Mitigating Shoreline Erosion along New Jersey's Sheltered Coast: Overcoming Regulatory Obstacles to Allow for Living Shorelines

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WHITE PAPER FOR DISCUSSION

"This 'white paper' was prepared with the assistance of CSC Fellow, Leigh Wood for the Coastal Management Office (2009) in response to the 'permitting experience' of the first living shorelines pilot project implemented by the Partnership for the Delaware Estuary. This paper was developed to help the NJDEP and the CMO examine pilot project opportunities that explore the technical and science knowledge necessary to expand the universe of living shorelines projects and to make this knowledge and methodology available to the general public in response to climate adaptation, sea level rise and shoreline erosion. It does not address more recent changes to regulations and policies."

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Overcoming Regulatory Obstacles to Allow for Living Shorelines

The coast is constantly changing as the result of wind, waves, currents, storms, and sea level rise. In turn, developed shorelines are often stabilized with hardened structures, such as seawalls, bulkheads, revetments, rip-rap, gabions, and groins, to protect coastal properties from erosion. While hardened structures typically prove to be beneficial in reducing property damage, the rate of coastal erosion typically increases near stabilization structures, impacting natural habitats, spawning grounds, recreational opportunities, and public access.

To counteract the negative impact of hard structures, alternative forms of shoreline stabilization that provide more natural forms of protection are more readily used. Along the Atlantic coast of New Jersey, beach nourishment and dune restoration are now the main forms of shore protection. In addition, existing groins have been notched to reestablish the flow of sediment to previously sand starved portions of the beach. Many of the shoreline stabilization measures that are currently employed along the beachfront were defined in the New Jersey Shore Protection Master Plan of 1981. Because sheltered coasts, including inlets, bays, backbays and tidal estuaries, are impacted by an array of coastal processes, the Shore Protection Master Plan does not define the best suited shoreline stabilization measures for these areas. Unlike the Atlantic shore, sheltered coasts are often impacted by boat traffic and dredging, in addition to wind, waves, currents, storms, and sea level rise.

The majority of New Jersey's sheltered coastline consists of tidal marshlands and a few narrow, sandy beaches, all of which naturally migrate inland as sea level rises. Many experts contend that marshes can keep pace with a 2.5 millimeter rate of sea level rise[1], but New Jersey's current rate of sea level rise is approximately 3 to 4 millimeters per year[2], a rate that is expected to continue to increase. Tidal wetlands can no longer migrate at a simultaneous rate with the sea because coastal development, shore protection structures, and changes in sedimentation interfere with the dynamic equilibrium of the shore. Currently, bulkheads and revetments are the primary form of shore protection along these tidal areas. Because shoreline stabilization measures on sheltered coasts are evaluated as individual permits, application approval does not account for cumulative and secondary impacts of their installation, like increased erosion or impacts on fisheries. Unfortunately, as sea level rises and coastal storms increase in intensity, coastal erosion and the requests for additional bulkheads, revetments, and other hard stabilization structures are likely to increase. The addition of new erosion control structures inhibit the natural environment from adapting to climatic changes, leading to habitat loss for threatened and endangered species, the depletion of spawning grounds and natural flood protection, and the loss of carbon sequestering tidal vegetation.

There are a number of shoreline protection measures that can be implemented to not only protect coastal properties but also restore and create coastal wetlands. The National Oceanic and Atmospheric Administration (NOAA), the US Department of Agriculture (USDA), and the National Academy of Sciences favor shore protection measures that do not impede the natural processes of the dynamic coast. The National Academy of Sciences calls for a new shoreline management approach that "takes into

[1] Malmquist, D. (2009). *Study Reveals Threat to Tidal Wetlands*. From Virginia Institute of Marine Science. College of William and Mary. http://www.vims.edu/newsandevents/topstories/wetland_threat.php

[2] NOAA. (2008). *Mean Sea Level Trends for Stations in New Jersey*. Tides and Currents. http://tidesandcurrents.noaa.gov/sltrends/sltrends_states.shtml?region=nj

account all available erosion prevention alternatives and their attendant costs, benefits, and impacts. The regulatory preference for permitting bulkheads and similar structures should be changed to favor more ecologically beneficial solutions."[3]

Living Shorelines

In order to combat coastal erosion and wetland loss along sheltered coasts, Maryland, Virginia, North Carolina, Florida, and many other states are mitigating the problem through the creation of *living shorelines.* "This technique was coined with the term "Living Shorelines" because it provides "living space" for riverine, estuarine, and coastal organisms, which is accomplished via the strategic placement of native vegetation, sand fill, organic materials, and, if necessary, a small amount of reinforcing rock seeded with oysters."[4] There are numerous ways to define living shorelines, ranging from purely natural, biodegradable erosion control measures to hybrid solutions that include a combination of natural and structural stabilization. The following are some of the various definitions being used by other states and organizations:

Maryland Department of Natural Resources
"Living shorelines involve using non-structural stabilization measure. Living shorelines provide erosion control benefits while also enhancing natural shoreline habitat, sequestering carbon, and improving water quality. They often allow for natural coastal processes to remain through the strategic placement of plants, stone, sand fill, and other structural and organic materials."[5]

William and Mary, Center for Coastal Resources Management
A **"***Living Shoreline Treatment***"** is a shoreline management practice that addresses erosion by providing for long-term protection, restoration or enhancement of vegetated shoreline habitats. This is accomplished through the strategic placement of plants, stone, sand fill and other structural and organic materials. Living Shoreline Treatments do not include structures that **sever** natural processes & connections between riparian, intertidal and aquatic areas such as tidal exchange, sediment movement, plant community transitions & groundwater flow.[6]

Chesapeake Bay Foundation
A living shoreline is a natural system for shoreline stabilization that involves buffering rivers and streams with native grasses, shrubs, and wildflowers, which hold soil in place and absorb harmful nutrients. Biologs - rolls of natural fiber that slowly biodegrade as plant roots develop in their place - stabilize steeper slopes and filter runoff before it enters the waterway.[7]

Benefits

The reestablishment of vegetation stabilizes the shoreline by increasing soil deposition, decreasing the impact of waves and boat wakes, and altering the flow of water away from the bank.[8] By stabilizing,

[3] The National Academies. (2006). *A Report in Brief.* Mitigating Shore Erosion on Sheltered Coasts. http://dels.nas.edu/dels/rpt_briefs/shore_erosion_final.pdf
[4] NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm
[5] Maryland Department of Natural Resources. *Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change. Phase 1: Sea-Level Rise and Coastal Storms.* Report of the Maryland Commission on Climate Change Adaptation and Response Working Group.
[6] William and Mary. Center for Coastal Resources Management. http://ccrm.vims.edu/livingshorelines/
[7] Chesapeake Bay Foundation. Living Shoreline at Salisbury City Park. http://www.cbf.org/Document.Doc?id=252

[8] US Department of Agriculture (USDA). Chapter 16: Streambank and Shoreline Protection. National Engineering Handbook. Part 650. Engineering Field Handbook. 210-VI-EFH, December 1996.

enhancing, and restoring the shoreline, there are numerous benefits for property owners and for the environment, including:

- Trapping and retaining land runoff containing nutrients and pollutants.
- Providing flood protection for adjacent and upland properties.
- Can be less costly than structural stabilization (e.g., bulkheads and seawalls) when implemented in low-energy environments.
- Providing aesthetic value, enhanced views, a sense of place, and privacy to the property owner.
- Preserving, creating, or maintaining habitat for aquatic flora and fauna.
- Restoring critical feeding and nursery habitat for adult and juvenile fish.
- Providing wildlife access to the shoreline for nesting species of birds and terrapins.
- Increasing carbon sequestering marshland vegetation. [9]

The installation of living shorelines support numerous goals and supplemental policies of the New Jersey Coastal Management Program, including:

- Healthy coastal ecosystems
  - Protect, enhance and restore coastal habitats and their living resources to promote biodiversity, water quality, aesthetics, recreation and healthy ecosystems;
  - Manage coastal activities to protect natural resources and the environment;
- Effective management of ocean and estuarine resources
  - Develop and implement management measures to attain sustainable recreational and commercial fisheries;
- Coastal open space
  - Preserve, enhance and restore open space including natural, scenic, historic and ecologically important landscapes that:
    - Protect valuable wildlife and plant habitats and ecosystem health, foster aesthetic and cultural values;
    - Minimize natural hazards;
    - Abate impacts of nonpoint sources of pollution
- Safe, healthy and well-planned coastal communities and regions.
  - Manage coastal activities and foster well-planned communities and regions that:
    - Minimize the threat of natural hazards to life and property;
    - Protect the natural environment. (New Jersey CZM, 7:7E-1.1)

According to the National Research Council, marshes and mangroves provide the greatest overall benefit for humans and wildlife. The following is a summary of ecosystem services provided by natural ecosystems as well as by commonly used techniques to mitigate shoreline erosion:

[9] Adapted from: NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm

Ecosystem Services	Natural Coastal Ecosystems							Techniques to Mitigate Shoreline Erosion					
								Harden shoreline		Trap or add sand			Plant it
	Sandy beaches	Sand dunes	Mudflats (microalgae)	Marshes and mangroves	Seagrasses and macroalgae	Bluffs		Bulkheads and seawalls	Revetments	Groins	Breakwaters and sills	Beach nourishment	Marsh/mangrove planting
Habitat *fishes*	○	○	⊙	●	●	○		○	⊙	○	●	⊙	●
mollusks	●	○	●	●	●	○		⊙	⊙	⊙	⊙	⊙	●
crustaceans	⊙	○	⊙	●	●	○		–	○	○	○	○	●
turtles	●	⊙	–	○	⊙	○		–	–	–	–		○
birds	⊙	●	●	●	○	●		–				⊙	●
Nutrient uptake/cycle	⊙	○	⊙	●	●	○		○	○	○	○	○	●
Food production	○	○	⊙	●	●	⊙		○	○	○	○	○	●
Wave attenuation	⊙	●	○	⊙	⊙	●		○	⊙	⊙	●	○	⊙
Sediment stabilization	–	●	⊙	●	●	–				⊙	●		●
Gas regulation	○	–	○	●	●	–		–	–	–	–	–	●
Biodiversity	⊙	●	⊙	●	●	●		○	○	○	○	○	●
Recreation	●	●	○	●	●	⊙		⊙	○	⊙	⊙	●	●
Raw materials	●	●	○	●	●	●		○	○	○	○	○	●
Aesthetic value	●	●	⊙	●	●	●		–	–	–	–	●	●

NOTES: The darker symbol (●) represents the highest degree of contribution for the ecosystem service listed while the lighter symbol (○) represents a low contribution. The ⊙ symbol represents an intermediate contribution and a dash (–) suggests that the ecosystem service in not relevant or nonexistent. Please note that the ecosystem services assigned to techniques to mitigate shoreline erosion are best estimates. Extensive research is still needed to determine the ecosystem services provided by these techniques.

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Living Shoreline Design

Living shorelines are typically used in low to medium energy shorelines, which makes them ideal to use along New Jersey's sheltered coast. Living shorelines refers to a suit of natural shoreline stabilization options, all of which include the transplant of marsh grasses to reestablish a vegetative cover. "Vegetation can be used to control shore erosion by planting appropriate grasses into the existing tidal and subtidal substrate. This strategy is generally limited to sites with very limited fetch. At sites with a larger fetch

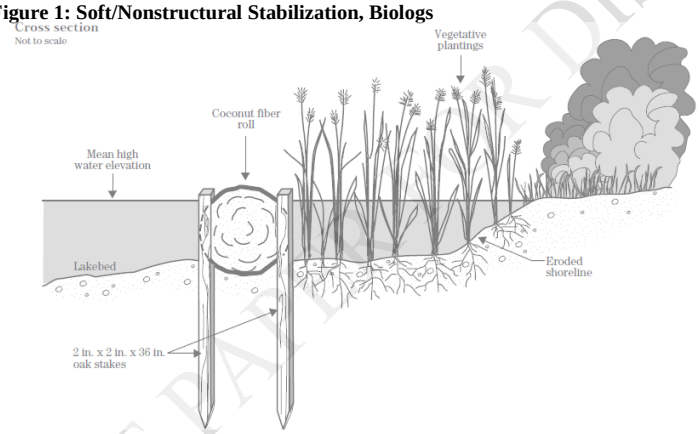
[10] National Research Council of the National Academies. (2007). Mitigating Shore Erosion Along Sheltered Coasts. National Academies Press: Washington, DC. p.98

(over roughly .8 km, about .5 mi), creation of a marsh fringe will require the addition of elements such as sand fill (to provide a better substrate or planting terrace) with or without some type of sill to attenuate wave action."[11] In medium energy systems, the installation of breakwaters in addition to planting native marsh grasses may be necessary. Determining the ideal type or combination of shoreline stabilization "can be determined via an analysis of the nature of the erosion problem, site characteristics (including location, elevation, wave energy, fetch, frequency of storms, prevailing wind and wave direction, presence of vegetation, runoff, and recreational use), costs and availability of building materials, and construction alternatives available."[12]

Soft/Nonstructural Stabilization

Soft/nonstructural stabilization is typically implemented in low-energy creek, tributary, riverine, and estuarine environments to restore habitat without the use of hard structures. Materials used for soft/nonstructural stabilization include natural vegetation, submerged aquatic vegetation (SAV), sand fill, and biodegradable organic materials such as natural fiber logs (bio-logs) and organic matting. Soft/nonstructural stabilization creates a natural buffer to protect the shoreline from erosion; traps sediment and allows for increased vegetation; preserves or creates habitat for benthic, estuarine, shallow water, and intertidal organisms; and maintains natural habitat features and shoreline dynamics. [13]

Figure 1: Soft/Nonstructural Stabilization, Biologs



[14]

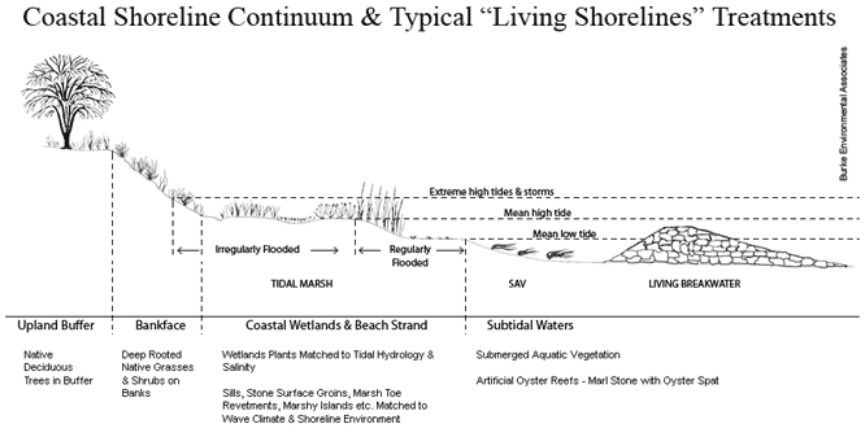
Hybrid Stabilization

Hybrid stabilization is typically implemented in medium-energy riverine, estuarine, and coastal environments to restore habitat with the assistance of some hardened structures. This method of stabilization involves the use of a minimal amount of rock to anchor soft/nonstructural materials in place, thus ensuring that project goals are met and habitat is restored for aquatic organisms. Hybrid materials include natural vegetation, SAV, sand fill, biodegradable organic materials, and low-profile rock structures such as segmented sills, stone containment groins, and living breakwaters seeded with oyster spat. Hybrid stabilization restores and protects shoreline habitat,

[11] National Research Council of the National Academies. (2007). Mitigating Shore Erosion Along Sheltered Coasts. National Academies Press: Washington, DC. p.46
[12] NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm
[13] Same as above
[14] USDA Engineering Field Handbook, Streambank and Shoreline Protection

maintains natural sand movement and tidal water exchange, and facilitates the movement of estuarine species into critical wetland habitat. Living Shorelines projects do not include projects that only use hard/structural stabilization methods.[15]

Figure 2: Hybrid Stabilization, Breakwater

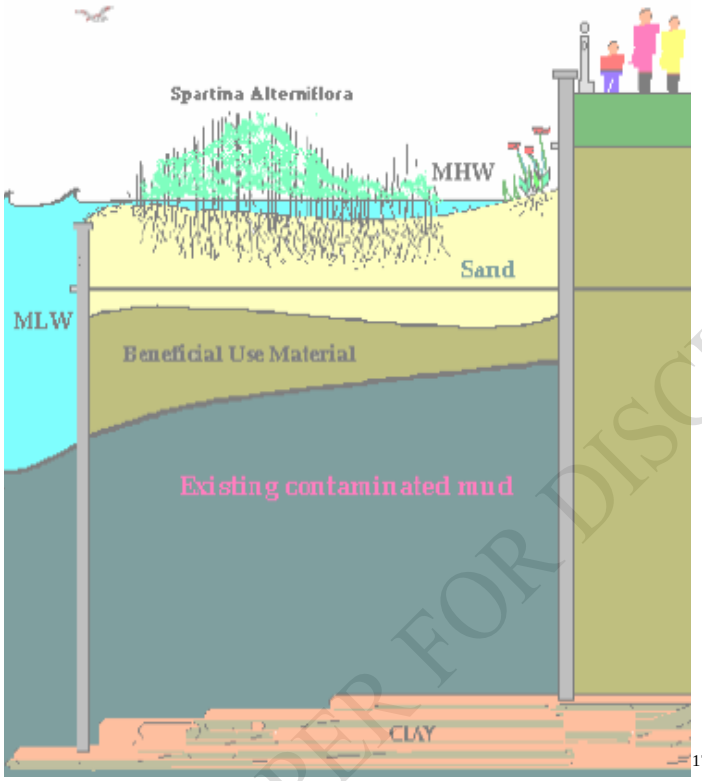


Evolving Shoreline Stabilization Technology

Bionautics, Inc of Staten Island, NY has patented the "Bulking & Tiering Wetland System", which is a shoreline stabilization and remediation option for troubled waterways, including contaminated marshlands and heavily dredged waterways. It includes the installation on an upland bulkhead and a submerged bulkhead that are divided by new fill and marshland vegetation. This technique works to improve water quality by reducing the influx of polluted runoff, discharge, and contaminated soils. It also has the ability to reintroduce habitat where existing bulkheads have resulted in the loss of critical habitat. Bulking and tiering has been proposed for portions of the Passaic River in North Jersey.[16] Because there are few options for the inclusion of living shorelines in developed regions of the shore, bulking and tiering may prove to be a viable option.

[15] NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm
[16] Lerin, Paul. (2001). Bulking & Tiering Wetland System. Presentation to Harbor Heron Committee. http://www.harborestuary.org/reports/harborheron/Presentations/121108/Lerin_Tiering_Wetland_System.pdf

Figure 3: Bulking and Tiering Option



[17]

For more living shoreline options, see Appendix I.

Site Considerations

[17] Lerin, Paul. (2001). Bulking & Tiering Wetland System. Presentation to Harbor Heron Committee. http://www.harborestuary.org/reports/harborheron/Presentations/121108/Lerin_Tiering_Wetland_System.pdf

When determining the types of living shoreline options are viable for a specific location, many factors must be taken into consideration. NOAA suggests that the "bank erosion rate, bank elevation, bathymetry, fetch, wave energy, prevailing wind and wave direction, vegetation presence, and soil type" be evaluated before determining the type of shore protection to be installed.[18] Additionally, the USDA Engineering Field Handbook on shoreline stabilization indicates that the shoreline stabilization option take into account existing and future land use, projected shoreline change, and former shoreline stability problems, modifications and treatments. The option should also consider the needs of the entire watershed, including the "surrounding wetlands, the riparian corridor, terrestrial habitat, aquatic habitat, water quality, and aesthetics." The Engineering Field Handbook indicates that it is more effective to prevent the decline of a healthy system than rehabilitate a highly degraded system.[19] .

Ideal locations for the placement of living shorelines include:

- Bank erosion caused by storm waves instead of regular tidal action;
- Low, cleared banks where a riparian can be restored;
- Tidal marshland with an eroding edge;
- Failed bulkheads on tidal creeks where there is tidal marsh;
- Failed or under-sized revetments with existing tidal marsh;
- Sandy banks that can be graded. [20]

Figure 4: Low-energy systems and failed shore protection structures

[21]

Living shorelines are best located along low-energy, tidal creeks and tributaries, while hybrid living shoreline options are best suited for medium-energy systems, such as bays. Adapting shoreline

[18] NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm
[19] US Department of Agriculture (USDA). Chapter 16: Streambank and Shoreline Protection. National Engineering Handbook. Part 650. Engineering Field Handbook. 210-VI-EFH, December 1996.
[20] Same as above.

[21] Virginia Institute of Marine Science: Center for Coastal Resource Management. *Education: Living Shoreline Design- A Class for Marine Contractors. Module 2: Understanding and Predicting Site Suitability.* College of William and Mary. http://ccrm.vims.edu/education/ls_design_class/index.html

stabilization measures where there is a failed bulkhead or revetment is a prime opportunity to introduce more natural protection options. While living shorelines work in low to medium energy systems, they should generally be avoided along the open ocean, in areas where upland development is close to the shoreline; and where there is extensive upland bank erosion.
The Chesapeake Bay Foundation developed a matrix to determine which shoreline stabilizations solutions work under varying conditions.

WHICH PROJECT IS RIGHT FOR MY SITE?
(source: MD Department of Natural Resources)

Site Conditions	Low Energy (Nonstructural)	Medium Energy (Hybrid)		High Energy (Structural)
Shoreline Location	creek or cove	minor river	major tributary	mainstem Bay
Water Depth (ft/near shore)	-1.0	-1.0 to -2.0	2.0 to -4.0	-4.0 to -15.0
Fetch (mi/distance to nearest opposite shore)	0.5	1.0 to 1.5	2.0 or more	2.0 or more
Erosion Rate (ft/yr)	2 or less	2 to 4	4 to 8	8 to 20
Erosion Control Treatment Options	Nonstructural projects	Hybrid Project		Structural Projects
	beach replenishment	marsh fringe w/groins		bulkheads
	marsh fringe	marsh fringe w/sills		revetments
	marshy islands	marsh fringe w/breakwaters		stone reinforcing
	biologs, groins	beach replenishment w/breakwaters		groins and jetties
Cost per foot	$50–100	$150-300	$350–500	$500–1,200

From: Living Shorelines for the Chesapeake Bay Watershed, Chesapeake Bay Foundation

Best Management Practices
In Maryland, if there is a presumed erosion control problem, it can be reported and an inspector from the state will visit the site to determine what the best form of protection would be. Maryland indicates their preference of shoreline erosion measures, from no action or structural relocation to non-structural engineering/living shorelines to the least favorable as structural engineering. In some cases, non-structural/living shorelines are considered impractical. Maryland mapped these areas to help property owners deduce where other shoreline protection measures may be more suitable:

(a) Areas that lack an adjacent natural shoreline;
(b) Proximity to navigation channels, where a nonstructural practice may impede passage of vessels;
(c) High energy shoreline-----severely eroding shorelines where nonstructural methods are impractical;

(d) Inaccessible shoreline-----landform characteristics such as very steep, high banks, and nearshore shallow water that prohibits both land or barge access necessary for the transportation of construction materials to the site; and
(e) Commercial vessel berthing-----commercial water-dependent facilities when loading and unloading operations require a bulkheaded shoreline.[22]

If a structural engineering measure is proposed for an area outside of these designated locations, the applicant must demonstrate the following constraints for the site:

(f) Presence of channel width inadequate to support a nonstructural shoreline stabilization measure;
(g) Adverse impacts on tidal flushing of waterway from establishment of a nonstructural shoreline stabilization measure;
(h) Adverse impacts on navigation;
(i) Lack of suitable bottom elevation and slope at mean low water for sustaining a nonstructural shoreline stabilization measure, as measured in the field;
(j) Severe tides and wave action;
(k) Bank elevation and orientation that would prevent grading and successful establishment of vegetation;
(l) Other physical constraints to successful establishment of a nonstructural shoreline stabilization measure; or
(m) Other environmental factors or benefits that would be adversely affected by the proposed nonstructural shoreline stabilization practice[23].

Once a living shoreline is defined as a restoration or shore protection option, site design specifics can then be determined, including the need for grading, biologs, vegetation type, and placement. Once the appropriate permits are obtained, site preparation can begin. The site should be cleared of debris and unstable trees, and failing seawalls and bulkheads should be removed or naturalized. Steep banks should be re-graded to provide an elevation gradient for wave dissipation, and runoff issues should be identified and addressed prior to the installation of the living shoreline.[24]

New Jersey Initiatives

There are multiple non-profit organizations that are enhancing and improving New Jersey's tidal waterways, including, but not limited to, the Partnership for the Delaware Estuary, the Barnegat Bay National Estuary Program, and the American Littoral Society. The EPA's National Estuary Programs, including the Partnership for the Delaware Estuary (PDE) and the Barnegat Bay National Estuary Program (BBNEP), developed to address threats to nationally significant estuaries in the United States.

[22] Maryland Department of the Environment. Water Management Administration. (2008). Shore Erosion Control Guidelines for Waterfront Property Owners. 2nd ed.
[23] Same as above.
[24] NOAA. Restoration Portal: Living Shorelines. https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab1.cfm

The EPA has charged these programs to address threats to the nation's estuaries, simultaneously protecting water quality and wildlife. PDE and BBNEP are also part of the EPA's Climate Ready Estuaries Program (CRE). As part of the CRE, the PDE and the BBNEP are working to "1) assess climate change vulnerabilities, 2) develop and implement adaptation strategies, 3) engage and educate stakeholders, and 4) share the lessons learned with other coastal managers."[25] Both the PDE and the BBNEP work to enhance and restore tidal marshlands, which includes the installation of living shorelines. The PDE has taken a strong lead in restoring the Delaware Bay. Their pilot living shoreline project has been slowed down by the NJDEP permitting process. Not only are their multiple general permits that apply to the installation of living shorelines, a permit from the Army Corps of Engineers is also necessary. Depending on the timeframe in which applications are submitted and approved, it is possible that projects may be delayed because ideal planting and transplanting seasons may have passed. Because the PDE, BBNEP, and the American Littoral Society have all made the creation of living shorelines a strategic priority of their organizations, many more projects will need permitting approval. Providing a clear permitting process is vital to the success of these projects, all of which support water quality improvements, habitat restoration and creation, and shore protection.

Figure 5: PDE Living Shoreline Project
[26]

Living Shoreline Planning

The National Research Council (NRC) indicates that current permitting systems provide a reactive approach to address erosion along sheltered coasts. Additionally, "current legal and regulatory framework discriminates against innovative solutions because of the complex and lengthy permitting process that almost always considers these options on a case-by-case basis."[27] The NRC advocates the creation of shoreline management plans so that shore protection holistically addresses erosion and wildlife

[25] US Environmental Protection Agency (EPA). Climate Ready Estuaries. http://www.epa.gov/cre/
[26] Partnership for the Delaware Estuary (PDE). Living Shorelines. http://www.delawareestuary.org/science_projects_living_shoreline.asp
[27] National Research Council of the National Academies. (2007). Mitigating Shore Erosion Along Sheltered Coasts. National Academies Press: Washington, DC. p.130

management in a comprehensive manner. A shoreline management plan would have the ability to guide permitting officials on where living shorelines are best suited. While projects would still need to be approved on an individual basis, a plan could effectively expedite the approval process.

New Jersey's Shore Protection Master Plan currently only addresses shore protection measures along the oceanfront reaches of the New Jersey coastline. While the plan does support low-cost structural and nonstructural techniques for bays, backbays, and tributary waterways, it also indicates states that projects should be addressed on a case-by-case basis because of their individual complexities. And permit applications should be evaluated based off of "State coastal management policies and objectives as well as their economic feasibility."[28] Because the Shore Protection Master Plan was designed to guide the protection of developed portions of the shore, it may not suggest the best forms of shoreline stabilizations for natural reaches of the coast.

Planning Needs

In order to effectively design a plan for living shorelines or to update the New Jersey Shore Protection Master Plan, multiple types of data will need to be collected and analyzed. The location of shore protection structures needs to be updated to include projects since 1996 and the location of living shoreline projects. It may also be helpful to survey the conditions of bulkheads and revetments to identify where replacement may be necessary. Additionally, long-term erosion rates for beachfront and tidal areas needs to be updated. Typically, erosion rate information has only been gathered for beachfront areas. In order to gather this information, assistance from Coastal Engineering may be necessary.

Accelerated sea-level rise should also be considered when determining where to approve living shoreline projects or where to invest state dollars for such measures. The NJ Coastal Management Office would need additional time to determine what areas may be vulnerable to sea level rise and increased erosion rates. Such an analysis for the entire CAFRA area could not be completed until LiDAR, high quality elevation data, is acquired.

Living Shoreline Permitting

Living shorelines should be considered under the following situations:

- The request for a bulkhead general permit
- The request to replace a damaged bulkhead
- The request for any shoreline stabilization permit
- The protection of an open reach of natural shoreline

Unfortunately, New Jersey's general permits do not easily allow for the installation of living shorelines. Currently, there is no guidance on which general permit(s) are necessary for the approval of a project. Additionally, if fill or any alteration to a wetland is necessary, a permit from the Army Corps of Engineers

[28] New Jersey Shore Protection Master Plan. (1981). II-66

is required. Is there a joint application available between New Jersey and the Army Corps? Additionally, is there a size requirement to trigger the need for an Army Corps permit?

In order to support the installation of more natural shore protection measures and simultaneously restore habitat, New Jersey's existing Rules and General Permits should be adjusted. A clear definition of living shorelines should be provided within the Coastal Permit Program Rules. This definition should differentiate between soft/nonstructural and hybrid living shorelines. There are three existing permits that may be altered to advocate the use of living shorelines as a shore protection or habitat restoration option.

7:7-7.18 Coastal General Permit for bulkhead construction and placement of associated fill
Currently, if a bulkhead is damaged, a permit is not necessary to replace it. This makes it easier for the landowner to replace it or repair the existing bulkhead with yet another bulkhead. In some cases, it may be feasible to install a living shoreline in the place of a new bulkhead or the failing bulkhead. Installing a living shoreline in front of a new bulkhead may also be an option, whether it is through bulking and tiering or by grading the submerged substrate to accommodate vegetation. See Appendix II for additional notes.

7:7-7.21 Coastal General Permit for the stabilization of eroded shorelines
Presently, it is designed to allow for the installation of natural stabilization measures, but it appears to be most applicable to restore beaches. It does not allow for wetlands to be disturbed, nor does it allow for grading below the spring high water line. The installation of most living shoreline options along sheltered coasts will result in some minimal wetland disturbance, but this disturbance will be mitigated through the accrued benefits. Additionally, many projects will require fill to grade the submerged profile and attenuate wave action. While this permit allows for soft/nonstructural living shorelines, it does not allow for hybrid living shorelines. In order to allow for the installation of living shorelines along tidal reaches, it may be necessary to create a permit similar to 7:7-7.21 that allows for wetland disturbance, pending the approval of the Army Corps of Engineers. A new permit could also provide options for hybrid solutions. 7:7-7.21 could be retained as a general permit for the stabilization of eroded, beachfront shores. See Appendix II for additional notes.

7:7-7.29 Coastal General Permit for habitat creation and enhancement activities
Permit 7:7-7.29 is restricted for projects that are solely for the creation of habitat as part of a habitat creation and enhancement plan. It does not permit projects with dual purposes, such as shore protection and habitat creation, even though existing research and literature indicates that both can occur simultaneously. Because most non-profit organizations, like the National Estuary Programs or the American Littoral Society, are more inclined to create living shorelines for the sake of habitat restoration, it may be in the best interest of the organizations or a state agency to provide a wildlife management/enhancement plan to serve as a guide. Otherwise, it may be more effective to direct them to a new general permit for the stabilization of eroded tidal reaches. See Appendix II for additional notes.

Permitting Considerations
Monitoring: Upon the adaptation of an existing permit or the creation of a new permit, it should incorporate monitoring into the application. The State should have some way of monitoring the success of approved living shoreline projects.

Incentives: Is there a way to provide incentives to use soft/natural stabilization measures, such as decreasing permitting fees or providing tax credits? If living shorelines are installed on state property with state funds for the purpose of research, should they be charged permitting fees? Considering that it is already more difficult to receive a permit for a living shoreline, it should be incentivized to avoid the installation of additional hard stabilization structures.

Appendix 1: Description of Living Shoreline Types, NOAA Restoration Portal
https://habitat.noaa.gov/restorationtechniques/public/shoreline_tab2.cfm

1. Upland Buffer / Bankface Zones

Sand Fill, Clean Dredge Material, and Shoreline Regrading

Sand fill and clean dredge material is typically used at Living Shoreline sites to create a gentle bank slope that dissipates wave energy and provides substrate on which to plant seagrasses and marsh and riparian vegetation. Sites without a bulkhead can be regraded, filled, and replanted with native vegetation. Bulkheads can be removed and the shoreline then regraded, filled, and replanted. Another option is to leave the structure in place, add sand fill in front of the bulkhead, and then regrade and replant the shoreline and embankment with native vegetation.

Pre-construction site with bulkhead and minimal aquatic habitat. Photo: Rich Takacs, NOAA Restoration Center

Bulkhead removal, shoreline regrading, and filling process. Photo: Rich Takacs, NOAA Restoration Center

Completed site: post- bulkhead removal, shore regrading, and replanting. Photo: Rich Takacs, NOAA Restoration Center

Upland Riparian Buffer Creation

Native deciduous trees, shrubs, and grasses stabilize the riparian zone above high tide by providing a root mass that minimizes bank erosion while filtering sediment and nutrients from upland runoff and providing wildlife habitat for terrestrial species. Common riparian vegetation used at each site differs depending on the species native to that area, but typically includes a combination of native woody trees, shrubs, and grasses, including bayberry (*Myrica pensylanica*), wax myrtle (*Myrica cerifera*), switchgrass (*Panicum virgatum*), and broomsedge (*Andropogon virginicus*).

Upland riparian vegetation with natural fiber log and marsh grass vegetation. Photo: Rich Takacs, NOAA Restoration Center

2. Coastal Wetlands and Beach Strand Zone

Coastal Wetlands Vegetation Planting

Marsh grasses dissipate wave energy, filter sediment and nutrients from upland runoff, and improve wildlife habitat for terrestrial and aquatic species. Native grasses are planted in the water and at the mean high tide mark in the intertidal zone in low- to medium-energy environments. Marsh grasses may be more successful if they are planted in the spring in areas where there is evidence of existing marsh, where there is less than 3 miles of open water, and where the prevailing winds will not cause destruction of the newly planted grasses. Typical marsh vegetation used in the intertidal zone of the Atlantic coast include marsh hibiscus (*Hibiscus moscheutos*), groundsel tree (*Baccharis halmifolia*), high tide bush (*Iva frutescens*), salt marsh hay (*Spartina patens*), stout bulrush (*Scirpus robustus*), common three-square (*Scirpus pungens*), and smooth cordgrass (*Spartina alterniflora*).

Wetland grass planting at a Living Shorelines site. Photo: Rich Takacs, NOAA Restoration Center

Mangrove Restoration

Mangroves are woody plant communities that play an important role in stabilizing the shoreline. Through their extensive root system, mangroves trap sediment and nutrients and dissipate wave energy. Mangroves are found in estuarine tropical and subtropical environments and could significantly decrease coastal erosion if used at Living Shoreline sites. These plant communities typically grow in the Caribbean, southern Florida, and portions of south Louisiana, and include red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), and white mangrove (*Laguncularia racemosa*). The black mangrove appears to be more suited for use at Living Shoreline sites throughout Florida because it can withstand colder temperatures. This species also develops a subsurface root system faster than the red and white varieties, thereby stabilizing the shoreline quicker than other mangrove species.

Mangrove vegetation in tropical environments. Photo: National Oceanic and Atmospheric Administration

Natural Fiber Log (Bio-log) Installation

Natural fiber logs made of biodegradable coir (coconut) fiber and netting are commonly used to stabilize slopes and minimize bank erosion. Bio-logs blend into the natural environment and effectively trap and retain sediment, retain moisture for plant growth, and provide bank stability while new vegetation takes root and increases in density. Natural fiber logs are placed at the foot of bank slopes or in the water, molded to fit the bank line, and then anchored in place by wooden stakes or a rock footer. Bio-logs can be planted with marsh grasses to promote the establishment of vegetation along the shoreline, thus providing additional bank stabilization through growth of fibrous root systems.

Natural fiber logs, pre-installation. Photo credit: Rich Takacs, NOAA Restoration Center

Natural fiber logs, post-installation. Photo credit: Rich Takacs, NOAA Restoration Center

Natural Fiber Matting Installation
Natural fiber matting is made of coir fiber, wood, straw, jute, or a combination of organic, biodegradable materials. Organic matting used at Living Shoreline sites is laid over eroding steep slopes or coastal areas to minimize the loss of sediment from the land and trap wave-transported sediment. Organic matting can be planted with marsh grasses or riparian vegetation to enhance shore stabilization, which collectively facilitates nutrient and sediment removal from the ecosystem.

Natural fiber matting. Photo: Rich Takacs, NOAA Restoration Center

Rock Footer Placement
A rock footer is a small amount of rock or boulder material used to anchor and support bio-logs and stabilize the restored shoreline. The rock footer supports the structural integrity of the bio-log and prevents it from sloughing off into deeper waters of the bank slope.

Low-Crested Segmented Rock Sill Stabilization
Low-crested segmented rock sills are freestanding rock structures placed in the water parallel to shore to dissipate wave energy, thereby protecting actively eroding marshes and shorelines. Sills generally stand no more than 6 to 12 inches above mean high water, which allow boat and wind-induced waves to pass over the sill structure and provide an opportunity for natural processes to occur shoreward of the sill. Sills used at Living Shoreline sites are segmented to provide wildlife such as fish, crabs, and wading birds access to both the water and the shoreline habitat. Low-crested segmented rock sills typically are used to protect newly planted marsh grasses from wave action in medium-energy environments, thereby providing wetlands benefits in the long run.

Natural fiber log held in place by a rock footer. Photo: Chesapeake Bay Foundation

Post-construction segmented rock sill. Photo: Rich Takacs, NOAA Restoration Center

Low-crested segmented rock sill with marsh grasses. Photo: Alison Ward-Maksym, NOAA Restoration Center

Offshore segmented living breakwaters. Photo: Rich Takacs, NOAA Restoration Center

Living Breakwater Construction
Living breakwaters are structures placed parallel to the shore in medium- to high-energy open-water environments for the purpose of dissipating wave energy while providing habitat and erosion control benefits to an ecosystem. These breakwaters are constructed of marl limestone, granite, or rock that is seeded with oyster spat. Living breakwaters often create quiescent areas between the breakwaters and the shoreline, which can be replanted with SAV and marsh grasses to create intertidal and marsh habitat for aquatic organisms.

Oyster reef material taken from a Living Shoreline breakwater constructed from rubble and recycled concrete. Photo credit: Rich Takacs, NOAA Restoration Center

Rubble and Recycled Concrete Breakwater Construction
Rubble and recycled concrete can be used at Living Shoreline sites as material for offshore breakwaters to reduce wave energy. To provide maximum benefit to the ecosystem, these rubble and concrete breakwaters should be seeded with oyster spat to provide water quality and habitat benefits while reducing wave energy.

Sediment-Filled Geotextile Material Tube Installation
Sediment-filled geotextile material tubes are placed parallel to shore to dissipate waves in high-energy environments. These sediment-filled tubes measure approximately 12 feet in diameter, create new avenues for dredge material disposal, and produce a hard substrate with vertical relief on which the eastern oyster (*Crassostrea virginica*) can construct reefs.

Sediment-filled geotextile tube in background. Photo credit: Alison Ward-Maksym, NOAA Restoration Center

Filter fabric beneath rock footer. Photo credit: Alison Ward-Maksym, NOAA Restoration Center

Filter Fabric Placement
Filter fabric is a porous layer of geotextile material placed beneath rock sills and breakwaters to prevent sand movement into or through the rock or concrete structure at hybrid Living Shoreline sites.

3. Subtidal Water Zone

Submerged Aquatic Vegetation Planting

Seagrass beds dampen wave energy, stabilize nearshore sediments, improve water quality via nutrient uptake, and provide food and shelter for marine organisms. When used in conjunction with other Living Shoreline components such as marsh grasses, a natural shoreline buffer is created that reduces coastal erosion and stabilizes sediments via root growth. Establishing seagrass beds is typically more successful at Living Shoreline sites in which grasses were historically present. Seagrass species used in typical SAV restoration projects include wild celery (*Vallisneria americana*), redhead grass (*Potamogeton perfoliatus*), and eelgrass (Zostera marina).

Submerged Aquatic Vegetation. Photo credit: Rich Takacs, NOAA Restoration Center

Oyster Reef Enhancement or Creation

Native reef-building oysters, such as the eastern oyster (*Crassostrea virginica*), play an important role in aquatic ecosystems. Oyster reefs can be enhanced or created at Living Shoreline sites as natural shoreline protective structures to dissipate wave energy, decrease coastal erosion, increase habitat for fish species, improve water quality, and provide protection for newly planted marsh grasses and SAV. For more information on oyster reefs, visit the Oyster Reef Habitat section of this website.

Oyster reef in the Rappahannock River, Virginia. Photo: Rich Takacs, NOAA Restoration Center.

Oyster reef in the Rappahannock River, Virginia. Photo: Rich Takacs, NOAA Restoration Center

Oyster / mussel ball. Photo: Steve Giordano, NOAA Chesapeake Bay Office

Oyster/Mussel Ball Installation

Small concrete oyster balls can be used at Living Shoreline sites to decrease wave energy while enhancing fish and oyster habitat. These hollow concrete structures with holes provide substrate on which oysters colonize and form small living reefs, thus providing habitat and food for fish and other aquatic species. Wave dissipation by these structures decreases coastal erosion and provides a reduced-energy area in which newly planted vegetation can grow.

Appendix 2: Coastal Permit Program Rules: General Permits

7:7-7.18 Coastal General Permit for bulkhead construction and placement of associated fill

See page 7-52.16

(a) This coastal general permit authorizes the construction of a bulkhead and associated fill at a single family/duplex lot on a natural water body provided that the proposed bulkhead complies with the following:

1. Legally existing functional bulkheads are located on the lots adjacent to the proposed bulkhead and are no more than 75 feet apart;
2. The bulkhead shall be located at or above the spring high water line;
3. The bulkhead is located a minimum of five feet inshore of any wetlands;
4. The bulkhead shall not be located on a dune or oceanfront beach;
5. Clean fill from an upland source shall be used for backfill;
6. The bulkhead shall not be located further waterward than the bulkheads on the adjacent properties;
7. In the event that the bulkhead will be located landward of the adjacent bulkheads, the new bulkhead shall connect to the bulkhead on either side;
8. The construction of bulkheads subject to wave run up forces (V-zones) shall be designed and certified by a professional engineer to withstand the forces of wave run-up, and shall include a splash pad on the landward side. The splash pad shall have a minimum width of 10 feet, and shall be constructed of concrete, asphalt or other erosion resistant material. If a cobblestone or similar splash pad is utilized, appropriate sub-base and filter cloth shall be incorporated into the design;
9. The placement of rip-rap along the seaward toe of the bulkhead structure may qualify for this coastal general permit if the Department determines that such rip rap is required to limit scour potential and the areas and volume of rip rap are minimized;
10. There shall be no disturbance to wetlands during construction; and
11. Except as provided in (a)11i below, public access shall be provided in accordance with the public trust rights rule, N.J.A.C. 7:7E-8.11. Additional requirements may be imposed as a condition if Shore Protection Program funding is utilized, pursuant to N.J.A.C. 7:7E-8.11(p).
    i. In accordance with N.J.A.C. 7:7E-8.11(f)6, the Department shall not require public access for the development under this coastal general permit provided no beach and dune maintenance activities are proposed and the site does not include a beach on or adjacent to the Atlantic Ocean, Sandy Hook Bay, Raritan Bay or Delaware Bay or their shores. This provision does not apply to the Hudson River Waterfront Area at N.J.A.C. 7:7E-3.48.

(b) This general permit is not available for activities subject to the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq.

(c) In addition to the application and information required under N.J.A.C 7:7-7.3, the following information shall be submitted:

1. Three copies of a site plan(s) showing the following:
    i. The mean high and spring high tide lines of the tidal waters at the site;
    ii. The upper and lower limits of wetlands, beach and dunes areas;
    iii. Existing features both at the site and on adjacent waterfront sites including all waterfront structures and existing bulkhead and other retaining structures;

Comment [ilw1]: Here is an opportunity to require the installation of living shorelines or a hybrid version where it is appropriate.

Comment [ilw2]: Another option would be to allow the installation of a breakwater or tiered structure in front of the bulkhead in addition to the installation of SAV or tidal marsh grasses.

iv. The proposed new bulkhead including returns and tie backs and splash pad if located within the V-Zone; and

v. All existing and proposed public access areas and public accessways to tidal waterways and their shores on-site; and

2. A Compliance Statement prepared in accordance with N.J.A.C. 7:7-6, demonstrating how the proposed bulkhead and associated fill complies with (a) and (b) above, including supplemental documents as appropriate, such as maps and survey.

7:7-7.21 Coastal General Permit for the stabilization of eroded shorelines

See page 7-52.18

(a) This coastal general permit authorizes the stabilization of eroded shorelines along tidal waterways, excluding the Atlantic Ocean, provided that the proposed method complies with all of the following:

1. The stabilization materials are limited to live branch cuttings, live facings, live stakes, vegetative cuttings, vegetated earth buttresses, choir fiber products, fiber plugs, plants and clusters, selected plant materials, fiber pallets, fiber carpet, and wood stake anchor systems. Materials shall be installed in accordance with the construction guidelines of Chapter 16--"Streambank and Shoreline Stabilization Protection," of the National Engineering Handbook (NEH), Part 650, 1996, published by the United States Department of Agriculture, incorporated herein by reference, as amended and supplemented. This coastal general permit does not authorize the use of geotubes, stone, concrete, gabions, wood sheathing, pvc pipe, used tires, discarded Christmas trees, or other material not specifically stated in this paragraph;

2. The stabilization of the eroded shoreline shall have no adverse impact on Special Areas defined at N.J.A.C. 7:7E-3;

3. No disturbance to wetlands shall occur;

4. Where shoreline stabilization will occur outshore of a wetland, the construction shall result in minimum feasible alteration or impairment of natural tidal circulation;

5. Where shoreline stabilization will occur outshore of a wetlands, the construction shall result in minimum feasible alteration or impairment of the natural contour or the natural vegetation of the wetlands;

6. For sites where grading is required, no grading shall occur below the spring high water line, and all soil or other graded materials shall be pulled back away from the water. Grading by pushing soil or other material below the spring high water line is prohibited;

7. The placement of bioengineering materials, with the exception of plantings, shall be limited to that necessary to protect the shoreline;

8. Plant material shall be chosen and installed in accordance with "Vegetation For Tidal Shoreline Stabilization In the Mid-Atlantic States" in Chapter 16--"Streambank and Shoreline Stabilization Protection," of the National Engineering Handbook (NEH), Part 650, 1996, published by the United States Department of Agriculture, incorporated herein by reference, as amended and supplemented.

9. For projects on public lands, public access to the waterfront shall be provided and maintained during construction, and thereafter; and

10. If the Department determines that construction has resulted in adverse shoreline sand movement, including erosion or shoaling, the Department may require the permittee to remove the shoreline stabilization materials.

Comment [ilw3]: This allows for living shorelines, but not hybrid solutions or the use of shellfish material.

Comment [ilw4]: The installation process will inevitably result in some form of disturbance.

Comment [ilw5]: This inhibits the success of living shoreline projects, and should be altered.

Comment [ilw6]: Is this only referring to bioengineering measures listed in a.1?

Comment [ilw7]: "Vegetation for Tidal Shoreline Stabilization in the Mid-Atlantic States" is only referenced at the end of Chapter 16. Specifications are not included!- It was published in 1980- is it based off of the best available knowledge?

Comment [ilw8]: What if it is a natural area that currently does not have public access- ie, marsh?"

(b) In addition to the applications and information required under N.J.A.C. 7:7-7.3, the following information shall also be submitted:

1. Three copies of a site(s) plan showing the following:
   i. Mean high, mean low and spring high water lines of the tidal waters at the site;
   ii. Existing waterfront structures at the site and on adjacent waterfront sites;
   iii. The upper and lower limits of wetlands, beach areas, and dune areas at the site and on adjacent waterfront properties;
   iv. The location and cross section of the proposed stabilization materials in relationship to mean high and mean low water; and
   v. On public lands, the location of the existing and proposed public access to the waterfront; and
2. A compliance statement prepared in accordance with N.J.A.C. 7:7-6, demonstrating how the proposed stabilization of the eroded shoreline complies with (a) above, including supplemental documents as appropriate, such as maps and surveys.

7:7-7.29 Coastal General Permit for habitat creation and enhancement activities

See page 7-52.22

(a) This coastal general permit authorizes habitat creation and enhancement activities necessary to implement a plan for the restoration, creation, or enhancement of the habitat, water quality functions and values of wetlands, wetland buffers, and open water areas, which is sponsored or substantially funded by a Federal or State agency or other entity described in (b) below. For the purposes of this general permit, a "sponsor" shall be an active participant in or substantial financial contributor to the activities, and shall endorse the activities in writing.

(b) The following habitat creation and enhancement plans are acceptable provided they demonstrate compliance with (c) through (g) below:

1. A fish and/or wildlife management plan created or approved by the Department's Division of Fish and Wildlife;
2. A project plan approved under the Partners for Fish and Wildlife program, Coastal Program, or a similar program, administered by the U.S. Fish and Wildlife Service
3. A project plan created by the U.S. Department of Agriculture's Natural Resources Conservation Service under the Wetlands Reserve program, the Conservation Reserve program, the Conservation Reserve Enhancement program, the Wildlife Habitat Incentive program (WHIP), or a similar program, and approved by the local Soil Conservation District;
4. A plan approved by the Department's Office of Natural Resource Damages for the restoration, creation or enhancement of natural resources injured as the result of an oil spill or release of a hazardous substance;
5. A mitigation project required by and approved by a government agency, such as the U.S. Army Corps of Engineers;
6. A habitat creation or enhancement plan carried out by one of the Federal or State agencies at 1 through 5 above or by a government resource protection agency such as a parks commission; or
7. A habitat creation or enhancement plan carried out by a charitable conservancy, as defined at N.J.A.C. 7:7-1.3, provided that the plan is part of a program listed at 2 through 5 above.

(c) Habitat creation and enhancement activities that are authorized by this coastal general permit include but are not limited to the following:

Comment [ilw9]: Essentially, a wildlife management plan is required, and the project is to be administered by the US Fish and Wildlife Service.

Comment [ilw10]: Great location to introduce Living Shorelines options here.

1. Altering hydrology to restore or create wetlands conditions, such as by blocking, removing, or disabling a human-made drainage ditch or other drainage structure such as a tile, culvert or pipe;
2. Breaching a structure such as a dike or berm in order to allow water into an area;
3. Placing habitat improvement structures such as:
   i. Nesting islands;
   ii. Fencing to contain, or to prevent intrusion by, livestock or other animals; and
   iii. Fish habitat enhancement devices or fish habitat improvement structures such as placed boulders, stream deflectors, or brush piles;
4. Regrading to provide proper elevation or topography for wetlands restoration, creation, or enhancement; and
5. Cutting, burning or otherwise managing vegetation in order to increase habitat diversity or control nuisance flora.

(d) To be eligible for authorization under this coastal general permit, an applicant shall demonstrate that the proposed project:

1. Is part of a comprehensive plan for the restoration, creation or enhancement of the habitat and water quality functions and values of wetlands, wetland buffers, and/or State open waters;
2. Is sponsored or partially funded by an appropriate entity in accordance with (b) above;
3. Is consistent with the requirements of the Wetlands Act of 1970, the Waterfront Development Law, the Coastal Area Facility Review Act and the Coastal Zone Management rules;
4. Will improve the values and functions of the ecosystem; and
5. Will have a reasonable likelihood of success.

(e) Activities under this coastal general permit shall comply with the following:

1. If the proposed habitat creation or enhancement activity is to take place in Special Areas, as defined at N.J.A.C. 7:7E-3, the coastal general permit authorization shall be issued only if the Department finds that there are no practicable alternatives that would involve less or no disturbance or destruction of Special Areas;
2. The activities shall disturb the minimum amount of Special areas as defined at N.J.A.C. 7:7E 3 necessary to successfully implement the project plan;
3. The activities shall not decrease the total combined area of Special Areas on a site. However, the Department may approve a decrease if the Department determines that the activities causing the decrease are sufficiently environmentally beneficial to outweigh the negative environmental effects of the decrease. In addition, the Department may conversion of one Special Area to another Special Area if the Department determines that such conversion is environmentally beneficial;
4. If the activities involve the removal of a dam, the activities shall be conducted in accordance with a permit issued pursuant to N.J.A.C. 7:20 by the Department's Dam Safety Section in the Division of Engineering and Construction; and
5. A conservation restriction for the habitat creation or enhancement area is recorded in accordance with N.J.A.C. 7:7-1.5(b)18.

(f) Public access shall be provided in accordance with the lands and waters subject to public trust rights rule, N.J.A.C. 7:7E-3.50, and the public trust rights rule, N.J.A.C. 7:7E-8.11.

(g) This coastal general permit does not authorize an activity unless the sole purpose of the activity is habitat creation or enhancement. For example, this coastal general permit does not authorize construction

Comment [ilw11]: Again, a restoration plan is necessary.

Comment [ilw12]: Is it in the best interest of the project to allow for "public access" to places that are vulnerable or trying to be restored?

Comment [ilw13]: This needs further clarification. It essentially says that planting trees can provide habitat, but it can't simultaneously be intended to improve air quality. Considering NJ is working on a Climate Adaptation Plan, this could hinder its success.

of a detention basin in wetlands for stormwater management, even if the detention basin or the project of which the basin is a part will also result in habitat creation or enhancement.

(h) In addition to the application and information required under N.J.A.C 7:7-7.3, the following information shall be submitted:

1. Three copies of a site plan(s) showing the following:
   i. The mean high and spring high tide lines of the tidal waters at the site;
   ii. The upper and lower limits of wetlands and wetlands buffers, beaches, dunes, and coastal bluff areas;
   iii. Limits of all intertidal and subtidal shallows, submerged vegetation, and shellfish habitat areas;
   iv. Existing features both at the site and on adjacent waterfront sites including all waterfront structures and existing bulkheads, other retaining structures, and culverts;
   v. Existing roads and utilities immediately adjacent to the site; and
   vi. The limits and depth of all proposed excavation, proposed grading or fill
2. A Compliance Statement prepared in accordance with N.J.A.C. 7:7-6, demonstrating how the proposed project complies with (a) through (g) above, including supplemental documents as appropriate, such as maps and survey.

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