

# SOFTENING OUR SHORELINES

POLICY AND PRACTICE FOR LIVING SHORELINES  
ALONG THE GULF AND ATLANTIC COASTS



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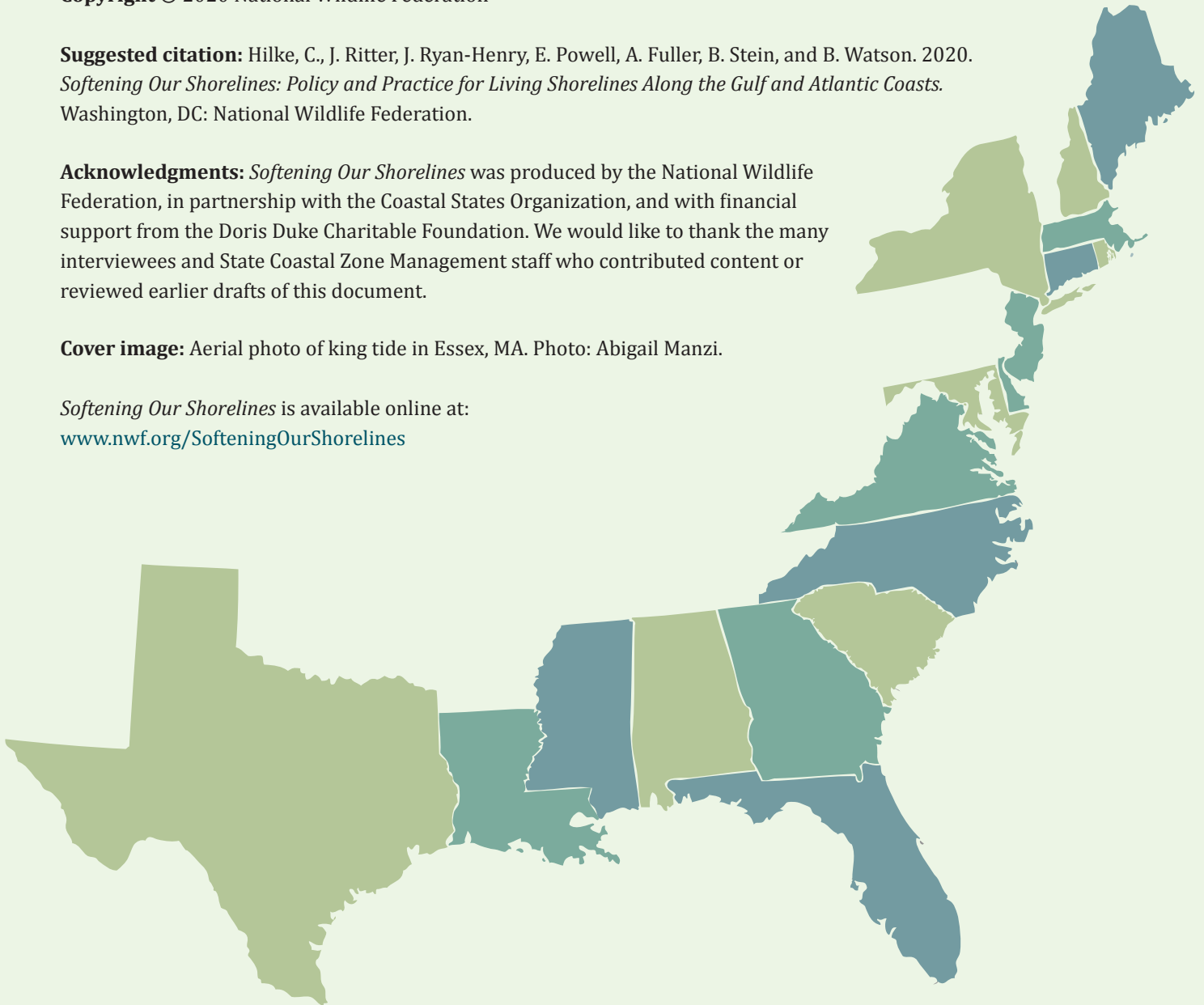
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National Wildlife Federation  
1200 G Street, NW, Suite 900  
Washington, D.C. 20005  
[www.nwf.org](http://www.nwf.org)



Blackbird Creek Reserve Living Shoreline. Photo: DE Living Shoreline Committee.

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Parker River National Wildlife Refuge. Photo: Kelly Fike/USFWS.

## EXECUTIVE SUMMARY

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Over the past two decades the use of living shorelines to address coastal erosion has increased dramatically as landowners seek more natural solutions to shoreline stabilization. Approaches for protecting coastal properties from erosion and coastal storms traditionally have focused on erecting hard structures, but hardened shorelines can complicate coastal adaptation needs, and may be counterproductive in the face of inevitable inland shifts. In contrast, the softening of our shorelines where appropriate can enhance the capacity of coastal habitats and communities to adapt and respond to climate-driven changes. Although there has been progress in the adoption of these softer approaches in some states, the rate of living shoreline installation is still low relative to the amount of hardened shoreline protections.

To better understand the possible reasons for this discrepancy, the National Wildlife Federation worked in collaboration with the Coastal States Organization to assess the regulatory landscape relevant to the living shorelines permitting in all Atlantic and Gulf coastal states. Through research and a series of interviews

with state agency personnel and other experts, we found that the permitting process for living shorelines varies considerably across states, and appears to play a significant, though not complete, role in either constraining or facilitating living shoreline implementation on the ground. A number of other factors were identified as barriers, including the lack of relevant design standards and a deficiency in service providers trained to construct living shorelines. Based on the information gathered, Part 1 of this report highlights some specific best practices and state and federal policy recommendations to promote the implementation of living shorelines. In Part 2, we provide a more detailed summaries of permitting processes by state.

*Although there has been progress in the adoption of these softer approaches in some states, the rate of living shoreline installation is still low relative to the amount of hardened shoreline protections.*



Winter waves hitting Plum Island, MA. Photo. Ron Barrett.

**F**or centuries people have flocked to coastlines, drawn by ready access to resources, transportation, recreational opportunities, and natural beauty. U.S. coastal counties are home to 42 percent of the population (133.2 million people), and serve as economic engines that support jobs in defense, fishing, transportation, and tourism industries; contribute substantially to the U.S. gross domestic product; and serve as hubs of commerce, with seaports connecting the country with global trading partners.<sup>1</sup> Coastal zones are also home to important ecosystems such as saltmarshes, beaches, intertidal zones, reefs, estuaries and deltas which in turn support a diverse array of environmental and economic services including recreation, fisheries, water quality, critical habitat for migratory bird species, and coastal storm protection.<sup>2</sup> Together, these social, economic and environmental services are under threat as a result of climate-driven stressors including sea-level rise, increasingly frequent and intense coastal storms, erosion, and saltwater intrusion, among others.<sup>3</sup> The impacts from these threats are exacerbated by the loss of hydrologic functioning, habitat loss and habitat degradation as a result of short-sighted land-use planning.

# PART 1: SHORELINE PROTECTION STRATEGIES

These climate change-related impacts are not operating in isolation. Rather, they are amplifying and exacerbating many of the existing challenges and hazards associated with building in highly dynamic coastal systems. Barrier islands, for instance, are notoriously unstable and prone to shifting, while many other coastal landforms are subject to ongoing shoreline erosion and land loss. Along undeveloped coastlines natural processes can often mitigate or counterbalance these erosional forces, but such “adaptive capacity” has been degraded or lost along much of the coast due to development, disruptions in natural sand and sediment transport processes and damming or diversion of inland rivers that are the source of much coastal sand and sediment. Data indicate that on average, 80.1 acres of coastal wetlands were lost annually between 2004 and 2009, with 71 percent of that loss occurring in the Gulf of Mexico.<sup>4</sup> At this rate, an additional 16 percent of coastal wetlands across the United States are projected to be lost by 2100.<sup>5</sup>

There are approximately 350,000 structures located within 500 feet of U.S. coastlines that are vulnerable to erosion and coastal storms.<sup>6</sup> Approaches for protecting coastal properties have traditionally focused on erecting hardened structures to serve as barriers to wave action and flooding. Shoreline armoring such as sea walls, breakwaters, riprap and levees are examples of such “structural” or “gray” approaches to coastal protection. Estimates suggest that approximately 14 percent of the U.S. coastline is currently armored, and if shoreline hardening and coastal population growth continue at current rates, roughly one-third of the contiguous U.S. coastline will be effectively armored by 2100.<sup>7,8</sup>



Oyster castle breakwaters protecting a vegetated shoreline from erosion. Florida Gulf Coast. Photo: Kaila Drayton/NWF.

## NATURAL AND NATURE-BASED APPROACHES TO SHORELINE PROTECTION

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Over the past few decades there has been increasing interest in the use of “natural infrastructure” to reduce the risks from coastal hazards. As described in NWF’s 2016 report *Natural Defenses in Action*, risk reduction approaches include: protecting intact natural systems; restoring natural systems; creating nature-based features; and combining natural and man-made features. The various ecological approaches for risk reduction not only provide protective value for people and properties, but also deliver environmental benefits, such as improved fish and wildlife habitat and water quality enhancements.

Natural infrastructure refers to systems such as dunes, marshes, and floodplains that provide essential services and benefits to society, such as flood protection, water purification, and carbon storage. Nature-based infrastructure can be defined as infrastructure that mimics characteristics of natural infrastructure but “is created by human design, engineering, and construction to provide specific services such as coastal risk reduction.”<sup>9,10</sup>

Natural and nature-based infrastructure is intended to harness the protective ecosystem services that many natural coastal features can provide such as attenuating wave energy, absorbing floodwater, slowing erosion, and accreting sediment. Research suggests that U.S. coastal wetlands provide \$23.2 billion in storm protection services annually.<sup>11</sup> Many of these natural and nature-based approaches for shoreline protection are known as “living shorelines,” and using living shorelines, rather than hard armoring, is gaining traction in some coastal regions.

*Natural infrastructure refers to systems such as dunes, marshes, and floodplains that provide essential services and benefits to society, such as flood protection, water purification, and carbon storage.*



## WHAT ARE LIVING SHORELINES?

The term “living shorelines” is used to describe a broad range of techniques and approaches for providing shoreline stabilization through the use of ecological, or “soft” approaches, as opposed to hard infrastructure. Although often solely associated with engineered approaches for shoreline stabilization, the concept of living shorelines spans the full range of natural defenses, from fully functioning natural systems to hybrid green-gray features. Such approaches, whether natural or engineered, typically serve to accommodate natural coastal processes as a means to reduce shoreline erosion, provide storm protection, and enhance habitat value.

Living shoreline creation typically relies on native materials, such as vegetation, shellfish, or other naturally occurring elements. These can be used alone or in combination with structural components to increase stability. Commonly used structural components include hardened toes, sills, biologs (e.g., coir logs), groins, and on-shore and off-shore breakwaters. While structural elements can include the use of “natural” components like oyster shells, a subset of living shorelines can be categorized as “hybrid” approaches. Hybrid approaches incorporate both natural materials and “nature-based” structural features like concrete reef balls or newly-placed rocks. As such, living shoreline design occurs along a continuum from green (natural materials only) to green/gray (hybrid) approaches. Regardless of the type, the goal of living shorelines is often to provide shoreline stabilization services similar to those achieved through a gray-only approach like sea walls, while maximizing the benefits inherent to natural shorelines by mimicking the function of natural shorelines in the local system.

*Sign preventing disturbance of natural habitat including sea oats and other dune plants. Photo: Caroline Wicks/University of Maryland Center for Environmental Science.*

*The concept of living shorelines spans the full range of natural defenses, from fully functioning natural systems to hybrid green-gray features.*





*Before and after images of the Conquest Beach Living Shoreline in Maryland. The project was specifically designed to accommodate projected sea level rise. Photo: Karl Schrass/NWF.*

## APPLICATION OF LIVING SHORELINE APPROACHES

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**T**he worst effects of climate change are still in the future for many people, but the inexorable and accelerating rise in sea levels make climate change impacts very real and near-term for many coastal communities. Although the initial response to these changes in most regions is to strengthen coastal defenses against encroaching waters, it is clear that over time coastal adaptation will require a much broader palette of responses. These range from resistance strategies—regardless of cost in some places (e.g., lower Manhattan)—to approaches that are designed to adjust to and accommodate varying levels of change (e.g., elevation of structures), to abandonment or retreat from particularly high-risk properties or areas. This range of options applies both to human-oriented adaptation as well as to adaptation for ecosystems and habitats. Indeed, one of the major concerns from an ecosystem conservation perspective is “coastal squeeze,” in which remaining natural habitats are infringed upon from rising tides but constrained by development from shifting inland. While it is easy to understand why property owners and local communities emphasize hard infrastructure approaches, many conservationists

have only recently shifted their orientation from resistance strategies towards accommodation or retreat paradigms for climate adaptation.

What then is the role of living shorelines within the broader context of coastal adaptation? Regardless of the pace and ultimate trajectory of macro-trends in coastal adaptation, softening the coast—through maintaining and restoring natural systems and/or creating engineered features that emulate natural systems—should facilitate eventual inland transitions of coastal habitats where feasible. At present, the choice for most property owners will not be between shoreline protection and retreat, but rather between structural or more nature-based protective strategies. From this perspective, using natural and nature-based approaches for shoreline protection will almost certainly retain more options for future adaptation than would shoreline armoring. This would hold true even where there are structural components of a living shoreline (e.g., rock sills), since relative to hard armoring, these shoreline designs are more likely to provide environmental benefit or be neutral in environmental impact.



*Living shoreline installation, Port Norris, NJ. Photo: PDE/Flickr.*

## PERMITTING LIVING SHORELINES: A SUMMARY OF FINDINGS

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**F**rom June 2018 through October of 2019 the project team conducted extensive research into the permitting landscape for living shorelines in 18 Atlantic and Gulf Coast states. This included initial desktop research followed by over 40 total interviews conducted with state regulators, practitioners, and scientists from academic institutions and non-profit organizations. Feedback was also solicited through several workshops hosted at conferences during this project period. What emerged from that research was a notable diversity in permitting regimes across states and regions. In this section, we present a summary of those findings, and highlight some specific examples of the different approaches observed. For more detailed state-by-state regulatory summaries, please see Part 2 of this report.

Because they occur in the coastal zone, living shoreline projects typically cross the jurisdiction of multiple federal and state agencies, creating some level of complexity in their permitting.

### FEDERAL REQUIREMENTS AND NATIONWIDE PERMIT 54

Most living shoreline projects, if they occur in intertidal waters, require authorization from the Army Corps of Engineers (Army Corps). The Army Corps has authority under the Rivers and Harbors Act of 1899 to permit activities that could impede navigation or obstruct navigable waterways, as well as responsibility under the Clean Water Act Section 404 to permit any activities that will impact “waters of the United States,” including navigable waters, tributaries and adjacent wetlands.

Unless a project occurs landward of the mean high tide line and otherwise impacts no waters of the United States, most living shoreline projects will require either an individual permit or a general permit from the Army Corps. Permits are issued at the Army Corps district level (with 38 district offices around

the country), and states are able to apply additional conditions to Army Corps permits to better align permits with state priorities. As such, there is quite a bit of heterogeneity in the regulatory requirements from state to state.

General permits are designed for projects that meet certain predefined criteria and which are expected to have minimal environmental impacts, so that they can be more quickly processed and approved, minimizing the burden on both the applicant and the regulators. General permits can be designed and issued at a state scale, a regional scale, or a national scale. Nationwide Permits (NWP) are a category of general permits administered by the Army Corps and traditionally updated every five years. They must be certified by a state to be applicable there, and states have the ability to deny certification of a Nationwide Permit.

For projects that do not meet the criteria of a general permit, or for activities for which there is not a general permit available, projects must receive an individual permit. Associated project-specific review for an individual permit tends to be more complex and time-intensive.

In the 2017 update and reauthorization cycle for the Army Corps NWPs, a permit for living shoreline projects was developed. This permit – called Nationwide Permit 54 – sought to level the playing field between living shorelines and other common bank stabilization techniques (bulkheads, rip rap, revetments, etc), for which a Nationwide Permit had long existed (NWP 13). Prior to issuance of the Nationwide Permit 54, in many states living shoreline permitting was all done individually, and as such it often required expensive shoreline surveys and geotechnical reports, and could take many months to complete. Alternately, most general permits could be issued within 30 days, without all the additional surveying requirements.<sup>12</sup>

Some of the criteria that must be met for Nationwide Permit 54 for living shorelines include the following:<sup>13</sup>

- Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.

- Living shorelines may not extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high-water mark in the Great Lakes, and may be no longer than 500 feet along the bank, unless the project received a specific waiver from these requirements from the district engineer.

- Discharges of dredged or fill material into waters of the United States, and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline.

- The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore.

- Proper maintenance of the living shoreline is required and maintenance and repair activities including minor deviations necessary to address changing environmental conditions are authorized.

- Beach nourishment or land reclamation activities are not authorized.

- A pre-construction notification to the district engineer prior to commencing the construction of the living shoreline is required.

In issuing permits for living shorelines, the Army Corps must comply with all other applicable federal laws, including the National Environmental Policy Act, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Coastal Zone Management Act.

## STATE REQUIREMENTS

In addition to an Army Corps federal permit (whether general or individual), most living shoreline projects also require state permits. The agencies responsible for the permitting of living shorelines vary by state, but often the responsibility is nested within a state department of natural resources or environmental

protection, often with the state coastal zone management program. Many states require specific approvals for use of state-owned submerged lands, which may engage a separate agency.

States also retain the authority to review and approve Army Corps permits, both through Clean Water Act (CWA) Section 401 water quality certification (CWA) and Coastal Zone Management Act federal consistency (CZMA) authorities. If a state determines that a federal activity does not comply with state water quality standards, or that an activity is inconsistent with the state's approved Coastal Zone Management plan, the state has the ability to either deny or issue conditions to the general permit. In many cases, general permits are designed collaboratively between the state and local Army Corps district to satisfy the permitting requirements of each party.

## TRENDS IN PERMITTING ACROSS THE ATLANTIC AND GULF

Atlantic and Gulf Coast states have used a diversity of approaches to satisfy the federal permitting requirements for living shoreline projects. Through our analysis, we found that **6 out of 18** states surveyed have approved Nationwide Permit 54 for living shorelines under the CZMA and CWA, typically with conditions applied specific to that state.<sup>14</sup> The 12 remaining states denied CZMA and/or CWA certification of NPW 54 for a variety of reasons. In some cases, the requirements of NWP 54 was not well-adapted to the realities of the physical landscape on the ground in the state. In several cases, states had general permits in place for permitting living shorelines that predated creation of NWP 54, and they opted to maintain their existing permitting regimes.



*Gulf coast erosion. Photo: Kaila Drayton/NWF.*

A number of states denied NWP 54 because of a broader policy preference to individually examine and approve every permit impacting the state's coastal zone. In states that have denied NWP 54, the NWP may still be used to satisfy Corps permitting requirements, provided the project meets the NWP 54 criteria; however, the project would require separate CZMA federal consistency review and/or CWA water quality certification from the state.

In **14 out of 18** states, some alternate form of regional or state programmatic general permit is used to permit living shorelines, and is designed cooperatively and reviewed jointly between states and their particular Army Corps district. These permits are not necessarily specific to living shorelines, but apply to a class of activities including living shoreline which the state has found to have minimal environmental impact, and which therefore qualify for expedited review. Finally, **4 states** have approved NWP 54, but also have a state-specific general permit in place.<sup>15</sup> The frequency of use of NWP 54 varies widely across these four states.

The divide between usage of the NWP 54 and individually-designed state or regional general permits suggests that many states prefer a more tailored permitting approach for living shorelines. This is unsurprising given that living shoreline projects must be designed to accommodate the specific environmental conditions on the ground in a given place, and several states already had general permits in place when NWP 54 was issued. Several states also cited the concern that the NWP 54 was less efficient for permitting living shorelines than their own general permits, for instance due to the NWP 54 requirement for pre-construction notification which added time to permit completion. As of December 2019, NWP 54 has been used over 100 times nationwide, with a majority of permits issued in Florida and Virginia.

Interviews also explored the prevalence of state law or regulations, or other state-specific permitting requirements, that incentivize the use of living shorelines. Of states surveyed, the majority had some form of regulations or guidance that directly or indirectly indicated a preference for soft shoreline stabilization approaches. This took a range of forms: direct, formal language in laws or regulations; indirect

preference created by raising the standards for use of hard shoreline stabilization approaches; or, a suggested preference for soft approaches communicated via permitting guidelines or application materials (checklists, website materials, etc).

In some states like Maryland and Virginia, legislation has been passed stating a very explicit preference for soft shoreline stabilization techniques. In Maryland, an applicant must prove that a living shorelines approach will not work for their property in order to obtain a waiver to pursue a hard stabilization solution. Several other states had language in their administrative code stating a preference for soft approaches, but enforceability of these provisions was often unclear. One state indirectly incentivizes natural living shorelines by stating that bulkheads and seawalls may only be permitted if the natural marsh is inadequate for erosion control. Several states encouraged consideration of living shoreline approaches through their websites or permit application materials (checklists, etc). A few states indicated that they felt it was inappropriate for them to communicate to potential private property applicants a preference for a living shoreline over any other approach.

Table 1 summarizes many of the findings described above across the states surveyed. A more detailed summary of living shorelines permitting approaches in each state may be found in Part 2 of this report.

*We found that 6 out of the 18 states surveyed approved the Nationwide Permit 54 for living shorelines under the Coastal Zone Management Act and Clean Water Act. The 12 remaining states denied CZMA and/or CWA certification of NWP 54 for a variety of reasons.*

**Table 1. Summary of Findings by State.**

State	Region	NWP 54 Approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?
Texas	Gulf	Yes	No	NWP 54 is approved with conditions	No
Louisiana	Gulf	No	Yes	The USACE developed a Programmatic General Permit for activities in the Louisiana Coastal Zone	No
Mississippi	Gulf	No	No	The Living Shorelines General Permit (MSGP-03) expired in 2018; all applicants file a joint application through the Department of Marine Resources to obtain state and federal permits	No
Alabama	Gulf	No	Yes	Did not certify NWP 54 as the ALGP-10 predates NWP 54 (GP-10 set to expire October 1, 2021)	Yes
Florida	Gulf	Yes	Yes	State Programmatic General Permit available for all projects that qualify for small-scale LSL permit exemption. Projects that don't fit size limitation go to NWP	Yes
Georgia	South Atlantic	Yes	No	NWP 54 approved with regional conditions	No
South Carolina	South Atlantic	No	No	Work underway by a living shorelines working group to develop a regulatory definition and standards for projects	No
North Carolina	South Atlantic	Yes	Yes	GP 2700 amended in March 2019 to mirror the new Corps RGP for marsh sill structures	No
Virginia	Mid-Atlantic	Yes	Yes	Regional Permit 19 (RP), authorizes living shorelines, riprap revetments, bulkheads, breakwaters, groins, jetties, spurs, baffles, aquaculture activities and boat ramps. The Norfolk District encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines where viable	Yes
Maryland	Mid-Atlantic	No	Yes	A Joint Permit Application is used to apply for federal and State authorization under the Maryland State Programmatic General Permit. Critical Area Buffer Notification Form	Yes
Delaware	Mid-Atlantic	Yes	Yes	Statewide Activity Approval (SAA) for Shoreline Stabilization Projects in Tidal and Non-tidal Waters provides expedited state-level permitting	Yes
New Jersey	Mid-Atlantic	No	Yes	General Permit 24 & 17	Yes
New York	Mid-Atlantic	No	Yes	Tidal Wetlands Permit, Coastal Erosion Management Permit	No
Connecticut	Northeast	No	Yes	General Permit 9 for Shoreline and Bank Stabilization Projects	No
Rhode Island	Northeast	No	Yes	General Permit 9 for Shoreline and Bank Stabilization Projects	No
Massachusetts	Northeast	No	Yes	General Permit 7 - Banks and Shorelines Stabilization, General Permit 23 - Aquatic Habitat Restoration, Establishment and Enhancement Activities	No
New Hampshire	Northeast	No	Yes	General Permit 9 Shoreline and bank stabilization projects	Yes
Maine	Northeast	No	Yes	General Permit 7 Shoreline and Bank Stabilization, General Permit 21 Habitat Restoration, Establishment and Enhancement Activities & Individual Permit	No

Living Shoreline preferred over hard approach, per state law or regulations?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Living and structural component (i.e. rip rap, breakwaters, oysters, etc.)	Texas General Land Office (primary), Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, USACE Galveston District
Yes, Title 43, Subchapter B. §709, Guidelines for Shoreline Modification, states that Nonstructural methods of shoreline protection shall be utilized to the maximum extent practicable	Oyster reef breakwaters	Department of Natural Resources – Office of Coastal Management (primary), Department of Environmental Quality and Department of Wildlife and Fisheries USACE New Orleans District
Yes, the Miss. Admin. Code Title 22, Part 23, Chapter 8, Section 103.01 states that non-structural methods shall be used in preference to structural methods for erosion control	Coir logs and plantings along eroding steep banks; oyster reef breakwaters; offshore rock breakwaters in high-wave energy environments	Department of Marine Resources (coordinating agency), Department of Environmental Quality – Office of Pollution, Secretary of State Public Lands Division (submerged water bottoms), USACE Mobile District
Yes (Ala. Admin. Code Rule 335-8-2-.06 and 220-4-.09, subsection (4)(b)(6))	Wide variety of oyster reef breakwaters as well as other natural and hybrid approaches authorized under ALGP-10	Alabama Department of Environmental Management (primary), Alabama Department of Conservation and Natural Resources, USACE Mobile District
No	Wide variety - oysters, herbaceous vegetation, and mangroves are all used in various combinations	Florida Department of Environmental Protection (primary), local Water Management Districts, USACE Jacksonville District
No	Oyster shell breakwaters and native plantings	Department of Natural Resources: Coastal Resources Division (primary) and Environmental Protection Division, USACE Savannah District
Hard armoring is only allowed for stabilization where the natural marsh is inadequate to control erosion	Oyster shell breakwaters, concrete anchors, and native plantings	Department of Health and Environmental Control - Office of Coastal Resource Management (primary), Office of Environmental Quality, USACE Charleston District
No	Sill with vegetation	NC Department of Environmental Quality, Division of Coastal Management (primary), Division of Marine Fisheries, State Property Office, Division of Water Quality Wilmington District, USACE
Yes, VA Code 28.2-104.1(b) (2014)	Sill with vegetation	Virginia Marine Resources Commission, Virginia Department of Environmental Quality, Local Wetland Boards, Virginia Institute of Marine Sciences
Yes, Living Shorelines Protection Act Title 26, 24.4.01 (2008)	Sill with vegetation, often associated with a breakwater structure	Maryland Department of the Environment, USACE Baltimore District
Yes, Title 7 DE Administrative Code (7504) 4.10.1.2	Sill with vegetation	Delaware Department of Natural Resources (DNREC), Wetlands and Subaqueous Lands Section, DNREC Delaware Coastal Programs (dependent on location), USACE Philadelphia District
Yes, NJ Coastal Zone Management Rules 7:7-9.44(d)	Wide variety from vegetation only to hybrid approaches including sills and hardened toes	New Jersey Department of Environmental Protection, USACE New York District
No	Wide variety from vegetation only to hybrid approaches including sills and hardened toes	New York State Department of Environmental Conservation & New York State Department of State (DOS), USACE New York District
Yes, CT Public Act 12-101, Section 3(a)	Vegetation only and hybrid approaches	Connecticut Department of Energy & Environmental Protection (CTDEEP), Office of Long Island Sound Programs (OLISP), USACE New England District
Yes, RI Code of Regulations-Red Book-650 RICR 1.2.1B.2(c)	Vegetation only and hybrid approaches	RI Department of Environmental Management, Coastal Resources Management Council (CRMC), USACE New England District
Yes, MA Wetlands Protection Act 310 CMR 10.30.3.b (2017)	Emphasis on “non-structural” approaches	Decentralized – Local Conservation Commissions, MA Department of Environmental Protection (MADEP), USACE New England District
Yes, Env-Wt 609.04(a)	Vegetation only and hybrid approaches	New Hampshire Department of Environmental Services (NHDES), USACE New England District
No	Apart from dune nourishment and bluff restoration projects, only a few living shorelines have been permitted thus far	Maine Department of Environmental Protection, USACE New England District



Sunset along the Florida Gulf Coast. Photo: Kaila Drayton/NWF.

## BARRIERS TO UTILIZING LIVING SHORELINE APPROACHES

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**M**any states expressed interest in further increasing the ease of permitting for living shorelines in environments appropriate for these shoreline stabilization techniques. However, a number of common challenges (both regulatory and non-regulatory) to increasing the use of living shorelines emerged.

### PERMITTING

Historically the regulatory and policy environment at federal and state levels has unevenly incentivized the use of structural shoreline protection approaches over living shoreline alternatives. Until the recent creation of the NWP 54, structural shoreline stabilization projects could be obtained more quickly and simply through Nationwide Permit 13 for bank stabilization, without going through the more arduous individual federal permitting process that was required of living shorelines in the absence of a general permit. Even with the new nationwide permit in place, however, permit

requirements vary from state to state as described above. A few states, such as Maryland, have been quite progressive in crafting policies designed to encourage living shorelines, but in many states, there is still a very uneven permitting and regulatory environment with respect to structural versus living shoreline projects.

Our state-level policy analysis confirmed that regulatory disparity continues to be a barrier to greater adoption of living shorelines. If hardened structures are dramatically quicker and simpler to get permitted, advances in education, training, and certification efforts in a particular geography does not necessarily increase the number of living shorelines permitted and installed. Specifically, if in a given state or region a permit for a seawall can be obtained in four weeks or less, while a permit for a living shoreline can take six months or more, there is little economic or practical incentive for service providers (or landowners) to pursue permits for living shorelines.



Making regulatory changes to level the playing field can be challenging, especially where statutory requirements apply differently between typical hardened structures and living shorelines. For example, many states are confronted by the challenge that hardened structures can be constructed entirely above the state's Public Trust bottomlands jurisdictional line, meaning no subaqueous lands permit or proprietary license is needed, whereas living shoreline designs that grade out into the waterway trigger more review processes and tighter requirements. Additionally, some states have encountered Endangered Species Act consultation challenges with habitat conversion issues where a living shoreline design would convert open water to wetland or fill.

Despite all this, the existence of a comparatively conducive regulatory environment alone does not necessarily lead to an increased number of living shoreline applications and installations. Feedback from coastal managers, regulators and practitioners suggests that despite the ease of obtaining a permit, limitations in the number of service providers with design, siting and construction expertise, and/or poor public awareness of the value and effectiveness of living shorelines, can result in low rates of application and installation.

## LANDOWNER AWARENESS AND INTEREST

Private shoreline ownership and fragmentation emerged as key challenges to scaling up the use of living shorelines. Across the country, over 70 percent of the shoreline is privately owned; in many states, including Maryland (96 percent) and Virginia (99 percent), that number is much higher. Therefore, wider implementation of living shorelines hinges on raising awareness among private landowners about these techniques and encouraging them to employ more natural approaches to shoreline management. This is particularly important for enhancing habitat connectivity along our increasingly fragmented and armored coastline. In choosing a shoreline protection

technique, property owners, whether private or public, tend to focus on how well an approach is likely to address the particular problem they are facing on the parcel (e.g., erosion, flooding), the costs of installation and maintenance, and aesthetics. Protection of fish and wildlife habitat can be perceived as a secondary benefit, but is not usually a primary demand driver, except in the case of public agency property holders with an environmental mandate.

Most private landowners rely on professional service providers for understanding their options for shoreline protection. Currently, however, relatively few professional service providers have a history of designing and installing living shorelines, and therefore often do not include living shorelines in the options presented to prospective clients. One of the most requested solutions during our workshops and webinars was dissemination of user-friendly information to property owners, including lists of recommended or certified contractors.

## SERVICE PROVIDER EXPERTISE

While awareness of natural infrastructure generally, and living shorelines in particular, has grown significantly over the past decade, efforts to increase service provider expertise have been very uneven at federal, state, and local levels. Existing efforts include living shoreline guidance documents, workshops, webinars, training courses and certification programs geared towards homeowners, engineers, marine contractors, and professional associations that offer shoreline protection and coastal restoration services. Feedback from our state interviews and workshops, however, make clear that there are significant differences in the target audience, scope, consistency in content, and geographic distribution of these efforts. In addition, many training and certification efforts are not coordinated with or conducted in partnership with existing peer-to-peer networks, such as the Coasts, Oceans, Ports, and Rivers Institute (COPRI) of the American Society of Civil Engineers (ASCE), a group that has demonstrated a growing interest in living shoreline design and construction.



Coastal contractor sign Shady Side, MD. Photo: Bradley Watson.

Living shorelines represent only a small portion of the overall marine contracting and construction industry. Lack of familiarity with living shorelines and perceived uncertainty regarding their ability to meet performance standards, have limited the proclivity of many contractors to include living shorelines in their portfolio of services and as viable alternatives to more traditional techniques. Because most property owners rely on the advice and recommendations of engineering firms, environmental consultants, and marine contractors, these professional service providers are key to expanding the use of living shorelines and other nature-based defenses. Through our interviews, workshops, and webinars, contractor knowledge and expertise in living shorelines implementation emerged as a critical need, both in terms of design and engineering as well as the marketing of these approaches to potential clients.

## DESIGN STANDARDS

Living shorelines inherently must be designed to reflect the unique ecology and geography of their natural surroundings. Because of this fundamental feature of living shorelines, the parameters for successful living shoreline designs vary significantly from state to state and even within states according to natural physiographic boundaries, unlike hardened structures which can employ uniform design and performance standards. This makes the challenge of establishing design standards a highly geography-specific undertaking.

Lack of clear, geographically-specific design parameters for project installation and performance is a critical barrier both to states seeking to responsibly and efficiently permit living shoreline projects and to marine contractors and engineers seeking to design and build these projects.

States require clear, measurable standards for use as compliance thresholds in the permitting process. This is especially true for implementing general permits, which require a demonstration that any project complying with its design criteria will have *de minimis* environmental impacts (or otherwise meet other state-level statutory standards). Even for individual permits, in the absence of clear standards project analysis tends to take longer and requires more staff time, more evidence, and more back-and-forth with applicants.

However, developing clear state-level standards and guidance is a challenge in terms of practical experience and technical capacity. In some ways, it is a chicken-and-egg problem - without pilot projects and comprehensive long-term monitoring, states cannot set permit standards, but without performance standards, very few pilot projects are brought through the long and costly individual permitting process or monitored over the long term.

Likewise, as noted above, engineers and marine contractors favor clear design and performance standards in order to minimize liability exposure. Engineering disciplines in general rely on measurable, precise standards to establish that a particular project conforms to best professional practices, risking liability for nonconforming projects that go on to fail. Typical performance standards are based on the project remaining unchanged over its design lifetime. This approach is an imperfect fit for inherently place-based, nature-based designs. Living shorelines are designed to evolve with the natural system, and in some cases, even to serve as sacrificial defenses to flood events. Performance standards and failure conditions are geography-dependant and dynamic, creating a level of uncertainty which can discourage engineers and contractors from offering living shorelines as options to potential clients. That said, coastal engineers and marine contractors have indicated that their hesitation to assume risk can be partially mitigated by the availability of state-supported technical design guidance, as is now the case in New York and New Jersey.

# OPPORTUNITIES & RECOMMENDATIONS

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*Student replanting dune grasses in Jamaica Bay, NYC. Photo: Chris Parker/NWF.*

## STATE-LEVEL RECOMMENDATIONS

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**C**oastal Atlantic and Gulf states have employed a broad range of both regulatory and non-regulatory approaches to facilitate appropriate use of living shorelines, and these approaches are continuing to evolve. Below we highlight a number of practices and approaches that have proved successful in different states, to serve as useful examples for state decision-makers and stakeholders interested in further incentivizing the use of living shorelines in their own jurisdictions. More information about highlighted examples is available through the state profiles in Part 2. Not all

strategies are suitable for all states; these strategies are offered to provide a broader picture of the policy options or best practices available at the state level.

### **1. Take the Lead in Developing Design Standards and Guidance**

States are in a strong position to take the lead through their regulatory authority and technical expertise to drive the development of design standards and/or guidance for living shoreline project development in partnership with practitioners and the engineering sector. State-level approaches might range from process and design guidance, to a specific regulatory definition, to required design standards. Because living shorelines inherently must reflect local ecology and physiography, and due to

significant variation between states regarding the extent to which hardened design elements can be incorporated into living shoreline designs (hybrid designs), there can be no single uniform national standard for living shoreline definition and design that will satisfy all needs in all states. That said, clear standards are important both for regulators to assist with efficient permit review (establishing clear criteria and processes for project approval), and for contractor and engineering professionals designing projects (establishing legal standards to define liability exposure).

State-level guidance documents are equally important to ensuring consistency across project design, permitting and construction. Guidance documents detailing appropriate project application, core engineering elements, and baseline site considerations can provide a common starting point for both designers and permitting entities. Coordinating with engineers and marine contractors to ensure that standards and/or guidance reflect current best practices and are realistic to measure and employ is critical to obtaining buy-in, facilitating efficient permit review, and reducing the number of improperly engineered or designed projects. Representatives from all state and federal agencies with jurisdictional authority, including USACE districts as well as other agencies with potential jurisdiction, such as FWS and NOAA, must also be part of the process. States have seen success in convening in-state working groups of state and federal permittees, practitioners, and experts to set guidance priorities and identify practicable state-level design standards.

#### **Examples:**

- In South Carolina, the Department of Health and Environmental Control Living Shorelines Working Group was convened in 2016 as part of the state coastal program's Coastal Zone Enhancement Strategy, and is currently working to develop living shoreline site success criteria as well as a regulatory definition and standards for living shoreline projects.



*Building a living shoreline on the Chester River, MD. Jane Thomas. Photo: Jane Thomas/University of Maryland Center for Environmental Science.*

- In Connecticut, the Office of Long Island Sound Programs has used a CZMA Coastal Enhancement Strategy to develop a regulatory definition for living shorelines, along with corresponding guidance documents and outreach materials for the regulated community.
- In New Jersey, the Department of Environmental Protection (NJDEP) has collaborated with the Stevens Institute of Technology to develop engineering guidelines for living shoreline projects.

## **2. Prioritize Long-Term, Comprehensive Monitoring**

For states that have successfully developed design standards, long-term monitoring of pilot projects has been an important step in gathering necessary state-level information to drive policymaking. Both successful and failed pilot projects provide valuable information to contractors on what design features work and how these projects change over time, as well as to permittees to develop experience in how these projects move through the permitting pipeline and where compliance issues can arise. Requiring

monitoring as a permit condition, especially for larger projects such as on public lands, and including monitoring protocols in funding applications can help accelerate the collection of valuable permitting data. Universities, extension programs (e.g. NERRs, Sea Grant), and nonprofits are effective partners to develop project designs, pilot projects, and monitoring programs.

Ongoing monitoring of existing projects, as contractors and permittees learn by experience over time, is helpful for updating and refining design standards. However, rigorous monitoring programs are costly and time-consuming to implement and funding for these programs is limited. Citizen science projects to engage property owners in monitoring installations on their land (for instance by periodically submitting photographs) or community members in monitoring installations on public land can help bridge this gap. It is also helpful to include a right to enter property for inspection in permits, so that either regulators or contractors may visit at regular intervals to assess project performance and collect data (depending on the arrangement.) Whenever

possible, states (in coordination with partners) should strive to collect information on living shorelines projects pre- and post- major weather events, to augment an understanding of project benefits and performance in extreme weather scenarios.

**Examples:**

- Five New England states (CT, RI, MA, NH, and ME) are coordinating with The Nature Conservancy to install and monitor living shoreline pilot projects in each state and monitor to develop design and performance standards. Projects were designed to meet state-level needs.
- Through Gulf restoration funding coming from Deepwater Horizon oil spill settlement dollars, Alabama is undertaking several new on-the-ground living shorelines projects as well as a comprehensive living shorelines monitoring program. A plan will be developed for monitoring and assessing the performance and efficacy of at least ten proposed and existing living shoreline projects in coastal Alabama and may serve as a Gulf-wide model for future rounds of funding.



*Oyster castle array. Florida Gulf Coast. Photo: Kaila Drayton/NWF.*

### 3. Establish a Permitting Preference for Nature-Based or Hybrid Designs

States may opt to employ regulatory authority to drive private decision making toward living shorelines for parcel-level erosion control and protection by establishing a regulatory preference for these designs. A preference can be a procedural prerequisite, requiring permit applicants to demonstrate affirmatively that a living shoreline design would be inadequate or inappropriate on the individual parcel, or else aspirational, stating clearly in permitting regulations that such designs are preferred and should be considered.

**Require rebuttal:** A stronger approach is to establish a procedural requirement for applicants to demonstrate either that a living shoreline approach is impracticable, or that a hardened solution is preferable for an individual parcel. This compels applicants to consider the design conditions on their shoreline and develop affirmative evidence before proceeding with a hardened structure. Before establishing a prerequisite, permitting agencies should develop specific criteria (e.g. wave energy thresholds and acceptable measurement methods)

for rebutting the presumptive preference. Ideally, statewide suitability mapping for living shorelines could help to inform applicants and create some predictability in permitting.

#### Examples:

- In Massachusetts, structural bank stabilization methods can only be used on coastal banks to protect certain structures that were in place prior to the enactment of current regulations, and require the applicant to demonstrate “that no method of protecting the building other than the proposed coastal engineering structure is feasible.”
- In Maryland, permit applicants must submit a waiver demonstrating unfavorable site-specific conditions in order to use a hardened structure, such as excessive erosion, severe high energy conditions, extreme water depths, or a narrow waterway. The state has also mapped and designated certain high energy shorelines as appropriate for structural measures; projects in these areas do not require waivers.

**Require consideration:** Where a procedural preference for living shorelines is not used, an explicit preference for such methods where they are appropriate, or a requirement to consider their use, can improve the process by normalizing these designs as a regular part of the design conversation. Language used in permitting or guidance material plays a role in defining the range of approaches considered by contractors and landowners. Project specifications, especially for small, routine projects, are driven in significant part by permit requirements, including elements that require consideration.

#### Example:

- In 2017 the New York State Department of Environmental Conservation announced new guidance for living shoreline projects. The guidance document expresses a preference for living

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*A preference can be a procedural prerequisite, requiring permit applicants to demonstrate affirmatively that a living shoreline design would be inadequate or inappropriate on the individual parcel, or else aspirational, stating clearly in permitting regulations that such designs are preferred and should be considered.*



*Florida Gulf coast saltmarsh.  
Photo: Kaila Drayton/NWF.*

shorelines over traditional approaches. In addition, the guidance provides information on types of living shorelines, reviews how tidal wetland and protection of waters permit standards relate to living shorelines, and speaks to proper siting, maintenance, and monitoring considerations.

#### **4. Ensure Parity in the Permitting Process for Living Shoreline Approaches**

Even without establishing an affirmative preference for living shorelines, states can also use their regulatory authority to ensure that hardened approaches do not have a systematic advantage over living shorelines in the permitting process. Key areas where obtaining a general permit authorization for a living shoreline is frequently more burdensome than for a hardened approach include:

- Requiring more detailed design documents in the permit application
- Requiring more expensive professional services (e.g. an engineer's stamp, a property survey, etc.)
- Requiring different or additional permits (e.g. wetland permits)
- Longer review times

In some cases, some of these disparities, such as more detailed documentation requirements and longer review times, are simply a consequence of the lack of existing design standards and state-level experience among practitioners and permittees with living shoreline designs. Where the outcome of projects is harder to anticipate, greater scrutiny is required. The process of developing design standards discussed above can go a long way toward alleviating these barriers even outside of regulatory change.

However, in many states, hardened structures still benefit from explicit regulatory process advantages. Alleviating these disparities by establishing similar permitting efficiencies for living shorelines as are available for hardened solutions is necessary to level the playing field and ensure that, on parcels where a living shoreline would in fact be the most effective choice, its use is not discouraged by permitting barriers.

**General Permits:** In states where no general permit exists for living shorelines comparable to a general permit for hardened structures, establishing a living shorelines general permit is the most effective step toward levelling the playing field. Ideally, this permit will be developed jointly with the relevant Army Corps district to simultaneously satisfy both state and federal requirements through one



*Attempts to reduce dune erosion on Plum Island, MA.  
Photo: Taj Shotland/NWF.*

centralized review process. For example, states have worked with Army Corps districts through the CZMA federal consistency and CWA 401 water quality certification processes to integrate state requirements into NWP 54 and district-level regional general permits. Having a “one-stop shop” helps permit applicants easily understand all permit requirements and avoids conflicting decisions or requirements across multiple agencies.

The requirements for the living shoreline permit in terms of documentation, professional certification, and inspection required should be as comparable as possible to those for existing hardened structure general permits. States should work across all relevant state permitting agencies with jurisdiction (or possible jurisdiction) over living shoreline projects to ensure that relevant required permits are incorporated to the extent practicable and any authorizations beyond the general permit that may be required are identified through the application process.

**Coordinated Federal-State Review:** Where a joint permit is not used, states can still work with USACE and other federal partners to coordinate parallel review processes. Federal processes may include not just USACE review but also ESA critical habitat and essential fish habitat consultation with USFWS and NOAA. Best practices include developing a unified permit application form that integrates the information requirements of all necessary permits, automatically routing permit applications to relevant agencies, scheduling joint site visits, and issuing joint public notices.

**Examples:**

- In February of 2019, North Carolina amended its General Permit for living shorelines, reflecting input from all state and federal agencies with jurisdiction over such projects. With this updated General Permit in place, living shorelines meeting the permit qualifications in North Carolina should now be permitted within a matter of days following a site visit, as is often the case for bulkheads.



- In Delaware, the Living Shorelines Statewide Activity Approval shortens the permitting timeline for certain smaller projects landward of mean low water in lower-fetch settings.

## 5. Provide Process Guidance Materials, Technical Assistance, and Outreach

States, especially coastal zone management programs, are well positioned to leverage their technical expertise and coordination role to provide support to contractors and landowners considering living shoreline projects. Areas where outreach and guidance are valuable include: assistance understanding what a living shoreline is and where it may be an appropriate solution, providing simple instructions for permitting requirements and processes, and technical design criteria for project development.

**Permit Guidance:** Clearly publicizing permit requirements in plain language is valuable not only for landowners and contractors looking into living shorelines options for the first time but also for practitioners to keep abreast of new developments. The agency website will often be the first place a landowner or contractor turns to for new information. A dedicated living shorelines webpage that clearly states relevant permit requirements, the jurisdictional thresholds for different permits, and how to obtain necessary forms and rules helps guide potential applicants to the correct information and agency contacts. Plain language permit checklists, decision trees, and design manuals are also valuable guidance to help applicants submit complete and sufficient applications.

### Examples:

- In Texas, the General Land Office offers a Permit Service Center which collects relevant forms and requirements on one webpage while offering project-specific technical staff assistance during the pre-application phase.

- In Mississippi, the Department of Marine Resources offers literature on living shoreline designs, a guidebook on project design and permitting, and cost comparisons.

- In New York, the Department of Environmental Conservation (DEC) released a comprehensive guide for permitting living shoreline projects in marine and coastal district waters.

**Public Data and Suitability Mapping:** States are a valuable source of the data needed for parcel-level site assessment and project design. States can use data portals to provide simple, centralized access to data such as bathymetry, vegetation types, fetch, current information, and other environmental factors, as well as jurisdictional lines and regulatory information. States can also conduct suitability mapping to identify areas that are more likely to benefit from living shoreline approaches, which can expedite permit review and help target outreach efforts. Academia and NGOs can be partners for executing mapping projects or filling data gaps.

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*Important outreach and guidance areas include understanding what a living shoreline is and where it may be an appropriate solution, identifying areas suitable for living shoreline designs, providing simple instructions for permitting requirements and processes, and technical design criteria for project development.*

### Examples:

- The Virginia Institute of Marine Science provides the Living Shoreline Suitability Model (LSSM), which can be calibrated to regional conditions to provide GIS-based suitability analysis. For instance, in Florida, the University of Florida and the Fish and Wildlife Research Institute applied the LSSM in Cedar Key and Tampa Bay respectively.

- The Harte Research Institute of Texas A&M University Corpus Christi has developed a Living Shoreline Suitability tool for the Texas Coast. The tool's map shows where on the Texas coast living shorelines may be suitable and what techniques could be considered.

- The New Hampshire Department of Environmental Services Coastal Program released the New Hampshire Living Shoreline Site Suitability Assessment: Technical Report in 2019 to identify sites that may be suitable for living shoreline approaches for the purpose of addressing tidal shoreline erosion.

**Site visits:** State staff can assist individual landowners through site visits to help identify erosion problems, discuss options, and explain regulatory requirements. Extension programs (e.g. NERRs, Sea Grant), academia, and NGOs can be partners in these efforts.

### Examples:

- In Virginia, the Shoreline Erosion Advisory Service offers site investigations to provide landowners and communities information about erosion risks and solutions.

**Education and Training:** In many states, living shorelines are not well known among landowners and contractors as viable options for shoreline stabilization needs. NGOs, universities, and extension programs are key partners both for general awareness campaigns and for dedicated training programs. Key audiences include contractors,

local officials, neighborhood groups, and individual property owners; each require different information and outreach techniques.

Contractors are a key audience because, as the trusted expert who sits at the kitchen table with a property owner and lays out the options, their perceptions of different erosion control techniques are often determinative of parcel-level land use decision-making. Contractors have cited the need for technical training on practical aspects of living shoreline installation: materials and vegetation types to use, where to source materials, best practices for construction, site assessment techniques, design parameters and decision trees, long term maintenance issues, and how to make the financial case for a living shoreline over a hardened solution. It can also be helpful to offer tours of existing projects, either during training or as stand-alone events, to demonstrate how these projects evolve over time and get a hands-on feel for them.

Although contractors may be the most valuable target audience for training and outreach, they are also very difficult to engage. Unlike other professions, in many states marine contractors do not have continuing education requirements or may not even require certification. Therefore, training may be most successful if offered with incentives, including opportunities to build business or for inclusion on a state-maintained directory of contractors who have completed state-approved training. Related professions such as engineers and real estate agents are also valuable audiences.

Local officials such as code officers, planners, and elected officials are also important ambassadors and experts, both for their community ties and for their role in building and zoning code enforcement. Training priorities include general introduction to living shorelines, integrating living shorelines into master planning, zoning, permit review processes, and funding opportunities.

Property owners are of course a key audience as well. Approaching landowners collectively through homeowners' associations or neighborhood groups can not only achieve efficiencies (help with venue and member outreach) but also can provide a basis for working with multiple parcels along a shoreline for coordinated protection. States can reach out to these groups to offer education and training tailored to the particular needs of the group, from introductory presentations to sharing results of suitability mapping efforts.

**Examples:**

- In New Hampshire, the Department of Environmental Services Coastal Program collaborates with a host of other organizations through the New Hampshire Coastal Adaptation Workgroup to host workshops and trainings for private landowners and marine contractors on the appropriate application of living shoreline approaches.
- In Georgia, the Department of Natural Resources Coastal Resources Division holds workshops with private landowners, homeowners associations, and local officials to educate citizens on the range of living shoreline approaches available and promote voluntary, neighborhood-wide, landowner-driven coordination on erosion control.

- In North Carolina, the Department of Environmental Quality has co-hosted a number of living shoreline workshops and trainings focused on issues from understanding the benefits and limitations of living shorelines to permitting and construction best practices.

- The Florida Fish and Wildlife Conservation Commission has partnered with a number of other Federal, State and private entities to develop and deliver a living shorelines training course specifically for marine contractors.

**Informational Resources:** States can provide helpful informational resources to contractors and landowners, including listings of materials suppliers (nurseries, oyster shell sources) or marine contractors with living shorelines experience. Inclusion in a list of training graduates can help marine contractors market their services and so can be used as an incentive to participate in trainings.

**Examples:**

- In Florida, Florida Living Shorelines is an online educational guide that aims to inform the public about living shorelines - what they are, how they compare to hardened infrastructure, and high-level information on initial permitting steps one should consider.



*Dune vegetation. Florida Gulf Coast. Kaila Drayton/NWF.*



*Flooded privately owned seawall along Northeast Massachusetts coast.  
Photo: Joe Teixeira, Newburyport, MA.*

- In Mississippi, the Department of Marine Resources has [compiled a list](#) of vendors and shoreline design experts operating in the state.

## 6. Develop Incentive Programs

States, especially coastal zone management programs, can also leverage their resources, technical expertise, and community partnerships to incentivize the voluntary deployment of living shoreline solutions as equally viable or preferable to hardened solutions on appropriate parcels. Incentive options include:

- Grants to property owners to install or monitor living shoreline projects
- Low-interest loans to property owners to install living shoreline projects
- Insurance for new plantings
- Property tax exemptions for living shoreline project footprints
- Tax deductions for living shoreline installations
- Permit fee waivers for living shoreline applications
- Grants to communities to make code revisions, develop green infrastructure plans, or install living shorelines on public lands
- Support for greenhouses, seed repositories, and other industrial suppliers
- Programs to collect and reuse recycled materials such as oyster shells, and rewards for businesses which voluntarily recycle these materials

### Examples:

- In Virginia, the state offers low-interest loans and a vegetation “insurance” program that will assist replacement of plantings destroyed by natural causes while the loan is outstanding. The Virginia program also uses many of the other incentives mentioned above.
- In Massachusetts, the Office of Coastal Zone Management’s StormSmart Coasts Program manages the [Coastal Resilience Grants Program](#) to support local communities in planning, public outreach, feasibility assessment, and analysis of shoreline vulnerability through design, permitting, construction, and monitoring.

# FEDERAL-LEVEL RECOMMENDATIONS

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## 1. Continue Support for General Permits

The Army Corps should continue its collaborative work with states that wish to design general permits for living shoreline projects. With different physical environments and variable regulatory structures in each state, tailoring permit conditions and criteria will facilitate faster permitting and maximize comfort with living shorelines approaches across agencies. As experience with living shorelines implementation increases, the Corps and states should update general permit conditions and criteria to account for lessons learned.

Although the majority of states surveyed opted to utilize their own regional or state programmatic general permits for living shorelines projects in lieu of NWP 54, the nationwide permit remains an important option for many states and provides a critical baseline from which to build. As the Corps works toward renewal of its nationwide permits,

the agency should evaluate NWP 54 for any requirements that preclude parity with NWP 13 for bank stabilization. For example, issuance of NWP 54 requires pre-construction notification while NWP 13 does not, creating an additional step in the permitting process for living shorelines approaches that was cited by some states as a delay factor. Either NWP 54 or NWP 13 should be adjusted so that parallel processes are required for each permit, to eliminate regulatory disincentives for soft shoreline stabilization approaches.

## 2. Increase Federal Investment in Project Implementation and Monitoring

The federal government can play an important role in increasing the prevalence of living shorelines projects by helping to offset the cost of such projects, including through grant programs administered by NOAA or other appropriate agencies. Grants for living shorelines projects should include associated monitoring and data reporting requirements as a condition for receiving funds, in order to help grow our national understanding of living shorelines performance and efficacy.



Living shoreline restoration site on Florida Gulf coast. Photo: Kaila Drayton/NWF.



*Shoreline erosion from a winter Nor'easter on Plum Island, MA. Photo: Joe Teixeira, Newburyport, MA.*

Additionally, as Congress contemplates creating or augmenting other funding sources, in the context of a federal infrastructure package or disaster resilience legislation, they should ensure that natural infrastructure approaches including living shorelines are eligible for any future federal investments.

### **3. Enable Disaster Mitigation Dollars to Support Living Shorelines**

There is increasing evidence that natural defenses such as living shorelines are not only effective for shoreline stabilization, but also can provide significant protection during storm events. For example, during Hurricane Irene in 2011, 75 percent of bulkheads along the hard hit shorelines in the central Outer Banks were damaged, while none of the marsh or marsh and sill shorelines there suffered visible damage, loss of sediment, or loss of elevation.<sup>16</sup> And, after Irene hit Pivers Island, North Carolina, as a Category 1 storm with a 2-5 ft surge and maximum sustained winds of 75 mph, a living shoreline site employing cordgrass and an oyster reef wave break remained intact; erosion was limited to non-vegetated areas on the landward side of the living shoreline.<sup>17</sup> Likewise, in 2016 living shorelines offered greater erosion protection than bulkheads in

coastal North Carolina during Hurricane Matthew.<sup>18</sup> Furthermore, studies document that when LSL vegetation density declines in the immediate aftermath of a storm event, pre-storm densities are generally recovered within one year.<sup>19</sup>

Recent disasters have resulted in significant supplemental funding to help affected communities recover and prepare for the next disaster event. A growing appreciation for the ultimate cost-savings that can be achieved through pre-disaster mitigation has resulted in more resources being reserved specifically for that purpose. Living shorelines, whether at a property-scale or a community-wide scale, should be competitive for disaster mitigation dollars. To facilitate this, FEMA should improve the tools available at the project-proposal scale for assessing the cost-effectiveness of living shorelines designs. Right now, many such nature-based projects are disincentivized in the mitigation application process because of challenges meeting benefit cost analysis requirements using available data and tools. Improved support and coordination with partner agencies to provide better tools for project design will improve the uptake of living shoreline methods in shoreline settings across the nation where they in fact represent the most cost-effective hazard mitigation strategy.



*Eroding marsh in the Maryland Coastal Bays. Photo: Adrian Jones/University of Maryland Center for Environmental Science.*

# PART 2. POLICIES RELEVANT TO LIVING SHORELINES: STATE SUMMARIES

## ALABAMA



Coastal Alabama is known for its white sandy beaches and seafood industry. It boasts a dynamic system of dunes, salt marshes, beaches, bays, rivers, oyster reefs and barrier islands, with the Mobile Bay watershed at its heart.

Alabama’s shoreline along the Gulf of Mexico stretches 60 miles and the tidal shoreline that borders all of the coastal bays, rivers, and bayous in Mobile and Baldwin counties extends another roughly 600 miles, with the shoreline around Mobile Bay accounting for about 100 of those miles. The tidal range around Mobile Bay varies and has reached 2.3 feet.<sup>20</sup> Shoreline retreat in portions of coastal Alabama ranges from 1.4 to 6.1 feet per year, on average.<sup>21</sup> Alabama routinely nourishes its beaches with sediment to address shoreline erosion. About 14 percent of the state’s tidal shoreline, including

tidal creeks, the Mobile-Tensaw River Delta, and other waterways, is armored with hard infrastructure, primarily seawalls, bulkheads, and rip rap.<sup>22</sup>

To construct a living shoreline in Alabama, the Army Corps of Engineers (USACE) Mobile District and the Alabama Department of Environmental Management (ADEM) require joint application and notification. The USACE Mobile District utilizes ALGP-10, a general permit predating the NWP 54, which authorizes living shoreline techniques and hybrid techniques that are appropriate to the project location and provide for any or all of the following goals: the protection, restoration and nourishment of shoreline areas; the preservation and restoration of dunes, beaches, wetlands, submerged aquatic vegetation (SAV), and submerged grassbeds; and the protection, enhancement, and propagation of

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	ALGP-10	Did not certify NWP 54 as the ALGP-10 predates NWP 54 (GP-10 set to expire October 1, 2021)	Yes, as defined by GP-10	Yes (Ala. Admin. Code Rule 335-8-2-.06 and 220-4-.09, subsection (4)(b)(6))	Wide variety of oyster reef breakwaters as well as other natural and hybrid approaches authorized under ALGP-10	<ul style="list-style-type: none"> <li>Alabama Department of Environmental Management (primary)</li> <li>Alabama Department of Conservation and Natural Resources</li> <li>USACE Mobile District</li> </ul>



near-shore essential fish habitat. This permit authorizes a maximum of up to one-half (1/2) acre (21,780 square feet) of total impacts to water of the United States, and projects authorized by this permit should accomplish the goals listed above by establishing and/or enhancing vegetative communities where possible, and limit use of fill and "hard" structural components to the minimum necessary. Additionally, a permit from the Alabama Department of Conservation and Natural Resources (ADCNR) State Lands Division is required to address riparian rights and to ensure any impact to state-owned submerged lands is not contrary to the public interest.

The Alabama Administrative Code contains the following rules relevant to living shorelines:

- Ala. Admin. Code Rule. 335-8-2-.06 "Shoreline Stabilization and Erosion Mitigation" - Encourages the use of soft approaches by denying a permit for a hard structure if a "non-structural alternative" is available, including but not limited to: preservation and restoration of dunes, beaches, wetlands, submersed grassbeds, and shoreline restoration and nourishment and retreat or abandonment.
- Ala. Admin. Code Rule 220-4-.09 endorses the general principles of living shorelines in subsection (4)(b)(6) - "To the maximum extent possible, shoreline stabilization should be accomplished by the establishment of appropriate native wetland vegetation. Rip-rap materials, pervious interlocking brick systems, filter mats, and other similar stabilization methods should be utilized in lieu of vertical seawalls wherever feasible." The ADEM coordinates onsite pre-application meetings

*Through Gulf restoration funding coming from Deepwater Horizon oil spill settlement dollars, Alabama is undertaking several new on-the-ground living shorelines projects as well as a comprehensive living shoreline monitoring program. A plan will be developed for monitoring and assessing the performance and efficacy of at least ten proposed and existing living shoreline projects in coastal Alabama and may serve as a Gulf-wide model for future rounds of funding. This effort is expected to be implemented in fall of 2019.*

with USACE and ADCNR to determine potential impacts to natural resources and adjacent riparian areas. The ADCNR works cooperatively with ADEM and USACE to review impacts to state-owned submerged lands and adjacent riparian property owners and may require additional information as well as monitoring protocols be established by a professional engineer or other recognized professional. The ADCNR further requires a notarized affidavit be submitted that recognizes the pre-project shoreline as boundary between private upland and state-owned submerged lands to prevent loss of state-owned proprietary submerged lands in the event of fill being placed below the mean high tide or if future accretion occurs due to a living shorelines project. The ADEM also conducts post-project monitoring.

Examples of on-the-ground living shoreline projects in Alabama are few but growing. Larger projects tend to be sponsored by the state government and/or non-profit organizations with homeowners implementing smaller-scale projects.

### Relevant Resources and Guidance

- ADCNR and the Mobile Bay National Estuary Program: [Living Shorelines: A Guide for Alabama Property Owners](#). 2014.
- Prepared for the Gulf of Mexico Alliance: [Living Shorelines: A Technical Guide for Contractors in Alabama & Mississippi](#). 2016.
- Climate and Resilience Community of Practice. [Living Shorelines in Gulf Coast States: Alabama Resource Catalog](#). 2019.

## CONNECTICUT



The Connecticut coastline extends for 618 miles along the eastern side of Long Island Sound and consists of rocky peninsulas, sand and gravel beaches, shallow bays, saltmarshes, and more than 300 small islands. The variation across coastal landforms is home to over a hundred species of fish and provides nesting and migratory habitat for a wide range of species including Piping Plovers, Common Terns, Least Terns, and American Oystercatchers. Tidal ranges across Long Island Sound vary both along the Connecticut’s coast and across the western to eastern sides of the Sound. Tidal ranges fluctuate from 7.4 feet along the southern Connecticut coastline (Greenwich) to 3.5 feet along the north coast (Old Saybrook). While Connecticut’s shoreline is better protected from storm-driven impacts than other northeastern coastal states, shoreline erosion is an issue for many coastal habitats. Research indicates that 9 percent of Connecticut’s shoreline is “critically” eroding, with 48 miles categorized as “significantly affected”.<sup>23</sup> Moreover, estimates suggest that much (in some areas up to 50 percent) of the Connecticut coast is armored with hard infrastructure, which in many instances, exacerbates shoreline erosion. These impacts, in conjunction with

those from a number of recent coastal storms, has increased interest in the use of nature-based erosion control techniques.

The Structures, Dredging and Fill Act (Conn. Gen. Statutes (CGS) Sec. 22a-359 - 22a-363f) and the Tidal Wetlands Act (CGS Sec. 22a-28 - 22a-35) provide authority for Connecticut’s Department of Energy and Environmental Protection (DEEP) to regulate all activities conducted in tidal wetlands and in tidal coastal or navigable waters in Connecticut. In 2012, the Connecticut Legislature passed Public Act (12-101): An Act Concerning the Coastal Management Act and Shoreline Flood Erosion Control Structures. PA 12-101 authorizes CTDEEP to establish a pilot program to encourage innovative and low-impact approaches to shoreline protection, including living shorelines techniques, and establishes a new coastal permitting jurisdiction by changing the “high tide line” to a “coastal jurisdiction line” (CJL), which is a fixed elevation that can be derived by a surveyor.<sup>24</sup> The Act serves to promote nonstructural solutions to flood and erosion problems except in those instances where structural alternatives prove unavoidable and necessary to protect existing inhabited structures.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	USACE CT General Permit 9 (GP 9) for Shoreline and Bank Stabilization Projects	No	Yes, CT Public Act 12-101, Section 3(a)	Vegetation only and hybrid approaches	<ul style="list-style-type: none"> <li>• Connecticut Department of Energy &amp; Environmental Protection’s (CTDEEP)</li> <li>• Land &amp; Water Resources Division (LWRD), USACE New England District</li> </ul>

Connecticut has three permit types for coastal projects including Individual permits, General permits, and Certificates of Permission. The New England District of the U.S. Army Corps of Engineers (USACE) has issued a general permit (GP 9) for shoreline stabilization projects that are less than 500ft, do not permanently or temporarily impact <1/2 acre of tidal wetland, <1000 SF in tidal Special Aquatic Sites (SAS), or are <100 SF in tidal vegetated shallows. General Permit 9 states a preference for soft stabilization measures “wherever practicable.” Smaller vegetation-only living shoreline projects (less than or equal to 200 linear ft) that meet GP 9 requirements might be eligible for Self-Verification (SV). As a result, the majority of living shoreline projects require Pre-Construction Notification (PCN). However, in an effort to incentivize non-structural approaches, PA 12-101 serves to exempt “any activity, including living shorelines projects, for which the primary purpose or effect is the restoration or enhancement of tidal wetlands, beaches, dunes or intertidal flats” from the definition of “shoreline flood and erosion control structure.”<sup>25</sup> Under these circumstances, the project must meet standards associated with “maintaining or restoring coastal resources and habitat”.<sup>26</sup>

Living shoreline projects can also be potentially permitted under the Connecticut Coastal Maintenance General Permit provided the project is performed

by, or under the direct supervision of DEEP and for the purposes of “intentional alteration of a site to reestablish the approximate biogeophysical conditions that existed in the pre-disturbance ecosystem or habitat and for coastal habitat creation and coastal habitat enhancement.”<sup>27</sup> While not specific to living shorelines, the Coastal Maintenance General Permit also covers any projects that include raising the marsh elevation surface. In addition, the Office of Long Island Sound Programs (OLISP) has issued a general permit distinct from the GP 9 called the Certificate of Permission (COP). The COP was established under the Structures and Dredging Statutes and applies to minor activities related to previously authorized work, and under limited circumstances, can apply to restoration of degraded tidal wetlands.

### Relevant Resources and Guidance

- Connecticut Sea Grant. Connecticut Beaches and Dunes: A Hazard Guide for Coastal Property Owners. 2016.
- University of Connecticut, Connecticut Institute for Resilience and Climate Adaptation (CIRCA). [Living Shorelines Fact Sheet](#). 2018.
- University of Connecticut, Department of Natural Resources and the Environment. Modeling Site Suitability of Living Shorelines in Connecticut.

*The Connecticut Department of Energy and Environmental Protection’s Land and Water Resources Division provides a substantive overview of the Coastal Permit Program and the permit application submission and review process on their website.*

## DELAWARE



Delaware has multiple tidal water bodies including the Delaware Bay along the central and northern coasts, the Atlantic Ocean to the southeast, and the Delaware Inland Bays in the southeast.

The narrow band of tidal freshwater wetlands in northern Delaware have mostly been filled and developed, however, south of Wilmington to Port Mahon, many areas of preserved wetland still exist across a large salinity gradient. In south and central Delaware, estuarine barrier beaches are characterized by higher wave energy and a large, intertidal flat that becomes submerged at high tide. Barrier island beaches border the southern part of the state, with broad sandy beaches and dunes that can be overtopped during coastal storm events. Relative sea level rise in Delaware is nearly double the global average due to a combination of land subsidence from historical glacial retreat, in addition to rising ocean levels. Habitat services in the state are particularly important, as the Delaware Bay hosts the world’s largest population of

the Atlantic horseshoe crab, and the second largest population of migrating shorebirds in North America.

Delaware requires applicants to separately submit federal and state permits for installing a living shoreline. There are expedited options for both levels, particularly for more natural projects. Nationwide Permits 13 (Bank Stabilization), 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities), and 54 (Living Shorelines) are often applicable to proposed projects, dependent design features. All activities in tidal and non-tidal waters in the State of Delaware also require authorization from the Delaware Department of Natural Resources and Environmental Control’s (DNREC) Wetlands and Subaqueous Lands Section and projects that involve fill below the mean low water line require a Subaqueous Lands Lease and are subject to an annual lease fee. All shoreline stabilization placements require a Wetlands and Subaqueous Lands Permit.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	Yes	Statewide Activity Approval (SAA) for Shoreline Stabilization Projects in Tidal and Non-tidal Waters provides expedited state-level permitting	Yes	Yes, Title 7 DE Administrative Code (7504) 4.10.1.2	<ul style="list-style-type: none"> <li>• Conventional Living Shoreline</li> <li>• Energy Dissipating (attenuating) Living Shoreline</li> <li>• Armored Living Shoreline</li> </ul>	<ul style="list-style-type: none"> <li>• Delaware Department of Natural Resources (DNREC)</li> <li>• Wetlands and Subaqueous Lands Section DNREC Coastal Programs (dependent on location)</li> <li>• USACE Philadelphia District</li> </ul>

The State of Delaware offers an expedited permitting process for living shorelines projects, called the Living Shorelines Statewide Activity Approval (SAA), which removes the public comment period and shortens the permitting timeline for projects meeting certain conditions. The SAA is meant for smaller, projects that are typically in lower-fetch areas and landward of mean low water, such as residential shoreline protection projects. Living shoreline projects that exceed the requirements of the SAA require a full Subaqueous Land Permit. There is no Statewide Activity Approval available for bulkhead construction, though repair work on bulkheads within their original footprint are covered.

Under the SAA, living shorelines are grouped into three categories: conventional, energy dissipating, and armored. Conventional living shorelines are typically placed in low energy systems, as they are comprised of elements that are completely nature-based. Treatments can include living or dead biomass (e.g. vegetation, shellfish, coir fiber logs, natural organic debris and litter), and natural earthen material like clays, silts, sands, shell, and grains up to gravel-sized. Energy dissipating living shorelines consist of any of the treatments included in conventional living shorelines, but also have structural features that attenuate energy and, importantly, also provide for measurable sediment accretion and habitat uplift. The structures must have the documented ability to provide habitat improvement on, within, or nearby them, and must also allow for the transfer of aquatic organisms throughout the design. The energy attenuation provided by the structures allows these living shorelines to be placed in moderate to high energy systems. Armored living shorelines consist of any of the elements in conventional living shorelines, with the addition of hard structural components like marsh-toe revetments and sills. Features used in armored living shorelines are less likely to directly provide habitat on the structures themselves (as with energy dissipating living shorelines), but may indirectly create habitat improvements nearby. Like energy dissipating living shorelines, these are typically used in high or moderately high energy systems. A common feature of all living shoreline types is their ability to

“sustain, enhance, and/or restore ecological functions and connections between uplands and aquatic areas”, as outlined in the DE SAA.

The Delaware Department of Natural Resources and Environmental Control, Division of Water hosts a webpage for Wetlands and Subaqueous Lands Permits that provides documentation on the approved categories of living shorelines types, information on submitting living shoreline permits, as well as a list of living shoreline contractors. Applicants are encouraged to discuss project needs with DNREC’s Wetlands and Subaqueous Lands Section before starting the application process to ensure timely permit processing.

### Relevant Resources and Guidance

- Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Water. [Wetlands and Subaqueous Lands Permits](#).
- DNREC, Division of Water. [Living Shoreline Contractors](#).
- DNREC, Division of Water. [Statewide Activity Approval \(SAA\) for Shoreline Stabilization Projects in Tidal and Non-tidal Waters of the State of Delaware](#).
- DNREC and the Delaware Center for the Inland Bays. [Delaware Living Shorelines Committee](#).
- Partnership for the Delaware Estuary. [Living Shorelines: Healthy shorelines combat erosion](#). 2017.
- Delaware Living Shoreline Committee. [Developing monitoring plans for living shoreline projects in Delaware: A goal-based framework](#). 2018.

## FLORIDA



The Florida Gulf Coast has 770 miles of coastline, 5,000 miles of tidal shoreline, and 7 million acres of tidally submerged lands that stretch from temperate Pensacola to tropical Key West. The state's Atlantic Coast makes up 580 miles of coastline plus another 3,331 miles of tidal shoreline. The state's barrier islands, estuaries, beaches, seagrass meadows, wetlands and mangrove forests are world-renowned. With its length and diversity, the Florida coast is a major ecological driver for the Gulf of Mexico as a whole. The state's many coastal estuaries provide food, shelter, and important nurseries for a wide range of fish, birds and other marine life. Similarly, much of the coast, including the Florida Keys, provides important habitat for endangered shore birds, beach mice, manatees and sea turtles. Its white sandy beaches are consistently ranked among the best in the nation, and millions of people come to Florida each year to fish, dive, swim, and view wildlife. While Florida is a leader

in the Gulf at implementing natural infrastructure solutions like living shorelines, 17 percent of its shoreline is armored.<sup>28</sup>

In Florida, living shorelines rank as a more common approach to shoreline stabilization and erosion control compared with other states in the Gulf of Mexico, and they are continuing to gain in popularity. The Department of Environmental Protection (DEP) requires Environmental Resource Permits (ERP) for projects that alter surface water flows, including wetland dredging and filling. Living shorelines are exempted from this permit requirement provided that they are below 500'x10' in size, use native plant species, include plans to remove invasive plants, and any breakwater meets additional criteria (Fla.Admin. Code 62-330.051(12)(e)).

The DEP utilizes a joint state and federal application form, and certain projects may qualify for Corps authorization under the State Programmatic General

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	Yes - SPGP-V	State Programmatic General Permit (for all projects that qualify for small-scale LSL permit exemption); projects that don't fit size limitation go to NWP	Yes	No	Wide variety - oysters, herbaceous vegetation, and mangroves are all used in various combinations	<ul style="list-style-type: none"> <li>• Florida Department of Environmental Protection (primary)</li> <li>• Local Water Management Districts</li> <li>• USACE Jacksonville District</li> </ul>

Permit (SPGP), which is currently on version V, revision 1, and effective through July 26, 2021. For the federal permit, depending on the scale of the project, an applicant could pursue the SPGP for smaller-scale projects or the NWP 54 for living shorelines projects that are larger. For living shorelines that qualify as exempt by the DEP based on their size, the SPGP V is used, which avoids duplication of permitting between the state and the Corps and allows the Corps to fast-track activities that are exempt by the state. The SPGP tends to move faster through the permitting process, and some interviewees reported that the NWP process can take up to a year in some cases. In any case, Florida has utilized the NWP 54 more than any other state, and to date 60 living shoreline projects have been permitted in Florida through the Army Corps of Engineers with this process.

The Environmental Resources Permitting division of the Florida DEP does encourage the use of natural vegetation to stabilize a shoreline whenever possible, although the state has no official preference for living shorelines over hard infrastructure, or requirement that an applicant must prove that a living shoreline would not work on their site before submitting a permit for a hardened structure, like a bulkhead or seawall.

*The Florida Fish and Wildlife Conservation Commission has partnered with a number of other Federal, State and private entities to develop and deliver a living shorelines training course specifically for marine contractors. The training also incorporates a contractor mentoring program to advance their learning as they incorporate living shorelines into their services.*

Approaches to living shoreline projects vary across the state and, given the importance of views and home values on the coast, utilization of natural features such as mangroves tend to be disfavored among homeowners. The Florida Fish and Wildlife Conservation Commission and the Florida Sea Grant are leading efforts to train marine contractors to offer more natural solutions to erosion control to their clients, including through the implementation of living shorelines. The DEP's Office of Resilience and Coastal Protection currently has two grant programs that help fund cities and counties to plan, design, and implement projects, including living shorelines.

### Relevant Resources and Guidance

- A partnership of Federal, State and private entities. [Florida Living Shorelines](#). 2020.
- Florida Fish and Wildlife Conservation Commission. [Living Shorelines Website and Training Course for Marine Contractors](#). 2020.
- Florida Department of Environmental Protection (DEP). [Resilience Planning Grants](#). 2020-2021.
- Florida DEP. [Coastal Partnership Initiative Grant Program](#).

# GEORGIA



Georgia’s hundred-mile Atlantic coast, stretching from the Savannah River on the South Carolina border to the St. Mary’s River on the Florida border, is characterized by barrier islands with rich wetlands and broad beaches, separated by deep tidal

inlets. The Lower Coastal Plain behind the barrier islands sees six-foot average tidal depths ranging up to ten feet during biweekly spring tides.<sup>29</sup> These deep tides support broad wetlands and comparatively narrow, deep creek systems with strong currents across the majority of the coastal zone. Coastal tourism, along with forestry and shipping, drive the economy of this dynamic, growing region, with increasing development pressures along the coast and scenic waterways.

Demand for shoreline stabilization has met and exceeded contractor capacity in the state in recent years, driven by damages from recent storms. However, there is low uptake of living shoreline techniques among stabilization projects, as awareness of techniques and best practices remains low among marine contractors and property owners – hardening remains the preferred technique for erosion control.

So far, most of the living shorelines projects that have been installed have been on research/demonstration sites, but new interest is developing among some private landowners.

The preferred living shoreline techniques among Georgia experts and practitioners include grading and stabilization with native plantings, and oyster shell bags for wave attenuation. Hybrid hardened structures are not recognized as living shorelines. In the geographic setting of coastal Georgia wetlands, narrow, deep creek systems and high tidal ranges predominate. Many project designs emphasize grading into the upland property while in some cases grading occurs into the tidal wetland in order to protect the habitat and nearby upland property. As of the time of writing, there are supply challenges in finding sufficient oyster shells for proposed projects.

The DNR Coastal Resources Division coordinates state review and site visits for projects in the coastal zone. For project proposals which utilize less than 1 cubic yard of fill per linear foot over less than 500 feet of shoreline, the DNR Coastal Resources Division will review the project for a Revocable License to alter state-

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	No	NWP 54 approved with regional conditions	No	No	Oyster shell breakwaters and native plantings	<ul style="list-style-type: none"> <li>• Department of Natural Resources: Coastal Resources Division (primary) and Environmental Protection Division</li> <li>• USACE Savannah District</li> </ul>



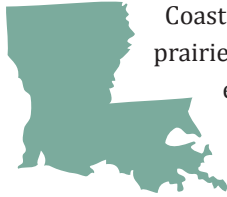
owned wetlands. Projects exceeding those thresholds are reviewed for a Coastal Marshlands Protection Act (CMPA) permit in addition to the Revocable License. Separately, projects modifying land upland of the contour at 5.6 feet above mean tide level must obtain an Erosion and Sedimentation Act (E&S) buffer variance. NWP 54 is approved for use in Georgia to approve living shoreline projects subject to regional conditions, including a limit on structures and fill extending more than 5 feet into the waterway. No applications have yet been submitted under the general permit to date. The state forwards permit applications to the Corps and coordinates on a staff level, but the District does not formally coordinate with the state on permit review.

## Relevant Resources and Guidance

- Georgia Department of Natural Resources (DNR), Coastal Resources Division. [Living Shorelines](#).
- Georgia DNR, Coastal Resources Division. [Living Shorelines along the Georgia Coast: A Summary Report of the First Living Shoreline projects in Georgia](#). 2013.
- Georgia DNR, Environmental Protection Division. [Streambank and Shoreline Stabilization Guidance](#). 2017.
- Georgia DNR, Environmental Protection Division and Georgia Soil and Water Conservation Commission. [Streambank and Shoreline Stabilization Guidance Book](#). 2017.

*The preferred living shoreline techniques among Georgia experts and practitioners include grading and stabilization with native plantings, and oyster shell bags for wave attenuation. Hybrid hardened structures are not recognized as living shorelines.*

## LOUISIANA



Coastal Louisiana’s barrier islands, prairies, and vast wetlands are ecologically rich and diverse. The state has over 7,700 miles of tidal shoreline and over 3 million acres of coastal wetlands. About

80 percent of the Louisiana coast is privately owned. The Mississippi River formed the state’s 6.2 million acres of swamps, marshes, and barrier islands over thousands of years, forming the Mississippi River Delta and Chenier Plain regions of the Louisiana Gulf Coast. The Deltaic Plain comprises a vast area of low-lying wetlands and coastal barrier islands, while the Chenier Plain region is characterized by inland lakes and wetlands behind beach ridges that parallel the coastline. Erosion and land loss threaten the long-term viability of the state’s vast wetlands and entire ecosystem. The state loses an average of 25-35 square miles of coastal wetland area annually. Based on current trends, the state is expected to lose an additional 800,000 acres of wetlands by 2040.<sup>30</sup> The state employs a wide variety of restoration techniques to slow and reverse current land loss and erosion

trends, including through sediment and freshwater diversions, hydrologic restoration, marsh creation and ridge restoration, and barrier island restoration. About 11 percent of its shoreline is hardened,<sup>31</sup> and the state has more than 2,000 miles of levees along its rivers.<sup>32</sup> Wave heights vary and typically range from 0.23 - 2.65 feet, although seasonal cold fronts and tropical storms often generate significantly larger wave heights.<sup>33</sup> Mean tidal ranges tend to decrease from the western Chenier Plain region eastward toward the Mississippi Delta and southeastern Louisiana. Overall, the diurnal tidal range varies from 0.4 - 3.2 feet.<sup>34</sup> High wave energy environments challenge the viability of traditional living shoreline approaches across much of the coast.

The Louisiana Department of Natural Resources (LDNR) – Office of Coastal Management (OCM) regulates coastal wetlands and uses in the state’s coastal zone and issues Coastal Use Permits for projects including shoreline modification. In Louisiana, all NWP are deemed inconsistent with the state’s coastal zone management plan, as LDNR OCM requires an opportunity to thoroughly review all activities

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	The USACE uses a Programmatic General Permit for activities in the Louisiana Coastal Zone	No	Yes, Title 43, Subchapter B. §709, “Guidelines for Shoreline Modification,” states that “Nonstructural methods of shoreline protection shall be utilized to the maximum extent practicable”	Oyster reef breakwaters	<ul style="list-style-type: none"> <li>• Department of Natural Resources – Office of Coastal Management (primary)</li> <li>• Department of Environmental Quality and Department of Wildlife and Fisheries</li> <li>• USACE New Orleans District</li> </ul>

occurring in the coastal zone. As such, Louisiana does not apply the NWP 54. Instead, OCM worked with the New Orleans District to create a Programmatic General Permit (PGP) for regulated activities within the coastal zone. Coastal uses subject to the PGP are separated into two processing categories based on the degree of impacts – Category 1 uses apply if the total number of acres of special aquatic sites impacted are no more than 1 acre, while Category 2 uses apply if no more than 5 acres are impacted.

When an applicant applies for a coastal use permit with OCM to build a living shoreline, the agency coordinates directly with the Corps. The Corps can decide to 1) issue a PGP, thereby handing off all regulatory authority to the state, or 2) require an individual permit. In some cases, a project may be outside of the jurisdiction of the OCM (for example, an upland forested area above the 5ft contour line would be exempt from permitting in Louisiana state law due to the Fastland exemption), but would still be within Corps jurisdiction and require mitigation requiring an individual Corps permit.

Because of Louisiana’s high rates of coastal land loss and high-wave energy environments, many types of living shoreline approaches are generally not applicable in the coastal zone. The most common types of projects in Louisiana have been oyster reef projects for shoreline stabilization and large-scale

wetland restoration projects, but the latter fall under the jurisdiction of a separate state agency called the Louisiana Coastal Protection and Restoration Authority (CPRA) and are not commonly thought of as “living shorelines”.

The state operates under a “no net loss” policy for wetlands, and requires in-basin and in-kind mitigation for any impacts. Wetland mitigation requirements take effect for any projects that result in habitat conversion, which can be an impediment to the use of living shorelines. If a project alters the habitat type in any way, the project must mitigate for those impacts in kind, even if the habitat change is expected to be environmentally beneficial.

### Relevant Resources and Guidance

- Coastal Protection and Restoration Authority of Louisiana. [Louisiana’s Comprehensive Master Plan for a Sustainable Coast](#). 2017.
- The Louisiana Department of Natural Resources Office of Coastal Management, Louisiana Sea Grant Law and Policy Program. [Regulatory Best Practices to Make Louisiana Coastal Communities More Resistant to Natural Hazards](#). 2013.
- Tetra Tech. [Living Shoreline Demonstration Project, Louisiana](#). 2016.

*Since 2013, the Office of Coastal Management has issued a statute to waive fees on permitting certain types of shoreline protection projects – saving applicants potentially thousands of dollars. The fee waiver applies to projects whose primary purpose and likely outcome are to reduce ongoing loss of coastal wetlands and/or barrier islands or barrier shorelines directly attributable to shoreline erosion, which includes living shorelines.*

## MAINE



Maine has slightly more coastline (3,478 mi) than California (3,427 mi), but if one were to add all the coastline from Maine’s 3,166 offshore islands, only Florida and Louisiana have more miles of coastline. Maine is well known for its glacially-carved rocky bluffs, bays and inlets, which are interspersed with sandy beaches to the south and elsewhere with granite formations which slope gently to the shore. Approximately 2 percent of Maine’s coast includes sandy beach and more than 40 percent includes unconsolidated rocky bluff. Maine’s rocky coastline provides critical habitat for Jonah crabs, juvenile herring, pollock, winter flounder, and lobster, while it’s 70 miles of sandy beaches provide resting and foraging areas for gulls, terns, and 23 species of shorebirds.<sup>35</sup>

Maine’s semi-diurnal tidal fluctuations vary considerably from 18.4 feet in Eastport to 8.7 feet in Kittery. Less than 1 percent of Maine’s shoreline is critically eroding, and most erosion occurs along coastal bluffs (1-3 feet/year), while Maine’s sandy beaches erode on average at a slower <1 foot/year.<sup>36</sup> Experience implementing living shorelines in Maine has been historically focused on stream restoration activities as well as dune restoration and nourishment through beneficial reuse of dredge material along Maine’s sandy beaches. However, ongoing development along Maine’s rocky bluffs, and the use of traditional shoreline stabilization approaches, have exacerbated erosion in some locations. This erosion, in conjunction with losses in marsh and mudflat habitat from storms and sea level rise, have increased interest in advancing the application of living shoreline approaches.<sup>37</sup>

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	GP 7 Bank and Shoreline Stabilization, GP 21 Habitat Restoration, Establishment and Enhancement Activities & Individual Permit	No	No	Dune construction & restoration, hybrid coastal bluff stabilization, and to a lesser extent, vegetation only approaches	<ul style="list-style-type: none"> <li>• Maine Department of Environmental Protection</li> <li>• USACE New England District</li> <li>Municipal Shoreland Zoning Review</li> <li>• Land Use Planning Commission if in an LUPC area</li> <li>• Bureau of Parks and Lands</li> </ul>

Living shoreline-type projects are subject to regulation under the Natural Resources Protection Act (NRPA) and/or the Shoreland Zoning Act (SZA) and typically require permits from both DEP and a local municipality. Apart from USACE review, regulatory and review authority over shoreline stabilization and restoration projects may include: ME Dept. of Environmental Protection (DEP), ME Land Use Planning Commission, ME Coastal Program, ME Dept. of Marine Resources, ME Dept. of Inland Fisheries and Wildlife, and ME Geological Survey, as well as local municipalities.

When approved by DEP, certain projects that conform to local shoreland zoning ordinances may be eligible under a Permit by Rule (PBR), which is a reduced permit process that satisfies NRPA permit and Water Quality Certification requirements. Otherwise, the project will require an NRPA GP or an individual permit under the NRPA for more in-depth projects. If a project is proposed within a Land Use Planning Commission (LUPC) area, an additional LUPC permit may be required. Permits may also be reviewed and approved under GP 7 for “bank and shoreline stabilization”, under GP 21 for “habitat restoration, establishment, and enhancement activities”, or through an Individual Permit. Under GP 7, a living shoreline can be classified as either a Category 1 or Category 2 “bank and shoreline stabilization” project. Category 1 projects under GP 7 are <200 linear feet and require submission of a self-verification notification form to the USACE.

Category 2 projects are >200 linear feet and require a pre-construction notification (PCN) from the Corps prior to proceeding with any work. Category 1 projects under GP 21 must be authorized in writing by a local, state, or non-Corps federal agency, and precludes conversion of habitat. Category 2 activities under GP 21 include work not eligible under Category 1, and includes activities that result in a net increase in overall aquatic resource functions and services.

Maine’s GPs, which expire in 2020, have no category specific to “living shoreline” projects. Because the NRPA requires an Individual Permit for projects occurring within tidal and subtidal lands, most living shoreline projects, including the handful of living shoreline projects implemented to date, have required an individual NRPA permit.

### Relevant Resources and Guidance

- Maine Geological Survey. [Maine Coastal Property Owner’s Guide to Erosion, Flooding, and Other Hazards](#). 2011.
- Maine Department of Agriculture, Conservation & Forestry, Office for Coastal Management. [Building Resiliency Along Maine’s Bluff Coast](#). 2017.
- Gulf of Maine Council Climate Network. [Living Shorelines: Working with nature to protect coastal properties and habitats](#).

*Experience implementing living shorelines in Maine has been historically focused on stream restoration activities as well as dune restoration and nourishment through beneficial reuse of dredge material along Maine's sandy beaches.*

## MARYLAND



Maryland’s coasts largely border the Chesapeake Bay and associated tributaries as well as the Atlantic Ocean to the south. Many of Maryland’s coastal habitats and communities are highly vulnerable to sea level rise, which is projected to rise by 1.4 feet by 2050 and 3.7 feet by 2100 with moderate reductions in greenhouse gas emissions during this century. Despite being a national leader in promoting living shorelines, shoreline armoring in Maryland is widespread in the Chesapeake Bay: eight Chesapeake Bay sub-estuaries are more than 50 percent armored, and 23 other sub-estuaries are between 30 percent and 50 percent armored (Patrick, et al., 2016). Overall, more than 1,000 miles of Chesapeake Bay shoreline have been armored, and despite Maryland’s Living Shorelines Law which mandates the use of green approaches where environmental conditions allow, over 50 percent of approved shoreline permits in 2017 were for some form of hardening.

State authorizations required for a living shoreline project include tidal wetland authorization and waterway construction authorization. These state authorizations are handled alongside USACE requirements under the Joint Federal/State Application

for the Alteration of Any Tidal Wetland. The state passed legislation in 2008, called the Living Shorelines Protection Act, which established a regulatory requirement for the use of nonstructural features over hardened structures for shoreline stabilization projects. Specifically, the Act states that, “improvements to protect a person’s property against shoreline erosion must consist of marsh creation or other nonstructural shoreline stabilization measures, i.e. Living Shorelines, that preserve the natural environment unless a Waiver is obtained.”

A person wishing to build a structural shoreline stabilization project must complete a Living Shorelines Waiver Request to MDE as part of a joint MDE/USACE application. Projects are eligible to receive a Living Shoreline Waiver if the proposed location has been identified by the state as appropriate for structural shoreline stabilization measures, or if the project site is not suitable for a living shoreline due to several attributes which include excessive erosion, severe high energy conditions, extreme water depths, or the fact that the waterway is too narrow for effective use of nonstructural shoreline stabilization measures. If the request is approved by MDE, the signed waiver should be submitted as part of the joint permit application.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	A Joint Permit Application is used to apply for federal and State authorization under the Maryland State Programmatic General Permit	Yes	Yes, Living Shorelines Protection Act Title 26, 24.4.01 (2008)	Sill with vegetation	<ul style="list-style-type: none"> <li>• Maryland Department of the Environment</li> <li>• USACE Baltimore District</li> </ul>

In addition to the authorized waiver (if applicable), applicants must also submit a proposed Critical Area Buffer Management Plan and a signed Critical Area Buffer Notification Form along with the Joint Application. It is also strongly recommended that in addition to completing the Living Shoreline Waiver Request that a pre-application site visit is made with an MDE Project Manager.

The USACE - Baltimore District suspended 39 Nationwide Permits (NWP), including NWP 13 (for hardened structures) and NWP 54 (for living shorelines) to avoid duplication and ensure effective implementation of the Maryland State Programmatic General Permit-5 (MDSPGP-5), which predates the NWP-54. The MDSPGP-5 applies to activities in waters of the United States, including wetlands and navigable waters, within the State of Maryland, and is intended to streamline the federal review and permitting process by allowing Maryland to issue an approval under the MDSPGP-5 for minor projects with no more than minimal individual and cumulative impacts on the environment. This allows Maryland's preference for the

use of living shorelines to be carried over at the federal level for many projects.

Review of the Joint Application falls into two timeframes, based on the extent of impacts of the proposed project. Minor projects that impact no more than 5,000 square feet of wetland outside protected areas do not require Public Notice, receive faster review (typically 90 days), and in a majority of projects will fit MDSPGP-5 criteria. Major projects require Public Notice with the Board of Public Works and issuance of the State authorization based on a recommendation from MDE; a majority of these projects require an individual permit from the USACE.

### **Relevant Resources and Guidance**

- Maryland Department of Natural Resources (DNR). [Frequently Asked Questions: Living Shorelines](#).
- Maryland DNR. [Summary of Living Shorelines Laws](#).
- Maryland Department of the Environment. [Structural Shoreline Stabilization Maps](#).

*In Maryland, a private property owner wishing to protect against shoreline erosion using a structural shoreline stabilization approach must submit an approved waiver with any application for a Tidal Wetlands License.*

## MASSACHUSETTS



Nicknamed “the Bay State”, Massachusetts is marked by numerous coastal embayments that largely

define it’s 1,500 miles of coastline. The Massachusetts coastline is made up of a dynamic matrix of habitats including sandy beaches, dunes, rocky intertidal shore, barrier beaches, salt marshes, estuarine habitats and coastal banks. This includes approximately 48,000 acres of saltmarsh, 20,000 of which make up the Great Marsh, the largest contiguous saltmarsh in New England. Together, Massachusetts’s coastal habitats provide critical habitat for dozens of federal trust species including the roseate tern, saltmarsh sparrow, piping plover, and least tern, as well as providing critical habitat and nursery grounds for a number of commercially important species including lobsters, mollusks, herring, alewife, bluefish, and striped bass.

Of the 1,500 miles of coastline, residential development accounts for approximately 40% of the shoreline, with natural upland areas, maintain open space, and non-residential developed accounting for 32%, 23%, and

7% respectively.<sup>38</sup> Estimates of short term (~30 year) erosion for the twenty Massachusetts communities experiencing the greatest rates of shoreline loss range from 8.70 ft/yr to .99 ft/yr.<sup>39</sup> In response to both long and short-term erosion, shoreline assessments indicate that nearly 27% of the exposed coastal shoreline is armored by some form of coastal protection with revetments occupying 17% and seawalls/bulkheads at 15%.<sup>40</sup> In an attempt to limit coastal armoring Massachusetts has instituted a preference for the use of non-structural approaches to address shoreline stabilization under the Wetlands Protection Act (WPA). The Wetlands Protection Act regulations do not allow hard armoring on beaches, dunes, barrier beaches, salt marshes, or banks where not necessary to protect a house constructed prior to August 1978. As a result of a 1’-11” tidal range, vegetation only living shoreline approaches are typically limited to low and moderate energy environments. However, additional opportunities for the use of nature-based approaches, including beach and dune nourishment and bioengineering may exist at more exposed sites.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	General Permit 7 - Banks and Shorelines Stabilization, General Permit 23 - Aquatic Habitat Restoration, Establishment and Enhancement Activities	No	Yes, MA Wetlands Protection Act 310 CMR 10.30.3.b (2017)	Emphasis on non-structural approaches	<ul style="list-style-type: none"> <li>• Local Conservation Commissions</li> <li>• MA Dept. of Environmental Protection (MassDEP)</li> <li>• USACE New England District</li> </ul>



Living shorelines projects in Massachusetts may require a state Chapter 91 authorization for construction or fill in waterways and/or a WPA or Rivers Protection Act permit, all regulated by MassDEP. MassDEP offers a combined application covering Chapter 91, WPA, and CWA 401 water quality certification requirements. While policies and regulations are promulgated by MassDEP, WPA permits are reviewed and decided by the 351 local conservation commissions in Massachusetts through the issuance of Orders of Conditions. Over 170 Massachusetts communities have more restrictive local wetlands protection bylaws in addition to the state and federal laws. State Areas of Critical Environmental Concern (ACEC) designations and permanent restriction orders placed on selected wetlands in over 50 communities under the Inland and Coastal Wetlands Restriction Acts establish further project requirements in certain areas. In addition, projects may trigger review under the Massachusetts Environmental Protection Act (MEPA). As such, MEPA review should be conducted prior to submitting applications for the MassDEP licenses and permits.

Use of the 2017 USACE Nationwide Permit for Living Shorelines (NWP 54) has been suspended in Massachusetts and replaced with General Permits. The New England District, U.S. Army Corps of Engineers (USACE) revoked the 2015 state-wide General Permits (GPs) for Massachusetts and the new GPs were issued on April 16, 2018. Activities with minimal impacts

that meet certain conditions qualify for authorization under the GP through either a Self-Verification (SV) or Pre-Construction Notification (PCN) process. Self-Verification (SV) activities are known as non-reporting projects and may be authorized under the GP without notifying the Corps as long as the project obtains necessary state approvals. Projects that necessitate a PCN require written authorization from the Corps. Projects that do not qualify under either SV or PCN require an individual USACE permit and individual federal consistency review by MA CZM.

### Relevant Resources and Guidance

- Massachusetts Department of Environmental Protection (DEP), Massachusetts Office of Coastal Zone Management (CZM). [Applying the Massachusetts Coastal Wetland Regulations: A Practical Manual for Conservation Commissions to Protect the Storm Damage Prevention and Flood Control Functions of Coastal Resource Areas](#). 2017.
- Massachusetts DEP & Massachusetts CZM. [Massachusetts Office of Coastal Zone Management Policy Guide](#). 2011.
- Massachusetts Department of Conservation and Recreation Office of Waterways & Massachusetts Office of Coastal Zone Management. [Massachusetts Coastal Infrastructure Inventory and Assessment Project](#). 2006-2015.

*The Massachusetts Office of Coastal Zone Management Policy Guide provides an overview of the coastal program policies, authorities, and the Federal Consistency review process. The guide describes a preference for non-structural alternative approaches to coastal hazard reduction stipulating that structural flood and erosion control alternatives are only allowed when it is determined that non-structural alternatives are not feasible.*

# MISSISSIPPI



The Mississippi Coast boasts dynamic ecosystems that include barrier islands, seagrass beds, meandering waterways, freshwater and estuarine wetlands, and maritime forests. Its coastline stretches 86 miles across Hancock, Harrison and Jackson Counties

along the Gulf Coast, and the state has 359 miles of tidal shoreline. The Mississippi Sound is the coast’s centerpiece, spanning the entire Mississippi Gulf Coast and helping to shield the coastline from waves and swells from the Gulf of Mexico. The Mississippi Sound has relatively low wave energy and a mean tidal range of 1.47 feet.<sup>41</sup> The state has 436,000 acres of estuarine wetlands with 65,453 acres of tidal wetlands. Coastal shorelines and barrier islands have long experienced erosion due to natural and human processes, and the barrier island shorelines are rapidly eroding with an

average long-term erosion rate of  $3.1 \pm 1.8$  meters per year.<sup>42</sup> Development has become a major threat to the state’s remaining wetlands. Severe storms and hurricanes have the potential to drastically change the coastline and displace large amounts of sand, as was the case during Hurricane Katrina. The beaches along the Mississippi Coast extend for over 26 miles and are periodically replenished with sand. Jackson County has the only remaining natural beach on the mainland coastline, formed by natural sand deposition from longshore currents, but this natural process has been interrupted by coastal armoring. Roughly 12 percent of the state’s shoreline is armored with hard infrastructure, including seawalls, groins, jetties, and breakwaters.<sup>43</sup>

The state of Mississippi has not approved the NWP 54. The state previously utilized a U.S. Army Corps of Engineers (USACE) General Permit (GP) for living

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	The Living Shorelines General Permit (MSGP-03) expired in 2018; all applicants file a joint application through the Department of Marine Resources to obtain state and federal permits	No, only as defined by MSGP-03 (now expired)	Yes, the Miss. Admin. Code Title 22, Part 23, Chapter 8, Section 103.01 states that non-structural methods shall be used in preference to structural methods for erosion control	Coir logs and plantings along eroding steep banks; oyster reef breakwaters; offshore rock breakwaters in high-wave energy environments	<ul style="list-style-type: none"> <li>• Department of Marine Resources (coordinating agency)</li> <li>• Department of Environmental Quality – Office of Pollution</li> <li>• Secretary of State Public Lands Division (submerged water bottoms)</li> <li>• USACE Mobile District</li> </ul>

shorelines (MSGP-03); however, this GP expired in October 2018 and was not renewed. As such, living shoreline applicants must obtain separate permits through the state and the USACE. Under a Memorandum of Agreement with the Mississippi Department of Marine Resources (MDMR) and the Mobile and Vicksburg districts of the USACE, wetland activities in the Mississippi coastal zone require joint application and notification, but there is no longer joint authorization. The MDMR is the point of contact for permits related to living shorelines in the Mississippi coastal zone. The Mississippi Commission on Marine Resources (Commission) regulates certain activities in the coastal zone and associated coastal watersheds for the conservation and protection of coastal wetlands. Most living shoreline projects must go before the Commission for approval, because the Commission requires a variance to the requirements for regulated activities for filling of coastal wetlands. MDMR notifies the Coastal Program Agencies at least 30 days prior to a determination of coastal zone consistency. In addition to a state permit, a separate permit may also be issued by the USACE Mobile District and they decide what type of permit is required. If the Mobile District requires an individual permit, the state Department of Environmental Quality (DEQ) determines whether the project adheres to state water quality standards, and DMR would determine coastal zone consistency. Depending on the location of the activity, the State Public Lands Division and Department of Archives and History may be involved as well.

Under the previous GP process, state authorization was issued by MDMR on behalf of the USACE Mobile District. The MSGP-03 was used to authorize shoreline protection through activities to preserve, restore, and/or propagate dunes, beaches, wetlands, uplands, submerged grassbeds, and/or essential fish habitat.

*The Mississippi Department of Marine Resources is developing a pilot program to increase guidance and expand the use of living shorelines across the coast. This effort seeks to encourage applicants to consider alternative softer designs to shoreline stabilization and coastal protection.*

The GP was instrumental in streamlining the permitting process and regulatory program for minor activities by providing coastal zone management consistency and water quality certification on a 5-year review cycle with no public notice or further coordination required. The turnaround for a permit was 45-90 days, on average. The DMR is currently pursuing a new mechanism to authorize activities that previously went through the GP. If approved by the Commission, projects that are deemed not to cause adverse environmental impacts or substantially change wetlands would potentially qualify for a Certificate of Waiver from securing a state permit, though this would not relieve the applicant from the requirement of obtaining a permit from the USACE or DEQ, or other regulatory requirements. Examples of living shoreline projects are gradually increasing throughout coastal Mississippi. There have been 10 living shoreline projects implemented across the coast through the former MSGP-03.

### Relevant Resources and Guidance

- Mississippi Department of Marine Resources (DMR). [Alternative Shoreline Management Guidebook](#). 2013.
- Mississippi DMR. [Alternative Shoreline Management Brochure](#).
- Mississippi DMR. [Living Shorelines Overview Brochure](#).
- Mississippi DMR. [Construction Cost Comparisons Brochure](#).
- Allen Engineering and Science. [List of Gulf Coast Alternative Shoreline Experts](#).
- Mississippi-Alabama Sea Grant Consortium. [Living Shorelines: A Permitting Guide for Mississippi Homeowners](#).
- Climate and Resilience Community of Practice. [Living Shorelines in Gulf Coast States: Mississippi Resource Catalog](#). 2019.

## NEW HAMPSHIRE



New Hampshire has 326 miles of tidal shoreline which includes 18 miles of open ocean coastline. The coastline includes a matrix of habitats dominated by coastal islands and rocky shores, sandy beaches and dunes, as well as two productive estuaries (Great Bay & Hampton Seabrook) and several large saltmarsh complexes. Together these habitats

provide refuge for a host of important bird species including American bittern, Nelson’s sharp-tailed sparrow, salt marsh sharp-tailed sparrow, seaside sparrow, and semipalmated sandpiper, as well as important nursery and spawning habitat for smelt, American shad, blueback herring, and horseshoe crabs. Approximately 32 percent (418,366 people) of the state’s population lives within the coastal zone, and many of these homeowners have responded to coastal erosion by constructing shoreline protection structures including rip rap, seawalls and revetments. A 2017 analysis of Wetland Bureau permit applications related to shoreline stabilization measures indicate that the demand for permits has increased markedly since the 1980’s.<sup>44</sup> Estimates suggest that between

30- 50 percent of New Hampshire’s original saltmarsh habitat has been lost to development, which is mirrored by the fact that 12 percent of the tidal shoreline, and 70 percent of the Atlantic shoreline, is armored by some type of erosion control structure.<sup>45</sup> That said, a living shoreline site suitability analysis conducted in 2019 found that 82 percent of the tidal shoreline “may be suitable for no stabilization action, low impact management or nature-based stabilization”.<sup>46</sup>

In New Hampshire, the Fill and Dredge in Wetlands Act and the Shoreland Water Quality Protection Act are the state’s primary wetland regulatory authorities. The New Hampshire Department of Environmental Services (NHDES) administers the state’s wetland regulatory program. While New Hampshire does not have a long history of implementing living shorelines, with only a handful permitted to date, recent [revisions to New Hampshire’s coastal lands and tidal waters/ wetlands rules](#) provide a statutory definition for living shorelines, and have shifted permitting in favor of living shorelines by stating a clear preference for natural and hybrid approaches to shoreline stabilization.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	General Permit 9 Shoreline and Bank Stabilization	Yes	Yes (Env-Wt 609.04 (a))	Vegetation only and hybrid approaches	<ul style="list-style-type: none"> <li>New Hampshire Department of Environmental Services (NHDES)</li> <li>USACE New England District</li> </ul>

Under the revised wetlands rules, many living shoreline-projects could be categorized as a “minimum impact” under Env-Wt 609.10. Smaller living shoreline projects may also qualify under the General Permit 9 for Shoreline and Bank Stabilization projects. Under GP 9, all projects in tidal waters with ≤ 1 acre of permanent or temporary impacts are subject to Pre-Construction Notification. Projects in tidal waters with >1 acre of permanent or temporary impacts are not authorized under GP 9 and require an Individual Permit from the Army Corps of Engineers. Additionally, municipal conservation commissions have an advisory role in the state permitting process and can provide comments to the NHDES before a permitting decision is made. Some local governments have adopted wetland protection regulations, including the requirements for buffers to wetlands.

*In 2019 New Hampshire adopted significant revisions to their Coastal Lands and Tidal Waters/Wetlands rules. The rules state that projects in tidal surface waters or tidal wetlands should be designed with a preference for living shorelines over hardened stabilization practices.*

### Relevant Resources and Guidance

- New Hampshire Department of Environmental Services (NHDES), Land Resource Management [How to Ensure Your Permit Application is Accepted](#)
- NHDES Coastal Program. [New Hampshire Inventory of Tidal Shoreline Protection Structures](#). 2017.
- NHDES Coastal Program. [New Hampshire Living Shoreline Site Suitability Assessment](#). 2019.
- NHDES & New England Interstate Water Pollution Control Commission. [Wetlands: Best Management Practice Techniques For Avoidance and Minimization](#). 2019.

## NEW JERSEY



The northern third of New Jersey’s 130 miles of coastline is dominated by sandy beach fronting an eroded bluff. The central and southern sections of coastline are dominated by a complex of barrier islands and back bays which provide cover for more than 300,000 acres of tidal wetlands. These wetlands in turn

provide critical habitat for more than 50 species of commercially and recreationally harvested finfish and shellfish. It is estimated that over 1.5 million shorebirds utilize Cape May alone each year as a migratory stopover site. Erosion and flooding are the primary threats to these coastal habitats. Research suggests that 2,000 feet of shoreline retreat has occurred since 1650.<sup>47</sup> Average long-term and short-term erosion rates from Sandy Hook south to Little Egg Inlet (northern coastline) are -8.6 and -6.1 meters per year respectively, and a long-term rate of -4.3 meters per year to -19.3 from Little Egg Inlet south to Cape May Inlet.<sup>48</sup> These impacts are complicated by the fact that New Jersey is considered one of the most developed and densely populated shorelines in the country. As a result, 76

percent of the coastline is developed leaving only 31.2 miles of shoreline with no hard infrastructure between the salt marshes and open ocean.<sup>49</sup>

In response to the breadth of coastal development, rates of shoreline erosion, and significant coastal resources, the State of New Jersey has assumed a strong preference for natural and hybrid shoreline stabilization approaches. New Jersey is one of a handful of States with significant online resources, a statutory definition, and a general permit specific to living shorelines. The Office of Policy and Coastal Management (PCM) within New Jersey’s Department of Environmental Protection (NJDEP) is the point of contact for all proposed living shoreline projects. Living shorelines fall under the jurisdiction of the New Jersey Coastal Zone Management Rules (CZM), which define the term, establish location and construction requirements, provide shoreline protection options, and outline options for authorizing construction.

In New Jersey, both a NWP 54 from the USACE and either a General Permit 17 or 24 issued by New Jersey

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	State General Permit (24 & 17)	Yes	Yes	Vegetation only and hybrid approaches	<ul style="list-style-type: none"> <li>• New Jersey Department of Environmental Protection</li> <li>• USACE Philadelphia and New York Districts</li> </ul>

are required for living shoreline projects. While a small subset of living shoreline projects may be authorized under General Permit 17, they are “limited to those that specifically address stabilization of an eroded shoreline along tidal waterways (excluding the Atlantic Ocean) utilizing only natural materials, with no impact to special areas (areas listed in N.J.A.C. 7:7-9), and no disturbance to wetlands”.<sup>50</sup> The majority of Living Shoreline projects fall within Coastal General Permit 24 (N.J.A.C. 7:7-6.24), which was officially adopted in 2013 and specifically authorizes living shoreline activities as well as habitat creation, restoration, and enhancement projects. While vegetation-only projects are allowed under GP 17, GP 24 provides for the permitting of hybrid living shoreline projects. In support more consistent project implementation NJDEP collaborated with the Stevens Institute of Technology in 2015 to develop engineering guidelines for living shoreline projects.

General Permit 24 applicants submit a single application and permit fees are waived to encourage the use of these types of approaches. The project can disturb up to one acre of below the mean high water line, but cannot exceed the shoreline footprint outlined in the Tidelands Map, which includes “all lands that are currently and formerly flowed by the

*New Jersey is one of the few states to develop specific engineering guidelines for living shoreline projects. The guidelines provide system parameters like erosion history and tidal range, ecological parameters such as water quality and soil type, hydrodynamic parameters, and terrestrial parameters including soil bearing capacity and offshore depth.*

mean high tide of a natural waterway”, and must be designed and/or sponsored by NJDEP, USACE, a Federal Resource Agency, or by a college or university.<sup>51</sup> If the application fails to meet the requirements of GP 24, necessitating an Individual Permit, the same permit application is utilized.

In 1994 the State of New Jersey assumed the Federal Section 404 permit program from the USACE; however, the U.S. Army Corps of Engineers retains authority for tidal waters and adjacent wetlands and other waters affected by interstate and foreign commerce. New Jersey and Michigan are the only states to have formally assumed the program.<sup>52</sup> In 2017, New Jersey denied Water Quality Certification (WQC), and objected to the Coastal Zone Management Act (CZMA) consistency determination for NWP 54.

### Relevant Resources and Guidance

- New Jersey Department of Environmental Protection, Office of Policy and Coastal Management. [Regulations and Permits](#).
- Stevens Institute of Technology & New Jersey Department of Environmental Protection. [Living Shorelines Engineering Guidelines](#). 2016.

## NEW YORK



The State of New York has 2,625 miles of complex glacially-carved coastline with a Marine and Coastal District that extends from the southern tip of Richmond County along the Raritan Bay around the entirety

of Long Island to the northern tip of Westchester County, and up the Hudson River as far as the Tappan Zee Bridge. New York's coastline includes a mosaic of habitats including marshes, wetlands, mud and sandflats, sandy beaches, and rocky shores. The New York State Department of State Division of Coastal Resources has designated 250 Significant Coastal Fish and Wildlife Habitats (SCFWH) which provide critical breeding, nursery, feeding, migration, and wintering habitats for a host of species including piping plovers, least terns, more than 30 species of reptiles and amphibians, juvenile flounder, bay scallops, clams and crabs, as well as the federally threatened seabeach amaranth. At the same time, more than 70 percent of New York residents live along the coast, and in many areas shoreline armoring, in conjunction with coastal storm impacts, are exacerbating shoreline erosion.

Estimates suggest that approximately 47 percent of New York's coastline is critically eroding.<sup>53</sup>

In recognition of the value of the State's extensive natural coastal resources, New York emphasizes the use of non-structural measures, and if active shoreline management is necessary, the use of soft approaches to shoreline stabilization.<sup>54</sup> On November 22, 2017 New York State Department of Environmental Conservation (DEC) announced new guidance for living shoreline projects in the marine district of the State. The guidance document provides information on the issuance of permits for living shorelines and encourages the use of natural infrastructure. In addition, the guidance provides information on types of living shorelines, reviews how tidal wetland and protection of waters permit standards relate to living shorelines, and speaks to proper siting, maintenance, and monitoring considerations. Currently, New York receives 5-10 living shoreline applications per year and the majority are vegetation and/or hybrid approaches implemented in low to moderate energy environments.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	Tidal Wetlands Permit (ECL Article 25, 6 NYCRR Part 661), Use and Protection of Waters (ECL Article 15, 6 NYCRR Part 608), Coastal Erosion Management Permit (ECL Article 34, 6 NYCRR Part 505)	No	No	Vegetation only and hybrid approaches	<ul style="list-style-type: none"> <li>• New York State Department of Environmental Conservation (NYSDEC)</li> <li>• New York State Department of State (NYSDOS)</li> <li>• NYS Office of General Services (OGS), USACE New York District</li> </ul>



In New York, all living shoreline permit applicants must submit a single N.Y.S. Department of Environmental Conservation (NYSDEC)/Corps of Engineers Joint Application for Permit which is reviewed by four agencies including the Corps of Engineers. All applicants must submit four copies of the joint application form, an environmental questionnaire, project drawings, and a Federal Consistency Assessment Form to NYSDOS. The application is reviewed by each involved agency and the project must receive individual permits or approvals from each agency prior to starting the work. State permitting of Living shoreline projects fall into two primary regulatory categories; those permitted under the Tidal Wetland Use and the Use and Protection of Waters Regulations pursuant to Environmental Conservation Law (ECL) Articles 25 & 15, respectively. A smaller subset of living shorelines may fall within the Coastal Erosion Hazard Areas Law (CEHAL) (ECL Article 3).

Under the CEHAL, NYSDDEC mapped all coastal erosion hazard areas and adopted regulations (6 NYCRR Part 505) to guide activities within those areas. Activities that fall within a designated Coastal Erosion Hazard Area (CEHA) require a Coastal Erosion Management Permit. Living Shoreline-type projects that may fall under the CEHAL are typically larger projects that include regrading or deposition within dune, beach, bluff or nearshore habitats.

The majority of living shoreline projects are permitted under the Tidal Wetlands Permit Program (Article 25), and to a lesser extent, the Protection of Waters Program (Article 15). Almost any activity that alter wetlands or the adjacent area within tidally-influenced waters requires a NYS Tidal Wetlands Permit. The Protection of Waters Permit Program regulates five different categories of activities that include disturbance or alterations of protected streams, other watercourses, excavation or placement of fill in navigable waters and Water Quality Certification for placing fill or undertaking activities resulting in a discharge to waters.

Coastal consistency review, administered by NYSDOS, provides an opportunity for the State to guide the use of natural resilience measures in state or federally funded or authorized actions, or activities directly undertaken by federal or state agencies. Through the federal Coastal Zone Management Act of 1972 (CZMA) NYS DOS is authorized to review federal actions, including direct actions and those requiring federal authorization or federal funding, that occur within or outside New York's defined coastal area, for consistency with the relevant enforceable policies of New York's Coastal Management Program (NYS CMP) or if applicable, an approved Local Waterfront Revitalization Program (LWRP) (NYS DOS, 2017). In 2017 NYSDEC denied Water Quality Certification (WQC), and objected to the Coastal Zone Management Act (CZMA) consistency determination for NWP 54. Therefore, an individual water quality certification from NYSDEC and consistency concurrence from NYSDOS is required for a project to be approved under the NWP.

### Relevant Resources and Guidance

- Tidal Wetlands Guidance Document: [Living Shoreline Techniques in the Marine District of New York State](#). 2017.
- New York Department of Environmental Conservation. [Tidal Wetlands Permit Program: Application Procedures](#).
- [US Army Corps of Engineers New York District Regulatory Program Applicant Information Guide](#). 2019.
- New York State Department of State. Office of Planning, Development and Community Infrastructure. [Coastal Consistency Review](#).

## NORTH CAROLINA



The North Carolina coastal zone includes barrier islands, sounds and estuaries, with over 12,000 miles of estuarine

shoreline, including swamp forests, bluffs, and marshes, and ~325 miles of linear beachfront shoreline. North Carolina’s shoreline is estimated to be only 6.3 percent hardened, significantly less than the national average. Lunar estuarine tidal range varies between 20 cm and 100 cm, with higher values in the south part of the state. Wind tides also have a strong influence, and much of North Carolina’s estuarine shoreline is eroding due to this and other factors.

The North Carolina Department of Environmental Quality Division of Coastal Management (NCDCM) is the primary permitting agency for living shorelines in the state of North Carolina. A Major, General, or Minor Coastal Area Management Act (CAMA) Permit is required from NCDCM for projects in the coastal zone.

Applicants looking for a permit in the coastal zone work directly with NCDCM, and the agency coordinates with the Corps and other relevant state agencies through the Major Permit process. Major Permits require consultation among agencies and usually take roughly 75 days to issue. General Permits are issued for routine projects meeting standards previously agreed to by the relevant state and federal agencies, and are typically issued within a few days following a site visit from a field representative and do not require consultation with other fed/state agencies. Docks, piers, and bulkheads shorter than 500 linear feet typically qualify for a general permit and receive this expedited review and issuance. There is also a General Permit for living shorelines projects (GP 2700), which was recently amended (details below). Wetland plantings for shoreline protection that do involve any fill do not require a permit. Minor permits are required for projects, such as single-family houses, that don't require major permits or general permits.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	Yes- North Carolina GP 2700; Army Corps Regional General Permit (201801536)	*GP 2700 amended in March 2019 to mirror the new Corps RGP for marsh sill structures	No	No	Sill with vegetation	<ul style="list-style-type: none"> <li>• NC Department of Environmental Quality, Division of Coastal Management (primary)</li> <li>• Division of Marine Fisheries, State Property Office, Division of Water Resources N.C. Wildlife Resources Commission</li> <li>• Wilmington District, ACE</li> </ul>

North Carolina has a long history of trying to promote living shorelines. The Wilmington District of the Corps worked with the NCDCM Coastal Area Management Act (CAMA) permit program to develop a State Programmatic General Permit (PGP), referred to as PGP 291, which was one of the first State PGPs authorized in the U.S. and gave NCDCM leadership in permitting projects in the coastal zone. Until recently, this was the federal permit/approval necessary for any living shorelines project in NC.

In 2003, the General Assembly directed the Coastal Resources Commission to establish a general permit for the construction of “riprap sills,” which in 2005 became General Permit .2700 (15A NCAC .2700 GP). However, in practice the permit did not function like other PGPs, as the Army Corps, NC Division of Water Resources, and the NC Division of Marine Fisheries all still wanted an opportunity to review the permits. Functionally, the General Permit approval was more akin to the Major Permit process.

Although the North Carolina deemed Nationwide Permit 54 consistent with the state’s coastal plan, since it still required pre-construction notification to the Corps it did not expedite or streamline permitting in North Carolina where the PGP 291 process was already in place. As of January 2019, the NWP 54 had been issued for only three projects in NC - two municipal living shorelines and one private installation.

Over the past several years, DCM has convened a stakeholder group, consisting of the Corps, the state’s marine science community, the Division of Water Resources, the Division of Marine Fisheries, the North Carolina Coastal Federation, North Carolina Sea Grant

and the National Marine Fisheries Service, to discuss ways to further streamline the permitting process. It was agreed that the Corps would develop a Regional General Permit (RGP) for marsh sill structures that will not require pre-construction notification to the Corps provided certain project criteria were met, and the state would work to amend General Permit .2700 to also reflect the conditions agreed to for the Corps’ RGP. The amendments agreed to provide additional material options to build the marsh sills, explain how to measure the width and height of sills, and remove coordination requirements among Division of Marine Fisheries, Division of Water Resources and the Army Corps of Engineers, with the intention of cutting down on permit processing time.

Any projects that do not meet the new GP.2700 conditions will be reviewed through the Major Permit Process and the USACE will issue PGP 291.

### Relevant Resources and Guidance

- U.S. Army Corps of Engineers. [Regional General Permit for Marsh Sills](#). 2019.
- North Carolina Division of Coastal Management & North Carolina Division of Marine Fisheries. [Living Shorelines Strategy](#). 2014.
- North Carolina Division of Coastal Management & North Carolina Division of Marine Fisheries. [Living Shorelines Strategy Accomplishment Report](#). 2016.
- N.C. Division of Coastal Management – North Carolina Coastal Reserve & National Estuarine. [How to Protect Your Property from Coastal Erosion: A Handbook for Estuarine Property Owners in North Carolina](#). 2013.
- NC Department of Environment Quality. [Coastal Management Science and Data Mapper](#).

*In 2019 the Coastal Resources Commission approved the final adoption of temporary rule 15A NCAC 7H .2700 General Permit for the construction of riprap sills for wetland enhancement in estuarine and public trust waters. With this updated General Permit in place, living shorelines meeting the permit qualifications in North Carolina should now be permitted within a matter of days, following a site visit by a North Carolina Division of Coastal Management field representative.*

## RHODE ISLAND



With 384 miles of coastline, Rhode Island is the smallest U.S. state by area and the second most densely populated.

More than half of Rhode Island's shoreline rests along Narragansett Bay and the more than 30 islands within the Bay. The coastline includes a variety of coastal

landforms, from sandy and gravel barrier beaches and rocky cliffs to relatively intact saltmarshes and tidal flats. Salt marshes covering roughly 3438 acres are the predominant estuarine habitat, of which 10 percent are fringe marshes less than 5 yards wide. The Rhode Island coast contains 16 Important Bird Areas that support Saltmarsh Sparrow, Piping Plovers, Least Terns and American Oystercatchers. The habitats that support these species are increasingly impacted by coastal erosion which is exacerbated by coastal storms and sea level rise. While these data are viewed as very conservative, studies suggest that 7 percent of Rhode Island's shoreline is critically eroding, with average rates reported between 0-4 ft per year.<sup>55</sup> However, much of Rhode Island's coastal erosion is episodic, largely driven by coastal storms. In these instances, tens of feet of erosion can occur during a single severe

storm.<sup>56</sup> Contributing to local erosion rates is the fact that more than 30 percent of Rhode Island's shoreline is hardened, with development occurring across 54 percent of the 500 ft of the coastal buffer.<sup>57,58</sup> While historically hard infrastructure approaches have been used to address shoreline erosion, the State is increasingly interested in the use of natural or nature-based infrastructure solutions.

In Rhode Island, permitting of living shoreline projects in tidally-influenced waters is conducted by the Coastal Resources Management Council (CRMC) and covered under General Permit 9 for Shoreline Stabilization. The CRMC is an independent state regulatory agency composed of 10 appointed members from coastal communities; state and local government officials, the general public, and the director of the Department of Environmental Management. Tidally influenced waters under CRMC jurisdiction have been categorized into six prioritized Water Types. These include; Type 1 Conservation Areas; Type 2 Low Intensity Use; Type 3 High Intensity Boating; Type 4 Multipurpose Waters; Type 5 Recreational and Commercial Harbors; and Type 6 Industrial Waterfronts and Commercial Navigation Channels.

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	Yes	USACE Rhode Island General Permit 9 Shoreline and Bank Stabilization Projects	No – RI has a LS Program, but no legal definition	Yes, Title 650-Coastal Resources Management Council. Chapter 20- Coastal Management Program 1.3.1(G)1.a	Vegetation only and hybrid approaches	<ul style="list-style-type: none"> <li>• Coastal Resources Management Council (CRMC)</li> <li>• RI Department of Environmental Management</li> <li>• USACE New England District</li> </ul>

CRMC regulations prohibit new structural shoreline protection measures on barriers classified as undeveloped, moderately developed, and developed, and on all shorelines adjacent to Type 1 waters. Applicants for any structural shoreline protection must “exhaust all reasonable and practical alternatives including, but not limited to, the relocation of the structure and nonstructural shoreline protection methods.” In addition to its core regulatory program, the CRMC has eight tailored Special Area Management Plans (SAMPs) that span most of the state, providing customized guidelines and regulations for addressing the specific needs of those areas. The Salt Ponds SAMP includes a chapter on experimental erosion control methods, defined as “unconventional methods that are intended to control erosion along coastal beaches or capture sand in shallow water depths parallel to the beach in order to restore beach profiles.” The corresponding regulations apply only to specific geographic areas of the Misquamicut and Matunuck headlands along Rhode Island’s south coast. Most of the Rhode Island shoreline is covered under the Shoreline Change SAMP area. The Shoreline Change SAMP details preference for non-structural living shoreline

approaches. The application process outlined in the Shoreline SAMP encourages applicants to consider the level of exposure of the proposed project site to coastal hazards including projected sea level rise, storm surge inundation, wave impacts, and erosion. Applicants are also expected to examine the potential for expansion of the floodplain within the Shoreline Change SAMP Planning Boundary.

### Relevant Resources and Guidance

- Rhode Island Coastal Resources Management Council. [Rhode Island Shoreline Change Special Area Management Plan](#). 2018.
- The University of Rhode Island Coastal Resources Center/Rhode Island Sea Grant- Rhode Island Coastal Resources Council. [Rhode Island Coastal Property Guide: What Coastal Property Owners, Renters, Builders And Buyers Should Know About Rhode Island’s Shoreline](#). 2014.
- Rhode Island State Conservation Committee. [Rhode Island Soil Erosion and Sediment Control Handbook](#). 2016.

*Rhode Island’s Shoreline Change Special Area Management Plan was designed as a planning and guidance document for State and local decision makers to assist with adapting to the impacts of coastal storms, erosion, and sea level rise.*

## SOUTH CAROLINA



The South Carolina coast is an ecologically rich network of barrier and sea islands, beaches, estuarine wetlands, and coastal uplands, encompassing a transition zone from the broad sandy beaches and robust dune systems that characterize the North Carolina coast to the barrier islands, tidal creeks, and expansive wetlands that extend southward into Georgia. In all, the state boasts 8,763 miles of coastline, more than half of which is eroding. The region is undergoing rapid economic growth in major manufacturing industries alongside shipping, fisheries, and tourism, driving expanded residential development.

To date, most living shoreline projects in South Carolina have been developed by state agencies or academic institutions, and have qualified for a research

exemption negating the need for a permit. Both all-vegetation and hybrid approaches have been used, with several projects using oyster bags backed by concrete block anchors. There is considerable interest among stakeholders in the advancement of living shoreline use in the state, especially to meet flood hazard mitigation needs at the community and parcel levels. The current priority is to develop state-specific information on permitting processes, construction and maintenance standards, and monitoring protocols.

The Department of Health and Environmental Control - Office of Coastal Resource Management is the lead agency for shoreline projects in the Critical Area, which is a subset of the coastal zone including coastal waters, tidelands, beaches and the beach/dune system. Projects in the Critical Area must obtain a Direct Permit (or Critical Area Permit), which sets design standards

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
No	No	Work underway by a living shorelines working group to develop a regulatory definition and standards for projects	No	Hard armoring is only allowed for stabilization where the natural marsh is inadequate to control erosion	Oyster shell breakwaters, concrete anchors, and native plantings	<ul style="list-style-type: none"> <li>• Department of Health and Environmental Control - Office of Coastal Resource Management (primary)</li> <li>• Office of Environmental Quality</li> <li>• USACE Charleston District</li> </ul>

for erosion control structures. Hard armoring is only allowed for stabilization where there is evidence of erosion occurring and the natural marsh vegetation is not providing an adequate buffer to control erosion.

Department of Health and Environmental Control operates a joint application and public notice process with the Corps. NWP 54 has been denied federal consistency and 401 water quality certification by South Carolina, as Department of Health and Environmental Control has determined to review all projects impacting the Critical Area on an individual basis. Project applicants can still pursue Corps approval under NWP 54, but would need to obtain individual federal consistency concurrence and water quality certification from the state. On the state level, no specialized review process or permit currently exists

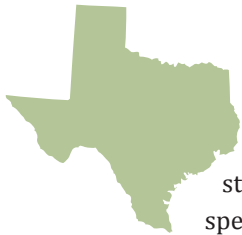
*The Department of Health and Environmental Control Living Shorelines Working Group was convened in 2016 as part of South Carolina's Coastal Zone Management Act - Coastal Zone Enhancement Strategy, and is currently working to develop living shoreline site success criteria as well as a regulatory definition and standards for living shoreline projects.*

for living shorelines, so project proposals are submitted using the same forms as for traditional bulkheads, and proceed through the same site assessment, public notice, and maintenance requirements. However, work is underway by a state Living Shorelines Working Group on developing review standards for living shorelines.

### **Relevant Resources and Guidance**

- South Carolina Department of Health and Environmental Control. [Critical Area Permitting – Overview](#).
- ACE Basin National Estuarine Research Reserve, South Carolina Department of Natural Resources. [Evaluating Living Shorelines to Inform Regulatory Decision-Making in South Carolina](#). 2015-2018.

## TEXAS



With a vast 367 miles of shoreline along the Gulf of Mexico, the Texas Coast serves as an ecological and economic powerhouse for the state and is also home to key wildlife species. The last wild flock of the endangered whooping crane winters in and around San Antonio Bay. Padre Island is the only place in the United States where the Kemp’s Ridley sea turtle regularly nests. The Texas Coast is also home to hundreds of species of birds, particularly during spring migration. The state boasts 3,359 miles of tidal shoreline, and with a booming coastal population, about 20 percent of the shoreline is armored with hard infrastructure.<sup>59</sup> The Texas Gulf Coast has a small tidal range, which averages about 1.4 feet near Padre Island.<sup>60</sup> Much of the Texas Coast has experienced erosion, with long-term rates of shoreline retreat averaging 4.1 feet per year and more than 15 feet per year in some places.<sup>61</sup> Since the 1950s, estuarine wetlands in Texas have decreased by an average of 1,600 acres per year, and Galveston

Bay has lost over 20 percent of its tidal marshes since the 1940s; some areas along the bay side of Galveston Island have seen as much as 80 percent marsh loss, largely due to subsidence and shoreline erosion, making shoreline stabilization a priority in the state.<sup>62</sup>

To authorize a living shoreline in Texas, an applicant can visit the Texas General Land Office (GLO) Permit Service Center (PSC) website. If the project is located in a U.S. Army Corps of Engineers (USACE) jurisdictional waterbody, a USACE permit may be required under provisions of the Clean Water Act and/or the Rivers and Harbors Act. The PSC assists applicants by providing information and guidance, as well as a joint permit application form that incorporates requirements for all agencies, including the USACE, GLO, Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). Texas has approved NWP 54 with regional conditions, so a project may be eligible under this NWP. The USACE Galveston District will determine eligibility. If a project is not eligible

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	No	NWP 54 is approved with conditions	No, but the state’s Coastal Resiliency Master Plan provides a definition	No	Vegetation with structural component (i.e. rip rap, breakwaters, oysters, etc.)	<ul style="list-style-type: none"> <li>• Texas General Land Office (primary)</li> <li>• Texas Commission on Environmental Quality</li> <li>• Texas Parks and Wildlife Department</li> <li>• USACE Galveston District</li> </ul>



for a NWP, the USACE will evaluate the project and forward the permit application to the appropriate state and federal agencies for review as needed. During processing of the permit application, certification from the TCEQ may be required to determine if the project complies with state water quality standards. Since most submerged lands are considered waters of the state (i.e. they are the property of the State of Texas), a landowner may also need authorization from the GLO. The applicant may also require a permit from TPWD to transplant vegetation into state waters, if applicable. In Texas, coastal boundary surveys are required for erosion response projects, including living shoreline projects, per [Texas Natural Resources Code §33.136](#). A coastal boundary survey is completed by a licensed state land surveyor. Depending on the complexity of the project, these surveys may take additional time and funding to complete. More traditional structures, such as bulkheads, constructed on private lands, do not require a coastal boundary survey.

While Texas does not have many permitted living shorelines given its vast coastline, since the passage of the NWP 54, the USACE has permitted four living shoreline projects in Texas under this permitting process. Implementers of living shoreline projects in Texas tend to be nonprofit organizations whose missions focus on the health of local bay systems. The nonprofit community has been very helpful to homeowners by securing funds to offset costs of

coastal boundary surveys. The GLO, through its Coastal Zone Management Program, is in the process of creating a Living Shoreline Manual to educate property owners and the broader public about the benefits and use of living shorelines (e.g., types, permitting process, design, materials, costs, etc.) in order to raise awareness and increase interest in the implementation of living shorelines.

### Relevant Resources and Guidance

- Texas General Land Office. [Permit Service Center](#).
- General Land Office. [Living Shorelines 101](#).
- The General Land Office hosted a series of living shoreline workshops in 2019 to promote the use of living shorelines as an alternative to traditional shoreline stabilization methods. The materials from the workshops are available on the GLO's Permit Service Center website. The GLO is also building a Living Shoreline website that will house reference materials, resources, and a Living Shoreline Site Suitability Tool being developed in partnership with the Harte Research Institute at Texas A&M University – Corpus Christi.
- Climate and Resilience Community of Practice. [Living Shorelines in Gulf Coast States: Texas Resource Catalog](#). 2019.
- Texas General Land Office. [Texas Coastal Resiliency Master Plan](#). 2019.

*The Texas General Land Office has developed the second iteration of the Texas Coastal Resiliency Master Plan, which provides a framework for community, socio-economic, ecological and infrastructure protection from coastal hazards. This plan recommends the state fund several living shoreline projects across the coast.*

## VIRGINIA



Virginia’s coastal zone includes 132 miles of Atlantic Ocean coast and 7,213 miles of Chesapeake Bay and tributary shoreline. Relative sea levels in the

Chesapeake Bay rose one foot in the twentieth century, due to a combination of the rising ocean surface as well as land subsidence. Many coastal communities and habitats in Virginia are situated at low elevations, making them particularly vulnerable to this change in sea level. The vast majority of tidal shoreline in the Commonwealth is privately owned (85 percent), so erosion and land loss efforts rest in the hands of individual landowners. Virginia has over 5,000 miles of coast, much of which continues to be developed and hardened despite some estimates stating that nearly half of the total coastline would be suitable for living shorelines.

Living shorelines permits in Virginia are primarily issued by local Wetlands Boards, which are comprised of appointed citizens tasked with decision-making regarding any activity that may impact tidal wetlands. The Virginia Marine Resources Commission (VMRC) has oversight over any decision made by these local groups, and can overturn or contest permits. The Virginia Institute of Marine Sciences also serves in an advisory capacity regarding tidal wetland permit applications. In 2011, Virginia passed legislation that states a policy preference for the use of living shorelines. Although not implemented through regulatory requirements, Virginia uses tax incentives, low interest loans through Planning District Commissions and Soil and Water Conservation Districts, on-site technical assistance programs through the Shoreline Erosion Advisory Service, and grants to promote their use. Living shoreline projects

Nationwide Permit 54 approved by state?	Other general permit?	Other comments	Official definition of Living Shoreline?	Living Shoreline preferred over hard approach, per state law, regulations, or guidance?	Types of Living Shoreline commonly used	Primary agencies involved in permitting
Yes	Yes, Regional Permit 19	Regional Permit 19, authorizes structural and non-structural erosion control. Regional conditions on NWP 54 make the requirements between both permits the same. The Norfolk District encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines where viable	Yes	Yes, VA Code 28.2-104.1(b) (2014)	Sill with vegetation	<ul style="list-style-type: none"> <li>• Virginia Marine Resources Commission</li> <li>• Virginia Department of Environmental Quality; Local Wetland Boards</li> <li>• Virginia Institute of Marine Sciences</li> <li>• USACE Norfolk District</li> </ul>

supported through one regional loan program, the Middle Peninsula Planning District Commission Living Shoreline Incentive Program, are protected by a vegetation “insurance” program that will assist replacement of plantings destroyed by natural causes while the loan is outstanding. Permitted living shoreline projects are also exempt from local property taxes.

The VMRC has issued a general permit with two sets of standards/procedures for non-structural projects (Group 1) and other projects including those using sills (Group 2). Applicants for shoreline projects use a joint permit application (JPA) that includes review by VMRC, the USACE’s Norfolk District, the Virginia Department of Environmental Quality (VDEQ), and local wetlands boards. The JPA is submitted to VMRC, which forwards it to other agencies for concurrent review. Living shoreline stabilization projects are generally permitted by the Norfolk District through the state’s Regional General Permit 19 (13-RP-19) or Nationwide Permit 54 (NWP54). Regional conditions on NWP 54 make the requirements between both permits the same.

Low impact Group 1 Permits are appropriate for living shorelines that are comprised of primarily natural

materials, constructed in tidal wetlands landward of Mean Low Water, and are located in an area with relatively low fetch (less than 0.5 miles). If approved, Group 1 permits do not require public interest review, notification of adjoining landowners, nor a permit fee. Group 2 Permits apply to a wider range of living shorelines, including those with a more hybrid design (such as sills), and can be constructed in areas with a fetch of up to 1.5 miles. Group 2 Permits do require that adjacent landowners be notified of the project to ensure they have no objection.

### Relevant Resources and Guidance

- Virginia Institute of Marine Sciences (VMRC). [Living Shorelines Information page](#). 2020.
- VMRC, Habitat Management Division. [Permitting](#).
- VMRC, Habitat Management Division. [Group 1 Permit Information](#).
- VMRC, Habitat Management Division. [Group 2 Permit Information](#).
- Virginia Department of Conservation and Recreation. [Shoreline Erosion Advisory Service](#).
- Virginia Association of Soil & Water Conservation Districts. [Living Shorelines Loan Program](#). 2020.

*Permit issuance in the Commonwealth of Virginia is conducted primarily by local Wetlands Boards, comprised of volunteer citizens. Permit applications are reviewed by the citizen Board members, with guidance around living shoreline regulation from the Virginia Marine Resources Commission as well as technical review and scientific insight from the Virginia Institute of Marine Sciences.*

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*Conquest Beach Living Shoreline, MD. Photo: MD DNR/Flickr.*





National Wildlife Federation  
1200 G Street, NW, Suite 900  
Washington, D.C. 20005  
[www.nwf.org](http://www.nwf.org)