, or other factors.[10] An example of another factor to

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[1] *See* CHESAPEAKE BAY FOUND., LIVING SHORELINES: FOR THE CHESAPEAKE BAY WATERSHED 1-2 (2007), http://www.cbf.org/document-library/cbf-publications-brochures-articles/Living_Shorelines011a.pdf.
[2] VA. CODE ANN. § 28.2-104.1 (2017).
[3] MARCIA BERMAN ET AL., VA. INST. MARINE SCI., IMPLEMENTING SUSTAINABLE SHORELINE MANAGEMENT IN VIRGINIA: ASSESSING THE NEED FOR AN ENFORCEABLE POLICY 3 (2018), https://publish.wm.edu/cgi/viewcontent.cgi?article=2104&context=reports.
[4] *Id*.
[5] *See* CHESAPEAKE BAY FOUND., *supra* note 1, at 7.
[6] *See Design Alternatives*, VIMS, http://www.vims.edu/ccrm/outreach/living_shorelines/design/index.php (last visited Apr. 26, 2018).
[7] *See* CHESAPEAKE BAY FOUND., *supra* note 1, at 7.
[8] *See* NAT'L OCEANIC & ATMOSPHERIC ADMIN., NATURAL AND STRUCTURAL MEASURES FOR SHORELINE STABILIZATION (2015), https://coast.noaa.gov/data/digitalcoast/pdf/living-shoreline.pdf.
[9] *Id*.
[10] *Living Shorelines*, VIMS, http://www.vims.edu/ccrm/outreach/living_shorelines/index.php (last visited Apr. 26, 2018) [hereinafter *Living Shorelines VIMS*].

consider is the depth of the water: shores adjacent to deep water may not be suitable for a living shoreline.[11]

A. What is a Living Shoreline?

According to the Virginia Code, 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."[12] This definition is likely to apply in the case of non-structural and hybrid shoreline stabilization practices, but not for purely structural stabilization practices. Living shorelines encompass "a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastlines and tributaries."[13] CCRM provides further information about the breadth of practices considered living shoreline techniques and when they are appropriate for use:

> Different living shoreline techniques are based on the prevailing natural conditions and habitats. Non-structural methods focus on enhancing or creating the dominant natural features already present, such as tidal marshes, beaches, and riparian forests. The most suitable sites for non-structural methods have only minor erosion problems, low wave action and few boat wakes. For higher energy sites with more wave action and severe erosion, the strategic placement of structures changes the physical environment to allow for the growth of vegetation and the persistence of natural habitat features. Shellfish reefs are effective living shoreline design alternatives where the natural presence and recruitment of oysters, ribbed mussels and other shellfish are already well-established.[14]

B. Benefits of Living Shorelines

A correctly implemented living shoreline provides numerous benefits.[15] Living shorelines provide water quality benefits that localities can count towards the Chesapeake Bay Total Maximum Daily Load (TMDL) requirements because they help prevent nonpoint source pollution in the form of runoff from reaching the Bay.[16] Living shorelines and tidal wetlands creation have been approved as a Best Management Practice for use in achieving the requirements of the Chesapeake Bay TMDL.[17] Data show that living shorelines also help prevent shoreline erosion by

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[11] *See Decision Tree for Undefended Shorelines and Those With Failed Structures*, CTR. FOR COASTAL RESOURCES MGMT. http://ccrm.vims.edu/decisiontree/undefended.html (last updated Apr. 24, 2018).
[12] VA. CODE ANN. § 28.2-104.1 (2017).
[13] *Living Shorelines*, VIRGINIA'S SOIL & WATER CONSERVATION DISTRICTS, http://vaswcd.org/living-shorelines (last visited Apr. 26, 2018) [hereinafter *Living Shorelines SWCD*].
[14] *Design Alternatives*, *supra* note 6.
[15] *See* CHESAPEAKE BAY FOUND., *supra* note 1, at 1-2.
[16] *See* CHESAPEAKE BAY FOUND., *supra* note 1; *Design Alternatives*, supra note 6.
[17] *See* BERMAN ET AL., *supra* note 3, at 23-24; CHESAPEAKE BAY PROGRAM, CBP/TRS-282-06, BEST MANAGEMENT PRACTICES FOR SEDIMENT CONTROL AND WATER CLARITY ENHANCEMENT 39 (2006), https://www.chesapeakebay.net/content/publications/cbp_13369.pdf.

absorbing wave energy.[18] Conversely, instead of absorbing wave energy, bulkheads reflect it and "creat[e] a soupy bottom where fish can't live and submerged aquatic vegetation can't grow."[19] In addition, living shorelines preserve or provide habitat for coastal plants and animals including oysters which help to purify water and are an important economic resource for Virginia,[20] and provide aesthetic benefits to landowners and the public.[21]

Another increasingly important benefit of implementing a living shoreline is the ability of non-structural features, like tidal wetlands, to potentially migrate with sea level rise.[22] This makes living shorelines more resilient to sea level rise over time (so long as there is space) compared to a structural stabilization measure like a bulkhead which provides protection up to a certain level of sea level rise but no further. In addition, bulkheads and other structural stabilization methods block the landward migration of wetlands, resulting in the loss of ecosystem services.[23] Living shorelines also can be designed to address other effects of sea level rise. The Chesapeake Bay is an estuary, meaning it is a place where freshwater from rivers meets saltwater from the sea, resulting in a gradient in the salinity content of the water in the estuary and effecting what plants and animals can survive in certain areas.[24] As a result of sea level rise, that gradient will be shifted upstream and could negatively affect plant and animal habitats.[25] Living shoreline implementation could mitigate effects of increased salinity while preserving the beneficial effects (filtering of non-point source pollution, preservation of habitat, etc.) of vegetated buffers by leaving intact or creating salinity-tolerant wetlands or vegetated shorelines which can migrate as necessary if there is space.

Finally, although the cost of a shoreline stabilization project can depend upon a number of factors, the National Oceanic and Atmospheric Administration (NOAA) has noted that including green infrastructure techniques for shoreline stabilization may be less costly than traditional gray techniques.[26] In Virginia there is the potential for even greater savings for landowners wishing to implement living shoreline practices. The Virginia Association of Soil and Water Conservation Districts, a private nonprofit association of Virginia's Soil and Water Conservation Districts

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[18] CHESAPEAKE BAY PROGRAM, CBP/TRS-282-06, BEST MANAGEMENT PRACTICES FOR SEDIMENT CONTROL AND WATER CLARITY ENHANCEMENT 39 (2006), https://www.chesapeakebay.net/content/publications/cbp_13369.pdf.
[19] Rachael Pacella, *Where Bulkheads Fail, Living Shorelines Thrive*, DEL. ONLINE (Oct. 25, 2015), https://www.delawareonline.com/story/news/local/2014/10/25/bulkheads-fail-living-shorelines-thrive/17936883/.
[20] *See* CHESAPEAKE BAY FOUND., *supra* note 1; *Living Shorelines VIMS*, *supra* note 10; *see also Oysters*, CHESAPEAKE BAY PROGRAM, https://www.chesapeakebay.net/issues/oysters (last visited Apr. 26, 2018).
[21] CHESAPEAKE BAY FOUND., *supra* note 1, at 2.
[22] *See* Karen Duhring et al., *Sea Level Rise & Virginia's Coastal Wetlands*, RIVERS & COAST (Ctr. for Coastal Resources Mgmt., Gloucester Point, Va.), Summer 2016, https://publish.wm.edu/cgi/viewcontent.cgi?article=1214&context=reports.
[23] *Id.*
[24] *The Estuary*, CHESAPEAKE BAY PROGRAM, https://www.chesapeakebay.net/discover/ecosystem/the_estuary_system (last visited Apr. 26, 2018); *What is an Estuary*, NAT'L OCEAN SERV., https://oceanservice.noaa.gov/facts/estuary.html (last visited Apr. 26, 2018).
[25] *See* Toyonobu Fujii, *Climate Change, Sea-Level Rise and Implications for Coastal and Estuarine Shoreline Management with Particular Reference to the Ecology of Intertidal Benthic Macrofauna in NW Europe*, 1 BIOLOGY 597, 602 (2012), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4009809/; *see also*, Karen C. Rice et al., *Assessment of Salinity Intrusion in the James and Chickahominy Rivers as a Result of Simulated Sea-Level Rise in Chesapeake Bay, East Coast, USA*, 111 JOURNAL OF ENVIRONMENTAL MANAGEMENT 61 (2012), https://www.sciencedirect.com/science/article/pii/S0301479712003519?via%3Dihub.
[26] *See* NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 8, at 6.

(SWCD), operates the Virginia Conservation Assistance Program (VCAP) which provides financial incentives and assistance to landowners who install certain Best Management Practices within the Chesapeake Bay Watershed.[27] Living shorelines are eligible for reimbursement "at 75% of total costs with a maximum of payment of $20,000.00 per parcel per year."[28] Structural shoreline stabilization practices, on the other hand, are not eligible.[29]

Anecdotal evidence from North Carolina provides further evidence of the cost difference between installation of living shorelines and structural shoreline stabilization: A 200 foot living shoreline was estimated to cost around $15 per yard (including the permit application fee which is not imposed in Virginia under the general permit) compared to an estimated cost of $450 per yard for a bulkhead in the same space.[30] In combination with the incentives the state and localities provide (tax incentives and potential loans), the cost of a living shoreline to a landowner should make it an attractive alternative for landowners in Virginia.[31] Table 1 compares the environmental benefits of living shorelines with traditional structural shoreline stabilization methods like bulkheads and revetments.

	Marsh Creation with Sill	Groin with Sand & Marsh	Coir Biolog with Sand & Marsh	Stone Revetment	Bulkhead	Do Nothing
Reduce Erosion	Yes	Yes	Yes	yes	yes	No
Provide Habitat	Yes	Yes	Yes	minor	no	No
Uptake Nutrients	Yes	Yes	Yes	no	no	No
Filter Sediments	Yes	Yes	Yes	no	no	No
Improve Water Access	Yes	Yes	Yes	no	no	No
Dissipate Waves	Yes	Yes	Yes	no	no	No
Impact to Receiving Waters	Positive (improves water quality - reduces nutrients and sediment loading)	Positive (limited protection for marsh)	Short Term	none	Negative (may cause near-shore erosion of bottom)	continued pollutant loading and loss of upland

Table 1. Shoreline Protection Methods Compared[32]

[27] *Virginia Conservation Assistance Program*, VIRGINIA'S SOIL & WATER CONSERVATION DISTRICTS, http://vaswcd.org/vcap (last visited Apr. 26, 2018).
[28] *Living Shorelines SWCD*, *supra* note 13. However, it is important to note that VCAP funded projects require the SWCD to monitor the project for ten years. If projects are not properly maintained or corrective action taken when site inspections occur, the SWCD can reclaim the original 75% cost share. E-mail from Bryan Hofmann, Programs Manager, FRIENDS OF THE RAPPAHANNOCK (Oct. 15, 2018) (on file with author).
[29] *Id*.
[30] *See* Trista Talton, *Living Shorelines: Better than Bulkheads*, COASTAL REV. ONLINE (Feb. 8, 2016), https://www.coastalreview.org/2016/02/12896/ (finding $15 cost per yard by converting 200 feet to yards (66.6) and rounding total cost divided by number of yards (1000/66.6)); 4 VA. ADMIN. CODE § 20-1300-30.
[31] *See* VA. CODE ANN. § 62.1-229.5 (2017); VA. CODE ANN. § 58.1-3666 (2017).
[32] *Shoreline Protection Methods Compared*, ENVTL. CONCERN, http://wetland.org/restoration_livingshorelines_compare.htm (last visited, Apr. 26, 2018).

C. Challenges of Living Shorelines

Assuming the above to be true, why would landowners choose not to install a living shoreline? As noted above, a living shoreline's effectiveness is limited by multiple factors; for example, non-structural living shorelines are most suitable for areas of low erosion and low fetch.[33] These physical limitations may prevent some landowners from using a living shoreline.

Another challenge regarding the implementation of living shorelines is the lack of public awareness of living shoreline techniques and benefits.[34] A recent study of coastal landowners done by researchers at the University of South Alabama showed that although landowners preferred the look of natural shorelines, they believed the maintenance costs associated with them are higher than structural measures like walls and revetments.[35] As noted above, non-structural living shorelines are generally considered to have low maintenance costs.[36] The data also shows that coastal landowners have an overall negative perception of a natural shoreline's ability to be a cost-effective solution to coastal erosion despite its aesthetic and environmental value.[37] This is in sharp contrast with data showing that "a properly engineered living shoreline will provide as much or more protection than riprap or a bulkhead and will improve water quality and enhance habitat as well."[38] Further, people are influenced by their neighbors when deciding what protective structures to implement.[39]

> In my experience, maintenance is always one of the largest barriers to implementation of green infrastructure whether it is rain gardens, green roofs, or living shorelines. Living shorelines will fail every time if frequent and routine maintenance is not performed. When given the choice between a more expensive and relatively maintenance free riprap or bulkhead shoreline stabilization practice compared to a more maintenance intensive living shoreline, many waterfront property owners may choose the maintenance free option. That is why proper landowner education and project incentives are so important to encourage high quality living shoreline projects.
>
> *Bryan Hofmann, Programs Manager, Friends of the Rappahannock*

Another problem with living shoreline implementation is a lack of contractor expertise in installing these types of projects.[40] This problem has been noted by the Maryland Department of

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[33] *Design Alternatives*, *supra* note 6.
[34] NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 8.
[35] *See* Steven B. Scyphers et al., *Participatory Conservation of Coastal Habitats: The Importance of Understanding Homeowner Decision Making to Mitigate Cascading Shoreline Degradation*, 8 CONSERVATION LETTERS 41, 44-45 (2015), https://onlinelibrary.wiley.com/doi/full/10.1111/conl.12114.
[36] NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 8.
[37] *See* Scyphers et al., *supra* note 35, at 45.
[38] Bhaskaran Subramanian et al., *Current Understanding of the Effectiveness of Nonstructural and Marsh Sill Approaches*, *in* MANAGEMENT, POLICY, SCIENCE, AND ENGINEERING OF NONSTRUCTURAL EROSION CONTROL IN THE CHESAPEAKE BAY: PROCEEDINGS OF THE 2006 LIVING SHORELINE SUMMIT 35, 36 (2006), http://www.vims.edu/cbnerr/_docs/ctp_docs/ls_docs/06_LS_Eval.pdf.
[39] *See* Scyphers et al., *supra* note 35, at 46.
[40] Bhaskaran Subramanian, Maryland's Living Shorelines Program (Feb. 27, 2015), http://www.nj.gov/dep/cmp/docs/20170227-ls-summit/bhaskar-nj-workshop.pdf.

Natural Resources (MDDNR).[41] A search of the business directory of the Chesapeake Bay Landscape Professional (CBLP) program, a voluntary accreditation program, shows nine out of 53 results for contractors claiming experience in implementing living shorelines in Virginia and one of those is currently listed as inactive.[42] Contractors may prefer to recommend and install a structure they are more experienced with, both from a cost and a skill perspective. Lewis Lawrence, Executive Director of the Middle Peninsula Planning District Commission (MPPDC), notes that the demand for qualified marine contractors and coastal-based landscape architects to design living shorelines is quickly becoming a new emerging industry cluster.[43] The MPPDC operates a Living Shoreline Revolving Loan Program, through which it has encountered new questions related to contractor warranties, construction inspection, and permit closure processes to ensure that contractors' work meets appropriate standards. The MPPDC is working to address these issues in partnership with the VIMS Marine Shoreline Studies Program and the VMRC.[44]

[41] *Id.*
[42] *See Search Results*, CHESAPEAKE BAY LANDSCAPE PROF., https://cblpro.org/business-directory/?dosrch=1&q&wpbdp_view=search&listingfields%5B19%5D=Virginia&listingfields%5B14%5D%5Bzip%5D&listingfields%5B33%5D%5B0%5D&listingfields%5B33%5D%5B1%5D=Shoreline+management%2C+living+shorelines (last visited Apr. 26, 2018).
[43] E-mail from Lewis Lawrence, Executive Director, MIDDLE PENINSULA PLANNING DIST. COMM'N (Oct. 16, 2018) (on file with author).
[44] *Id.*

Case Study: Northern Neck Living Shorelines Initiative

John Bateman, Northern Neck Planning District Commission & Bryan Hofmann, Friends of the Rappahannock

The Northern Neck has 1,109 miles of shoreline, of which a large percentage are developed. For decades, the preferred shoreline management strategy was to heavily armor shorelines and utilize landscaping practices that were not suitable for the ecosystem in which they were implemented. To combat this trend and to implement the State's living shorelines preference, the Northern Neck Planning District Commission (NNPDC) is working to promote nature-based best practices on a regional scale through demonstration sites, partnerships, and stakeholder groups. The primary objective of this regional living shorelines initiative (the "Initiative") is to educate the public, waterfront landowners, and local industry leaders across multiple sectors.

Funded by a small watershed grant from the National Fish and Wildlife Foundation Chesapeake Bay Stewardship Fund, the Initiative began with the creation of four living shoreline demonstration sites across the region. Recently, this expanded to seven demonstration sites, which allows flexibility to showcase a greater variety of commonly recommended features and practices. For example, one site showcases a riprap sill flanked by a created marsh while another incorporates the use of coir logs and oyster shell bags to establish a reef designed to protect a reestablished marsh. Utilizing local students to assist with project installation resulted in increased cost-savings, as well as hands-on experience for the students. And, holding a workshop to educate local contractors about commonly used features and permitting requirements increased interest in these type of projects. Additionally, NNPDC partnered with the Friends of the Rappahannock (FOR), an organization whose mission is to be the voice of and an active force for a healthy and scenic Rappahannock River, to develop brochures and other publications as well as facilitating a myriad of outreach events to educate the public on the use of living shorelines.

The NNPDC also coordinates with Rappahannock Community College (RCC) on the Chesapeake Bay Landscape Professional (CBLP) Certification Program. The goal is for RCC to host a CBLP certification course that local landscapers can use to expand their businesses to include the installation and maintenance of living shorelines, thus serving to fulfill a need that continues to be a barrier to the success of living shorelines.

In addition to the FOR, the NNPDC maintains a strong relationship with a number of other environmentally-minded entities dedicated to resiliency in the region, including the Northern Neck (NN) Land Conservancy, NN Master Gardeners, NN Master Naturalists, The Wetlands Project, regional industry leaders, the NN Soil and Water Conservation District, Department of Conservation and Recreation Shoreline Erosion Advisory Service, and members of the local wetlands board or other local designees whose purview is shoreline management. Under a Coastal Zone Management Program Technical Assistance Grant, the NNPDC plans to convene a meeting of these entities to determine how each entity supports and promotes living shorelines, identify duplicative efforts or barriers, and ascertain where efforts can be coordinated for greater impact. Information from this meeting would lead to the development of a regional scale plan to guide the promotion and implementation of nature-based best practices, potentially including programmatic recommendations for localities and state agencies and recommendations for funding to promote and incentivize these practices.

Overall, the Initiative's efforts will serve to expand awareness of living shorelines projects by educating both the public and industry through the use of demonstration sites, workshops, and training opportunities. Additionally, building and maintaining relationships between the various entities involved in resilience work will lead to a better understanding of roles and resources within the region, as well as a means of developing a regional scale plan to more effectively guide shoreline management projects in the future.

III. CURRENT LIVING SHORELINES LAW AND ITS LIMITATIONS

As noted above, current Virginia law states that living shorelines are the "preferred alternative" for tidal shoreline stabilization in the Commonwealth.[45] Further, in 2011, the General Assembly mandated the establishment and implementation of a general permit[46] to authorize and encourage the development of living shorelines and provide for an expedited permit review process

[45] VA. CODE ANN. § 28.2-104.1 (2017).

[46] A General Permit is a set of codified conditions and specifications designed to authorize and encourage the activity contemplated in the Permit by removing the discretion of a permitting body. If an application meets the eligibility requirements of the General Permit, the Permit is granted.

for qualifying projects.[47] In 2015, the Virginia Marine Resources Commission (VMRC) promulgated a "Living Shoreline Group 1 General Permit for Certain Living Shoreline Treatments Involving Tidal Wetlands" ("Group 1 Permit").[48] Then, in 2017, VMRC promulgated a second general permit regulation, "Living Shoreline Group 2 General Permit for Certain Living Shoreline Treatments Involving Submerged Lands, Tidal Wetlands, or Coastal Primary Sand Dunes and Beaches" ("Group 2 Permit").[49] Both general permit regulations are designed to streamline the permit review process and incentivize landowners to choose living shorelines when they are deciding to undertake a shoreline stabilization project on their property.[50] Construction of a living shoreline is also exempt from local wetlands board permits provided a Living Shorelines General Permit is applicable.[51]

A. The Group 1 Permit

Group 1 Permits are designed to streamline the process of implementing a living shoreline in tidal wetlands, landward of mean low water.[52] Issuance of a general permit constitutes the approval of VMRC or the local wetlands board required by § 28.2-1306 of the Code of Virginia.[53] To qualify for the permit the landowner must fill out and submit to VMRC a completed Joint Permit Application (JPA).[54] VMRC then forwards that permit to the U.S. Army Corps of Engineers (USACE), the applicable local wetlands board and the Virginia Department of Environmental Quality.[55] Then both VMRC and the local wetlands board review the application to determine completeness, satisfactory compliance with the general permit criteria, and whether the general permit process is applicable.[56] Permits that meet the above three requirements are subject to certain benefits: The permit issues quickly, there is no public interest review or notification of adjoining property owners, and no application or permit fee is imposed.[57] The permittee still must comply with all other applicable local, state, and federal laws and regulations.[58] Figure 1 below illustrates that any proposed project could be subject to multiple levels of review, depending on the features of the proposed site.

[47] *Id.*
[48] 4 VA. ADMIN. CODE § 20-1300 (2018).
[49] 4 VA. ADMIN. CODE § 20-1330 (2018).
[50] 4 VA. ADMIN. CODE § 20-1300-10 (2018); 4 VA. ADMIN. CODE § 20-1330-10 (2018).
[51] VA. CODE ANN. § 28.2-1302 (2017).
[52] 4 VA. ADMIN. CODE § 20-1300-30 (2018).
[53] 4 VA. ADMIN. CODE § 20-1300-10 (2018).
[54] 4 VA. ADMIN. CODE § 20-1300-30 (2018).
[55] *Id.*
[56] *Id.*
[57] *Id.*
[58] *Id.*

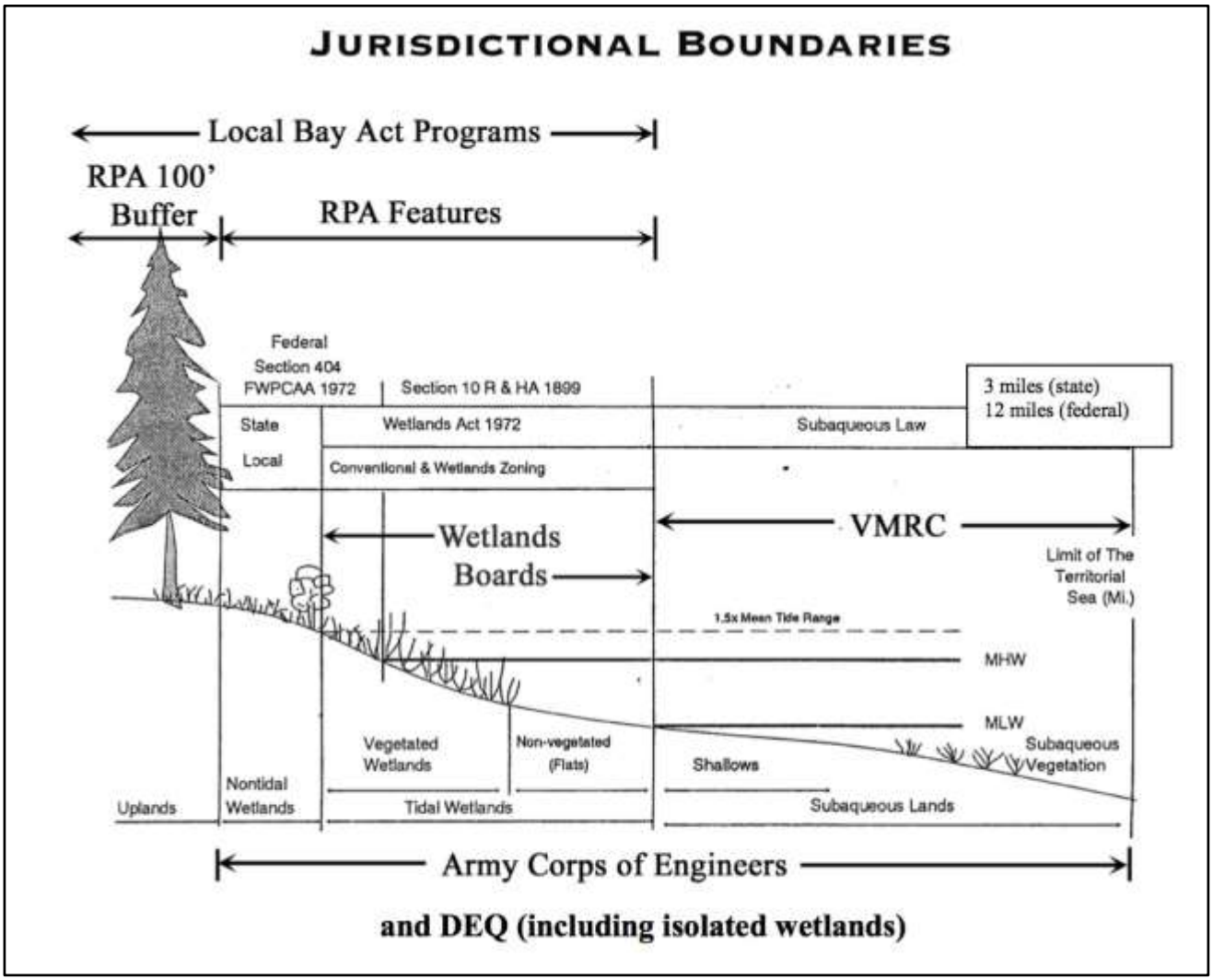

Figure 1. Potential Agencies that must Review a General Permit Application[59]

Once a Group 1 Permit is issued, the permittee must meet a set of criteria for specific materials and practices to be used during construction of the living shoreline.[60] Important conditions include siting requirements that limit the permit's applicability to shorelines with a maximum of one half mile of fetch at any angle.[61] The regulations also specify the types of vegetation for plantings and the type of sands for fill, and also include a two-year monitoring requirement to "allow improved evaluation of the techniques utilized."[62]

[59] VA. MARINE RES. COMM'N, TIDEWATER JOINT PERMIT APPLICATION (JPA) FOR PROJECTS INVOLVING TIDAL WATERS, TIDAL WETLANDS, AND/OR DUNES AND BEACHES IN VIRGINIA 24 (2017), http://www.nao.usace.army.mil/Portals/31/docs/regulatory/commonreq/Updated%20fillable%20Tidewater%20JPA%20May%202017.pdf?ver=2017-05-12-085429-590.
[60] *See* 4 VA. ADMIN. CODE § 20-1300-40 (2018).
[61] *Id.*
[62] *Id.*

The Group 1 Permit is further subject to a set of ten conditions.[63] One provides that the permit grants no right to encroach on the property rights of others.[64] Another condition states that the permittee shall minimize adverse impacts to neighbors to the greatest extent practicable.[65] Permittees have two years from the issuance of the permit to complete the project, subject to some permissible extensions.[66] The conditions also reiterate the fact that a permittee must comply with all other applicable laws and obtain any other necessary permits in addition to the Group 1 Permit.[67]

B. The Group 2 Permit

The Group 2 Permit is substantially similar to the Group 1 Permit but differs primarily in the siting of living shoreline projects that it permits.[68] Group 2 Permits may allow for filling on state-owned bottomlands.[69] Issuance of a Group 2 Permit constitutes the approval of "either the [Virginia Marine Resources] Commission or the local wetlands board authorization, or both, required in accordance with Chapters 12 (§ 28.2-1200 et seq.), 13 (§ 28.2-1300 et seq.), and 14 (§ 28.2-1400 et seq.) of Title 28.2 of the Code of Virginia."[70] Those Code sections correspond to Submerged Lands, Tidal Wetlands, and Coastal Primary Sand Dunes and Beaches, respectively.[71] The general permit once again requires compliance with all other applicable Virginia and federal laws and regulations.[72] One of the Group 2 Permit requirements is notification to adjacent property owners to document that they have no objections,[73] while the Group 1 Permit allows a landowner to bypass the notification of adjacent property owners provided the application meets the permit criteria.[74]

The Group 2 Permit contemplates projects in a wider range of sites and with more varied materials.[75] The permit allows construction of a living shoreline in areas with fetch of up to one and one-half miles.[76] The regulations also contain a requirement for maximum water depth and a limitation on how far a constructed project may extend into the water,[77] and requires the creation or preservation of at least eight feet of tidal wetlands.[78] An additional difference from the Group 1 Permit is that the criteria for Group 2 Permits allow for the construction of sills and revetments; Group 2 Permits are suitable for some hybrid living shoreline projects.[79] An important limitation on Group 2 Permits is that whenever a living shoreline is to be used to protect an unaltered

[63] *See* 4 VA. ADMIN. CODE § 20-1300-50 (2018).
[64] *Id.*
[65] *Id.*
[66] *Id.*
[67] *Id.*
[68] *Compare* 4 VA. ADMIN. CODE § 20-1330-10 (2018) *et seq. with* 4 VA. ADMIN. CODE § 20-1300-10 (2018) *et seq.*
[69] 4 VA. ADMIN. CODE § 20-1330-40 (2018).
[70] 4 VA. ADMIN. CODE § 20-1330-10 (2018).
[71] *See* VA. CODE ANN. §§ 28.2-1200, 28.2-1300, and 28.2-1400 (2017).
[72] 4 VA. ADMIN. CODE § 20-1330-30 (2018).
[73] *Id.*
[74] 4 VA. ADMIN. CODE § 20-1300-30 (2018).
[75] *See* 4 VA. ADMIN. CODE § 20-1330-30 (2018).
[76] *Id.*
[77] *Id.*
[78] *See* 4 VA. ADMIN. CODE § 20-1330-40 (2018).
[79] *See* 4 VA. ADMIN. CODE § 20-1330-30 (2018).

shoreline, it must be the only shoreline stabilization method used for the entire segment of shoreline considered by the permit.[80] For previously altered shorelines, a Group 2 Permit may be used to protect or enhance an existing vegetated wetland, provided that wetland meets the eight foot width requirement at the conclusion of the project.[81] Additionally, sills and revetments may not be constructed on existing wetlands or submerged aquatic vegetation.[82]

Group 2 Permits are subject to many of the same conditions as Group 1 Permits, including the reiteration of the necessity to obtain all other applicable permits.[83] Group 2 Permits are also subject to the same two-year time limit for completion of the project as well as the two-year monitoring period.[84] Because Group 2 Permits contemplate projects that may extend beyond mean-low water (and onto state-owned bottomlands), they contain an extra condition stating that no permit shall allow encroachment onto a lease for oyster planting without the consent of the lessee.[85]

C. Limitations of Current Law and Regulations

Currently, Virginia law only contains a preference for the use of living shorelines as shoreline stabilization practices in the Commonwealth.[86] This paper previously noted that people are more likely to choose the shoreline practices that their neighbors have chosen and that the general public is not well educated about the full benefits and costs of living shoreline practices.[87] CCRM data show that under the current law, 74% of projects permitted within the period from 2014-2016 did not include living shorelines, and 65% of the total permits were for bulkheads, revetments, or groins.[88] Without stronger language in the Code of Virginia or more attractive incentives, it is likely that the behavior of landowners will not change in the future, since the preference for living shorelines has been in the Code since 2011 and there has been no significant change.

Another limitation is the current permit structure itself. Although the general permits and the joint permit application may streamline the permit application process, they do not obviate the need to acquire additional permits from agencies.[89] Landowners could prefer to apply for traditional shoreline armoring structure like a bulkhead with which permitting agencies are more familiar. The number of different agencies that may have jurisdiction over a given project, as shown in Figure 1, is quite large and does not even include any FEMA permits that may be required for development in a floodplain. FEMA requires a Floodplain Development Permit (FDP) for

[80] *See* 4 VA. ADMIN. CODE § 20-1330-30 (2018).
[81] 4 VA. ADMIN. CODE § 20-1330-40 (2018).
[82] *Id.*
[83] *Compare* 4 VA. ADMIN. CODE § 20-1330-50 (2018) *with* 4 VA. ADMIN. CODE § 20-1300-50 (2018).
[84] 4 VA. ADMIN. CODE §20-1330-50 (2018).
[85] *Id.*
[86] VA. CODE ANN. § 28.2-104.1 (2017).
[87] NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 8; *see generally* Scyphers et al., *supra* note 35.
[88] BERMAN ET AL., *supra* note 3, at 3, 8.
[89] 4 VA. ADMIN. CODE § 20-1300-10 (2018); 4 VA. ADMIN. CODE § 20-1330-10 (2018).

"[m]ining, dredging, filling, grading, or excavating for major landscaping projects" and for "[a]ny human-caused changes in the floodplain, including storage."[90]

In addition to the further permit FEMA may require for living shoreline construction in a floodplain, it is very difficult to receive Community Rating System (CRS)[91] credit under the National Flood Insurance Program (NFIP) for a living shoreline project.[92] Currently, living shorelines may qualify for up to 120 points of CRS credit as Natural Shoreline Protection (NSP) providing that several requirements are met.[93] Unfortunately for Virginians, one of the requirements to receive credit is that there must be a prohibition on shoreline armoring including the construction of bulkheads.[94] There is no current prohibition on shoreline armoring in Virginia and nor should there be because, as noted above, living shorelines are not the ideal shoreline stabilization practice for all situations. In Virginia, the NFIP is administered in cooperation with the Virginia Department of Conservation and Recreation (DCR), and the CRS accounts for a savings of about $3.36 million a year for Virginia policyholders.[95] If the NSP credit requirements were changed to allow credit when living shorelines are encouraged and incentivized and bulkheads are limited rather than prohibited, such a change might create an extra incentive for coastal communities with property in flood zones to encourage the implementation of living shorelines in the hopes of having NFIP premiums further reduced for residents who hold policies. Wetlands Watch, a nonprofit organization that studies the CRS program extensively, notes another way that living shorelines may help reduce flood insurance costs for Virginia property owners: If the living shoreline sufficiently reduces the flood risk to the land it protects, a revised Flood Insurance Rate Map (FIRM) of the area could result in lowered flood insurance costs altogether (but would not earn CRS credit).[96]

Under Virginia law, political subdivisions of the Commonwealth are considered exempt from local wetlands zoning ordinance permitting requirements when conducting activities in wetlands they own or lease.[97] Based on the law and a Virginia Attorney General Opinion from 1983, a political subdivision does not need a local permit to conduct "governmental activity in

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[90] FED. EMERGENCY MGMT. AGENCY, FEMA P-726, LOCAL OFFICIALS GUIDE FOR COASTAL CONSTRUCTION: DESIGN CONSIDERATIONS, REGULATORY GUIDANCE, AND BEST PRACTICES FOR COASTAL COMMUNITIES 4-3 (2009), https://www.fema.gov/media-library-data/20130726-1707-25045-5869/chapter4.pdf.

[91] The Community Rating System is a voluntary incentive program by which localities can earn credits to reduce National Flood Insurance Program premiums for policyholders by up to 45% by engaging in community floodplain management activities that go beyond the minimum requirements of the National Flood Insurance Program. The number of credits a locality earns determines its rating and its rating determines the amount of the discount for policyholders. *See Community Rating System*, FEMA, https://www.fema.gov/community-rating-system (last updated Jan. 9, 2018).

[92] *See* SHANNON HULST JARBEAU & MARY-CARSON STIFF, WETLANDS WATCH, FLOOD PROTECTION PAY-OFFS: A LOCAL GOVERNMENT GUIDE TO THE COMMUNITY RATING SYSTEM 89-90 (2017), https://static1.squarespace.com/static/56af7134be7b96f50a2c83e4/t/58c6f314cd0f68e12278255a/1489433383745/Wetlands+Watch+CRS+Report+FINAL+2017.pdf.

[93] *See* FED. EMERGENCY MGMT. AGENCY, FIA-15/2017, NATIONAL FLOOD INSURANCE PROGRAM COMMUNITY RATING SYSTEM: COORDINATOR'S MANUAL 420-30 (2017), https://www.fema.gov/media-library-data/1493905477815-d794671adeed5beab6a6304d8ba0b207/633300_2017_CRS_Coordinators_Manual_508.pdf.

[94] *Id.*

[95] *See Floodplain Management Program Major Elements*, VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, http://www.dcr.virginia.gov/dam-safety-and-floodplains/fpelemnz (last visited May 19, 2018).

[96] *See* JARBEAU & STIFF, *supra* note 92, at 89.

[97] VA. CODE ANN. § 28.2-1302(3)(10) (2017).

wetlands owned or leased by the Commonwealth or a political subdivision thereof."[98] This exemption for political subdivisions might make it easier for them to construct a hard shoreline armoring structure, like Fairfax County did when it received approval to construct a levee without a wetlands permit.[99]

Another issue with the current administration of shoreline stabilization measures in Virginia is the parcel-by-parcel analysis required by the current process. Shoreline stabilization decisions have effects on neighboring owners' property.[100] The construction of a bulkhead on one property owner's shoreline can increase erosion on downstream owners' property.[101] A more stringent permitting process that limits the placement of bulkheads and increases the implementation of living shorelines can help mitigate the issue of downstream erosion while still providing flood protection.[102] Virginia should also consider ways to make shoreline erosion control a less parcel-by-parcel process to help avoid negative neighbor effects. One way this might be done is through larger financial incentives for projects that would protect longer stretches of coastline (and also could potentially entice groups of adjacent landowners to cooperate to implement a living shoreline approach all at once, for example). Unfortunately, the site-specific nature of living shoreline projects may limit the effectiveness of a non-parcel-by-parcel approach.

Additionally, current Virginia law is not clear concerning local tax relief for living shorelines.[103] The language of the statute is as follows:

> Wetlands, as defined herein, that are subject to a perpetual easement permitting inundation by water, and riparian buffers, as defined herein, that are subject to a perpetual easement permitting inundation by water, are hereby declared to be a separate class of property and shall constitute a classification for local taxation separate from other classifications of real property. The governing body of any county, city or town may, by ordinance, exempt or partially exempt such property from local taxation. In addition, any living shoreline project approved by the Virginia Marine Resources Commission or the applicable local wetlands board and not prohibited by local ordinance that satisfies the definition of a living shoreline consistent with § 28.2-104.1 shall qualify for full exemption from such taxation by local governments.[104]

It is unclear if the language "qualify for full exemption…by local governments" means the government has discretion to grant an exemption or must exempt living shorelines from local property tax by law. If the law requires local governments to enact an exemption, that presents a potential challenge to living shoreline implementation in localities where no exemption has been enacted. The fiscal impact statement (FIS) for the bill that codified the living shorelines tax

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[98] Commonwealth of Va., Office of the Att'y Gen. Opinion Letter (Jan. 18, 1983); *see also* VA. CODE ANN. § 28.2-1302 (2017).
[99] *See* Memorandum from Mary Ann Welton, Fairfax Cty. Wetlands Bd., to Susan Manes, Michael Baker Int'l (Feb. 18, 2016) (on file with author).
[100] *See* Scyphers et al., *supra* note 35, at 46.
[101] *Hard Armoring*, WETLANDS WATCH, http://wetlandswatch.org/hard-armoring/ (last visited Apr. 26, 2018).
[102] *Soft Armoring*, WETLANDS WATCH, http://wetlandswatch.org/soft-armoring (last visited Apr. 26, 2018).
[103] VA. CODE ANN. § 58.1-3666 (2017).
[104] *Id.*

exemption noted that the law at the time allowed for local tax exemptions for certain wetlands and riparian buffers and noted that living shoreline projects not already exempt under that exemption would further reduce local revenues.[105] The FIS also explains that although the wetlands and riparian buffer exemptions were allowed by state law, only two localities had enacted them as of 2014.[106] If localities must enact the exemption themselves, there is no incentive for them to do so (and give up potential revenue as a result) and, based on the prior wetlands and riparian buffer exemption's lack of enactment, this paper assumes that few, if any, localities have done so since the legislation was passed in 2016. It is also important to note that any locality that has enacted the tax exemption (if one is required) may then have an incentive to deny living shorelines permits to limit the potential impact to local tax revenue, no matter how small any such impact may be.

IV. LEGAL AND POLICY RECOMMENDATIONS

Increased implementation of living shorelines in Virginia's coastal areas is the purpose of § 28.2-104.1 of the Virginia Code, but the current regulatory scheme may not be producing the intended result. Policymakers should consider making changes to current practices to guide landowners' decision-making towards living shoreline stabilization practices when conditions at the site of a proposed action are appropriate.

A. General Recommendations

First, Virginia should make a greater effort to educate both the public and contractors about the costs, methods, and benefits of implementing living shorelines at sites where they are appropriate. As noted above, landowners simply do not recognize the value of living shorelines when compared to traditional structures like bulkheads and revetments. Likewise, contractors play an important role in recommending the best practices to landowners, so they need to have the knowledge to confidently build and maintain living shorelines as well as to provide accurate cost estimates for installation to the public.

> Because the economic benefits of living shorelines are not always evident, it is important to promote the practice in every facet of its implementation. For example: real estate agents could educate first-time waterfront homeowners about various techniques for protecting their shoreline, local landscapers could educate homeowners on the best practices for shoreline management and upland landscaping, landscape designers and engineers could educate property owners and provide a variety of options for shoreline management, and local nurseries could be incentivized to stock native plants and materials which would encourage their use and increase available options for homeowners. The economic benefits of promoting the practice across all sectors in our region are twofold – as the practice becomes more commonplace it drives down the cost, while at the same time creating a niche market across multiple sectors which benefits the local economy.
>
> *John Bateman, Regional Planner, Northern Neck Planning District Commission*

The General Assembly should eliminate the permitting exemption for political subdivisions conducting projects that impact wetlands that they own or lease, or at least prohibit the exemption from being used for hard armoring projects where a site analysis should be

[105] DEP'T OF TAX'N, 2016 FISCAL IMPACT STATEMENT HB 526 at 1 (2016), https://lis.virginia.gov/cgi-bin/legp604.exe?161+oth+HB526FER161+PDF.
[106] *Id*. at 2.

conducted to determine if living shorelines are more appropriate. Virginia should also provide for further streamlining of the permitting processes for living shoreline projects, which could incentivize more coastal landowners to choose them over other shoreline stabilization practices that would be subject to more review. An example of the type of further regulatory streamlining proposed here is to create a *de minimis* exception for living shoreline projects of specified sizes and designs. Florida has adopted this approach on a case-by-case basis and although it removes the necessity of state permits, it does not remove the need for federal permits like those administered by the USACE.[107] A program of *de minimis* exceptions in Virginia, combined with increased training and licensing for contractors to ensure proper implementation and maintenance, could greatly increase the usage of good living shoreline practices. Proper implementation and maintenance are key to the success of a living shoreline project.[108]

Virginia could consider ways to further consolidate the permitting process as well. Figure 1 above shows the various agencies that may have jurisdiction over a given living shorelines project in Virginia. Although the JPA eliminates the need for applying to each agency separately, living shorelines permitting processes in other states (like Maryland, New Jersey, and North Carolina) are overseen by fewer agencies which may further speed up the process by reducing review time.[109] CCRM recommends a similar change of "consolidation of tidal wetland, beach and dune management" and notes that two state agencies are uniquely equipped to handle the process: The Virginia Department of Environmental Quality (DEQ) and VMRC.[110] On the one hand, VMRC already administers the living shorelines general permits under state law.[111] On the other hand, DEQ already is responsible for water quality certification for tidal wetlands, and administers all non-tidal wetlands permits and the Chesapeake Bay Preservation Act (CBPA), Stormwater Management and Erosion and Sediment Control programs.[112] Those programs are all included in the jurisdictional diagram in Figure 1. CCRM also recommends eliminating local wetlands boards as a part of the consolidation.[113] Whichever agency were to be chosen, a single agency reviewing the entire living shorelines permitting process may make the review more efficient and faster. Alternatively, CCRM recommends requiring all wetlands board decisions where a living shoreline is recommended but not implemented be reviewed by VMRC.[114] Such a requirement could help ensure that the state preference for living shorelines is followed. Review by VMRC may also help to reduce variability in local wetlands board decisions.[115]

Another approach that the General Assembly could consider is removing shoreline armoring practices from the JPA. Currently, the JPA is used for both living shorelines and for shoreline armoring practices such as bulkheads and revetments that do not provide all of the

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[107] Chris A. Boyd & Niki L. Pace, Coastal Alabama Living Shorelines Polices, Rules, and Model Ordinance Manual 23 (2013), http://masglp.olemiss.edu/Advisory/livingshorelines/Coastal-Alabama-Living-Shorelines-Policies-Manual.pdf.
[108] Subramanian, *supra* note 40.
[109] *See generally Living Shoreline State Regulation at a Glance*, MD. DEP'T OF NAT. RESOURCES, http://dnr.maryland.gov/ccs/Documents/training/state%20regulation%20at%20a%20glance.pdf (last visited Apr. 26, 2018).
[110] BERMAN ET AL., *supra* note 3, at 23.
[111] VA. CODE ANN. § 28.2-104.1 (2017).
[112] *Id*.
[113] BERMAN ET AL., *supra* note 3, at 23.
[114] *Id*. at 22.
[115] *See id.*

benefits of a living shoreline.[116] If the state removed bulkheads and other traditional structural shoreline armoring practices from inclusion in the JPA, landowners would have more difficulty in applying and receiving permission to construct them. The current statutory preference for living shorelines would then be underscored by the actual structure of the permitting process instead of just mentioned on the second page of the permit application.[117] Although this proposal would almost certainly increase the number of living shoreline permit applications, it may be too burdensome on landowners whose property is not suitable for a living shoreline. To alleviate any extra burden on such landowners, they could be allowed to use the JPA upon a finding by the state permitting agency that the applicant has adequately demonstrated why their property would not be an appropriate site for a living shoreline.

Localities and the State also could incentivize landowners to install living shorelines, by providing either funding or regulatory or tax relief. Importantly, any funding sources for living shoreline installation provided by state agencies or organizations should be free from limitations regarding their combination or use; and any regulatory or tax relief provided should be streamlined so as to encourage its use.[118] Currently, the Virginia Water Facilities Revolving Fund provides loans to localities for the establishment of living shorelines or for funding programs that provide loans or incentives to individuals for the establishment of living shorelines.[119] Also, VCAP's reimbursement program provides for 75% of the total costs of a project but there may be landowners that cannot afford to build a living shoreline even with that assistance. To further offset the cost of a project, the state could fund the currently unfunded Virginia Shoreline Resiliency Fund (the "Fund") and allow its use for living shorelines projects.[120] Provided for in state law, the Fund, when it receives money, is intended to be used to "help residents and businesses that are subject to recurrent flooding as confirmed by a locality-certified floodplain manager."[121] The law also says that the Virginia Shoreline Resiliency Fund "may be used to mitigate future flood damage."[122] Living shorelines do that.[123] Another way to help make living shorelines even more financially attractive is to provide some incentive for localities to enact the local real estate tax exemption for living shorelines provided for by state law.[124] Such a proposal was even recommended in 2017 by a focus group comprised of members of local wetlands boards in Virginia.[125]

B. Approaches Taken by Other States

[116] VA. MARINE RES. COMM'N, *supra* note 59, at 2.
[117] *Id*.
[118] E-mail from John Bateman, Regional Planner, NORTHERN NECK PLANNING DIST. COMM'N (Oct. 2, 2018) (on file with author).
[119] VA. CODE ANN. § 62.1-229.5 (2017). However, administration of this funding source may be difficult for localities with limited staff resources and there is a significant financial risk if the loans are not repaid on scheduled. E-mail from John Bateman, *supra* note 118.
[120] *Soft Armoring*, *supra* note 102.
[121] VA. CODE ANN. § 10.1-603.25 (2017).
[122] *Id*.
[123] *See* NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 8.
[124] In its current format, the local tax exemption for living shorelines presents a fiscal dilemma for rural localities that rely on property taxes as their primary source of revenue, especially when living shorelines are often implemented on the highest value properties in the locality. E-mail from John Bateman, *supra* note 118.
[125] BERMAN ET AL., *supra* note 3, at 22.

The General Assembly also could consider wholesale changes to Virginia's policy on living shorelines. Other states have varying approaches to living shoreline implementation that Virginia could examine as potential options. Many other coastal states have created streamlined permitting processes as Virginia has done.[126] This section considers the shoreline stabilization policies of three other states: Maryland, Massachusetts, and South Carolina.

1. Maryland

In Maryland, instead of being the preferred alternative, living shorelines are required. Maryland regulations specify that persons proposing to install shoreline stabilization measures shall use nonstructural measures (like living shorelines).[127] That requirement is part of a larger policy of managed retreat; prior to consideration of a living shoreline, a person in Maryland must also consider taking no action or relocating structures that are threatened by erosion.[128] To construct a structural shoreline stabilization measure such as a bulkhead, a person in Maryland must request and be granted a waiver or be located "in an area identified by a map as appropriate for structural shoreline stabilization measures" by the Maryland Department of the Environment (MDE) in coordination with the Maryland Department of Natural Resources.[129] The maps are to be developed based on the consideration of a number of factors, including but not limited to the presence of high wave energy, severe erosion, channel proximity, and impacts to rare, threatened and endangered species.[130] In other words, the maps are designed to limit structural shoreline stabilization measures to sites where there is no other option.

Maryland's waiver process is based on similar concerns. MDE considers the following factors when reviewing an application for a waiver to build a structural shoreline stabilization project:

> (1) The width of the waterway;
> (2) The bottom elevation and slope at mean low water;
> (3) The bottom substrate:
> (4) The fetch;
> (5) The bank elevation and orientation;
> (6) The degree of erosion;
> (7) The height and regularity of tides;
> (8) Any other physical constraints that would impede or prevent successful establishment of a nonstructural shoreline stabilization measure; and
> (9) Any other relevant environmental resources, including a Critical Area buffer and other plant, fish, and wildlife habitat, and the likely adverse or protective impact of a nonstructural shoreline stabilization measure on those resources in comparison to the likely adverse or protective impact of a structural shoreline stabilization measure on those resources.[131]

[126] Boyd & Pace, *supra* note 107, at 23-24.
[127] MD. CODE REGS. 26.24.04.01 (2018).
[128] *See id*.
[129] *Id*.
[130] *Id*.
[131] *Id*.

Further, the waiver may only be granted if, "to the Department's satisfaction, a structural shoreline stabilization measure is the only feasible alternative that will protect and maintain the person's shoreline."[132] Maryland has made the process of applying for and building a non-living shoreline more difficult than it is in Virginia, where living shorelines and structural shoreline stabilization measures utilize the same application.

Virginia could adopt a similar system to Maryland's if it wants to seriously increase living shoreline implementation or at least slow the process of hard shoreline armoring. Combined with a program designed to provide more training and licensing to contractors who install living shorelines and increased public awareness of their benefits, a requirement for living shorelines in all places where they are appropriate would be a powerful policy to promote their use. This would require an amendment to state law and regulations that may be difficult to achieve given the Maryland regulation's requirement that landowners first consider relocation of structures. Virginia could choose to omit the requirement to first consider relocation if it is politically unpalatable. As for maps showing areas where living shorelines are feasible, VIMS and CCRM could potentially incorporate a similar feature into their existing tools such as the user-friendly Shoreline Assessment Mapper, which currently displays data about shoreline conditions based on a user selecting features from a dropdown menu.[133] Having a waiver process with factors upon which the reviewing body can base its decision should give applicants some clarity when deciding whether applying for a waiver would be appropriate for them as well.

2. Massachusetts

Massachusetts has adopted regulations that govern all projects involving construction in waterways including shoreline stabilization structures.[134] Massachusetts refers to shoreline stabilization structures broadly as "coastal or shoreline engineering structures" defined as "any breakwater, bulkhead, groin, jetty, revetment, seawall, weir, riprap or any other structure which by its design alters wave, tidal, current, ice, or sediment transport processes in order to protect inland or upland structures from the effects of such processes."[135] Living shorelines would be included because they serve the purposes described in that definition.[136] In its construction and engineering standards for projects in waterways, Massachusetts requires the following with respect to shoreline stabilization structures:

> Projects with coastal or shoreline engineering structures shall comply with the following:
> **(a)** any seawall, bulkhead, or revetment shall be located landward of the high water mark unless it must lie below the high water mark to permit proper tieback

[132] *Id*.
[133] *See Shoreline Assessment Mapper*, VIMS, http://cmap2.vims.edu/SAM/ShorelineAssessmentMapper.html (last visited Apr. 26, 2018).
[134] *See* 310 MASS CODE REGS. 9.37 (LexisNexis 2018).
[135] *See* 310 MASS CODE REGS. 9.02 (LexisNexis 2018).
[136] Chesapeake Bay Program, CBP/TRS-282-06, Best Management Practices for Sediment Control and Water Clarity Enhancement 39 (2006), https://www.chesapeakebay.net/content/publications/cbp_13369.pdf.

placement, to obtain a stable slope on bank areas, or to be compatible with abutting seawalls, bulkheads, or revetments in terms of design, size, function, and materials, or unless it is associated with new fill permitted according to the provisions of 310 CMR 9.32;

(b) any breakwater or similar structure designed to dissipate or otherwise reduce wave energy or to interfere with current flow shall not:

1. cause or contribute to water stagnancy;

2. reduce the ability of adjacent water bodies to flush adequately; or

3. cause or contribute to sedimentation problems in adjacent or nearby navigation channels, anchorages, or wetland resource areas, or cause increased erosion to inland or coastal beaches, banks, or other wetland resource areas;

(c) in evaluating coastal or shoreline engineering structures, the Department shall require non-structural alternatives where feasible;

(d) the Department shall evaluate coastal or shoreline engineering structures for compatibility with abutting coastal or shoreline engineering structures in terms of design, size, function, and materials;

(e) if the Department finds significant adverse effects on the project site or adjacent or downcoast and downstream areas after construction of any coastal or shoreline engineering structure, the Department may, after an opportunity for a hearing, require modification of said structure the cost of which may not exceed 25% of the replacement cost of said structure, or may require the removal of said structure; 310 CMR 9.37(3)(e) shall be specifically stated in the license.[137]

Living shorelines are mandated absent adequate site conditions; the regulation contains a requirement for "non-structural alternatives where feasible."[138] Massachusetts does not set out criteria in its regulations outlining how a determination of the feasibility of non-structural alternative shoreline stabilization measures is made. Additionally, the regulation addresses neighbor effects by requiring compatibility with neighboring structures and even potentially requiring modification if the project creates adverse effects for other sites.[139] Another regulation pertaining to coastal wetlands may also limit the placement of hard armoring structures because the regulation prevents the placement of projects which would cause increased erosion or degradation of habitat in areas where land under the ocean is found to be "significant to the protection of marine fisheries, protection of wildlife habitat, storm damage prevention or flood control."[140] As noted above, hard armoring structures disturb the seaward bottom and damage the habitats of both fish and vegetation.[141] As a result, hard armoring structures in Massachusetts may potentially be prohibited even in areas where a non-structural alternative is not feasible if certain other site conditions exist.

Virginia could consider similar language to prevent adverse effects on neighboring shorelines. Such language would also encourage landowners to make decisions on a shoreline basis

[137] 310 MASS CODE REGS. 9.37 (LexisNexis 2018).
[138] *Id.*
[139] *See id.*
[140] 310 MASS CODE REGS. 10.25 (LexisNexis 2018).
[141] *See* Pacella, *supra* note 19.

as opposed to on a parcel-by-parcel basis by requiring compatibility with neighboring shorelines and modification if negative effects occur. If Virginia adopted regulations similar to Massachusetts', hard-armoring in Virginia could occur only where living shorelines are not feasible (and sometimes not even then), and negative downstream effects of shoreline stabilization projects could be mitigated or avoided entirely for all shoreline stabilization projects. Such regulations could also protect habitats of fish and aquatic vegetation by limiting the placement of hard armoring in certain locations.

3. South Carolina

Although South Carolina "does not have specific project standards or regulations to guide the permitting and construction of living shoreline projects[,]"[142] its Beachfront Management Act provides a different type of model for limiting the placement of hard armoring structures on shorelines.[143] The Act, passed in 1988, is designed to "severely restrict the use of hard erosion control devices and encourage the replacement of hard erosion control devices with soft technologies which will provide for the protection of the shoreline without long-term adverse effects."[144] As a part of reaching that goal, the Act requires the establishment of two lines of beachfront jurisdiction once every seven to ten years.[145] These lines are intended to move with the coastline and serve as an area of regulation that promotes the construction of soft armoring projects and the movement of vulnerable structures away from areas of erosion.[146] The public has an opportunity to comment on the proposed lines.[147] The Act prohibits construction of new hard armoring and forbids the repair of structures that reach a certain percentage of destruction or damage based on when they were installed.[148] The only erosion control structures that are allowed are those that protect a public highway.[149]

South Carolina's Beach Management Act represents a policy of managed retreat.[150] Virginia could consider adopting that policy as well or it could consider taking some of South Carolina's policies—particularly those that severely limit the hard armoring of shorelines—and use them to encourage more living shoreline implementation in the state. If Virginia chooses a policy of retreat, South Carolina's approach is a good place to start, and living shorelines represent a way to maintain water quality while allowing the shoreline to naturally migrate. Unfortunately, while a policy of retreat may be the best option in some cases, the psychological, political, and

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[142] *Living Shorelines Working Group*, S.C. DEP'T OF HEALTH & ENVTL. CONTROL, http://www.scdhec.gov/HomeAndEnvironment/Water/CoastalManagement/LivingShorelines/ (last visited Apr. 26, 2018).
[143] *See Beachfront Management*, S.C. DEP'T OF HEALTH & ENVTL. CONTROL, http://www.scdhec.gov/beach/BeachfrontManagement/index.htm (last visited Apr. 26, 2018).
[144] *Id*.
[145] *Proposed Beachfront Jurisdictional Lines*, S.C. DEP'T OF HEALTH & ENVTL. CONTROL, http://www.scdhec.gov/HomeAndEnvironment/Water/CoastalManagement/BeachManagement/BeachfrontJurisdiction/ (last visited Apr. 26, 2018).
[146] *See id*.
[147] *Id*.
[148] S.C. CODE ANN. § 48-39-290 (2016).
[149] *Id*.
[150] S.C. CODE ANN. § 48-39-280 (2016).

economic barriers to it may be almost impossible to overcome until it is nearly too late.[151] It is worth noting that the CBPA may already provide some framework for a rolling system in Virginia similar to the one created by the South Carolina Beachfront Management Act; Resource Protection Areas (RPAs) are intended to be reestablished at the time of permit review under the CBPA in a way that would result in the RPA's area "rolling backward" with changes in the shoreline as new permits are sought.[152]

If Virginians decide that a policy of retreat is not in their best interests, the state could still create a system designed to strictly limit hard armoring by following South Carolina's model. As an example, Virginia could enact a system that prevents reconstruction of damaged bulkheads and revetments and mandates their replacement with living shorelines where feasible. In areas where a living shoreline is not feasible, Virginia could allow for the repair of bulkheads and other hard armoring structures. One aspect of South Carolina's Beachfront Management Act that would not be conducive to a statewide program to limit hard shoreline armoring and promote living shorelines is the Act's blanket prohibition on the construction of all hard shoreline stabilization measures. A prohibition on hard shoreline armoring may help certain localities earn CRS credit though.[153] A system for Virginia would have to be cognizant of the limitations on siting of living shorelines and leave open the possibility that the best option for a given site may be a structural shoreline stabilization measure.

V. CONCLUSION

Although living shorelines are not suitable in all locations, Virginia should strongly consider changes to its policies to help ensure that landowners choose living shorelines where they are appropriate. Additionally, it should consider policies which would limit adverse effects to neighbors from shoreline stabilization projects. Virginia should also consider public education initiatives, changes to the permitting process, and providing greater financial assistance to property owners for living shorelines projects. Finally, other states, like Maryland, Massachusetts, and South Carolina, also have programs that Virginia can consider as it determines the best way to promote further implementation of living shorelines along its coastlines.

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[151] Michelle Nijhuis, *When is it Time to Retreat from Climate Change?*, THE NEW YORKER (Mar. 27, 2017), https://www.newyorker.com/tech/elements/when-is-it-time-to-retreat-from-climate-change.

[152] *See* 9 VA. ADMIN. CODE § 25-830-140 (2018); 9 VA. ADMIN. CODE § 25-830-190 (2018). Resource Protection Areas are defined as "lands adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may cause significant degradation to the quality of state waters" and a 100-foot buffer area "adjacent to and landward of" such lands. 9 VA. ADMIN. CODE § 25-830-80.

[153] *See* FED. EMERGENCY MGMT. AGENCY, *supra* note 93, at 420-30.