

LIVING SHORELINE ACTIONS

EDUCATION AND OUTREACH

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan)

Actively engage with contractors, realtors, and homeowners' associations in the design and benefits of living shorelines.

Enhance communications, marketing, and education initiatives to increase awareness of, and build demand for, living shorelines among property owners.

Develop case studies that property owners can relate to that discuss site conditions, initial and ongoing costs, and performance of the structure.

North Carolina Coastal Federation

Educate waterfront property owners on the benefits of living shorelines through a coordinated communications and awareness building campaign.

- Document the success of living shoreline public and private demonstration projects
- Demonstrate the cost benefits of living shorelines
- Present the science that has documented the resilience of living shorelines compared to other types of shoreline stabilization
- Maintain the NC sections of the Living Shoreline Academy website up to date
- Regularly update the federation's living shoreline webpage and produce Coastal Review Online articles that communicate advancements in restoration activities and the federation's work

Provide coast wide trainings on living shorelines for contractors, design professionals and agency staff.

- On the job training provided by demonstration projects
- Joint training working with the N.C. Division of Coastal Management

Provide opportunities for groups to learn about the importance of living shorelines through classroom lessons, service learning experiences, and field trips to explore project sites.

Reach adult audiences through our student work, through press releases, web updates, media invitations and creation of videos.

Albemarle-Pamlico National Estuary Partnership

Develop and distribute educational materials encouraging landowners to protect natural shorelines. APNEP will work with its partners to continue to develop materials will describe how living shorelines are a viable alternative to hardened structures and explain the benefits natural shorelines provide.

North Carolina Division of Coastal Management

DCM field representatives will continue to distribute information about living shorelines to property owners, marine contractors, or consultants during site visits if a living shoreline may be appropriate. DCM will also provide continued training for staff utilizing information from research and other studies or observations.

DCM will reprint hard copies of the handbook and continue to make the document available online.

The successful Estuarine Shoreline Stabilization workshops organized by the Reserve CTP in 2011 and 2012 will be used as a model for DCM to plan future training events and consider new ways to engage marine contractors, landscaping companies, landscape architects, and realtors on the topic of living shorelines. DCM will focus future trainings on existing living shoreline examples and discuss the specific costs that were involved, materials used, equipment access issues, the permitting process, and demonstrated performance of these methods.

In the future, as new living shoreline demonstration sites are constructed (in conjunction with Wildlife Resources Commission (WRC) boat ramps, for example), informational signs should be placed nearby.

DCM will work to develop workshops, according to certain standards, that could provide engineering Continuing Education credits to eligible participants as well as certification or other official acknowledgement for attendees.

The Nature Conservancy

Partnering with NOAA, continue to develop and disseminate the [Living Shorelines app](#) (currently available for Carteret and Onslow counties) to local communities, contractors, permitting staff, and decision makers to help identify where wave energy conditions are best suited to use a living shoreline for erosion control. Seek additional funding to expand the app to all 20 coastal counties.

Use the [Restoration Explorer app](#) to demonstrate where shoreline oyster restoration would be suitable to address shoreline erosion concerns.

INCENTIVES

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan)

Investigate use of living shorelines as BMP or mitigation options.

North Carolina Coastal Federation

Work with waterfront property owners to design, permit, fund and build living shorelines on their properties through cost share programs such as the NOAA Coastal Ecosystem Resiliency Grant (through the end of 2018) and the N.C. Division of Soil and Water Conservation Community Conservation Assistance Program (CCAP).

Explore qualifying living shorelines as mitigation. The state recently increased the value of salt marsh from \$160K/acre to \$560K/acre.

Albemarle-Pamlico National Estuary Partnership

Assist local governments in the development of incentives for protecting natural shorelines. Incentives and techniques will be developed and promoted that encourage the protection of natural shorelines as an alternative to hardened structures such as bulkheads and sea walls.

Facilitate the development of incentives to replace hardened estuarine shorelines with living shorelines. Regulatory and financial incentives will make it easier to construct living shorelines

and help motivate landowners to restore shoreline property. Technical assistance can demonstrate that living shorelines are a viable option for shoreline stabilization.

North Carolina Division of Coastal Management

DCM and partners will notify property owners about potential living shoreline funding assistance available through the Community Conservation Assistance Program (CCAP), the Albemarle-Pamlico National Estuary Partnership (APNEP), Southeast Aquatic Resources Partnership (SARP), or other sources.

The Nature Conservancy

Assist local governments in developing policy-based incentives for property owners to protect natural shoreline function and encourage natural shoreline migration.

Work with local governments to develop dedicated funding streams to expand the local implementation of natural solutions to coastal hazards.

RESEARCH (MATERIALS AND PERFORMANCE)

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan)

Examine the effectiveness of natural and other structural materials for erosion control and ecosystem enhancement.

Examine the long-term efficacy of living shorelines and vertical structures, particularly after storm events.

North Carolina Coastal Federation

Explore and use suitable materials for building living shorelines when applicable such as biodegradable mesh for oyster bags

- Install test bags and other materials at several demonstration project sites
- Monitor and report performance of test bags and alternative materials

North Carolina Division of Coastal Management

DCM and partners will draft living shoreline research proposals for funding from the Coastal Recreational Fishing Licenses (CRFL) Grant Program.

DCM and N.C. National Estuarine Research Reserve staff will pursue research projects and funding to evaluate storm impacts on marsh sills, the effects of marsh sills on adjacent property, the feasibility of using oyster shell as a construction material for marsh sills, the short and long-term costs of marsh sills compared to other alternatives, and the effectiveness of existing sheetpile sills.

The Nature Conservancy

Document the fisheries benefits and performance (day-to-day and storm event) of alternative materials and configurations for shoreline oyster reefs, focusing on naturally occurring, local materials where possible.

MAPPING

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan)

Map areas where living shorelines would be suitable for erosion control.

North Carolina Division of Coastal Management

DCM will continue analyzing its existing estuarine shoreline mapping inventory and will consider adding such data attributes as bank height, nearshore depth, fetch, and locations of buildings. DCM will also continue to improve online access to estuarine shoreline data and explore development of a geospatial model that matches appropriate shoreline stabilization methods with shoreline type.

DEMONSTRATION

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan)

Seek funding and partnerships to increase the number of highly visible demonstration projects.

North Carolina Coastal Federation

Continue to build living shorelines at public and private properties each year.

North Carolina Division of Coastal Management

DENR will partner with the military and other public institutions along the coast to increase the number of living shoreline demonstration sites.

The Nature Conservancy

Continue to work with partners to install novel shoreline oyster reefs at highly visible locations.

OTHER

North Carolina Coastal Federation

Organize a “Corp” to prepare recycled oyster shell bags and other materials to be sold to contractors and waterfront property owners for use in building living shorelines.

Albemarle-Pamlico National Estuary Partnership

Facilitate the restoration of riparian and estuarine shorelines. Impacted shorelines will be replanted with native vegetation. Where feasible, bulkheads, and riprap structures will be replaced with living shorelines or structures that control erosion with the least impact to natural shoreline function.

***Phragmites* Actions**

North Carolina Coastal Federation

Develop a coordinated state strategy to manage the invasion of *Phragmites*.

- Hold agency meetings to develop the coordinated strategy

Future needs were identified based on the results of the July 17, 2017 *Phragmites* Workshop held by the N.C. Coastal Federation. It was concluded and the participants generally agreed that more effort is needed to develop an effective management strategy for *Phragmites*.

- A solid mapping effort
- More North Carolina-specific scientific studies
- Methods to educate property owners on early identification and treatments
- A better understanding of the effect of the plant community on the coastal region
- The effects of the current management approaches on the ecology and on human health.
- Identify partners for a working group,
- Obtain additional funding sources
- Create a pilot management program

Albemarle-Pamlico National Estuary Partnership (Not *Phragmites* specific)

Facilitate the development of protocols and conduct rapid assessments to determine presence and potential threat of invasive species. Aquatic and terrestrial invasive species can cause significant ecological damage. The timely identification and assessment of invasive species threats can ultimately result in cost-effective management if addressed before threshold levels are reached.

Minimize and rapidly respond to the introduction of invasive species through the development and implementation of integrated prevention and control strategies. Management strategies include education of the public and actions to prevent introduction of invasive species. Existing populations of invasive species will be managed to prevent further encroachment into natural habitats.

Develop and refine integrated invasive species eradication and control strategies. Invasive species that adversely impact native populations must be systematically removed. A restoration strategy for habitats populated by invasive species will be comprehensive and consider the natural processes of all species within the ecosystem.

Coordinate outreach and engagement efforts regarding the impacts of invasive species. Effective outreach and engagement is an important part of any integrated invasive species management effort. There are many ways citizens can help limit the spread of invasive species and informed volunteers can report on the presence and spread of these organisms.

North Carolina Department of Environmental Quality (Coastal Habitat Protection Plan) (Not *Phragmites* specific)

Enhance management of invasive species with existing programs. Monitor and track status in affected waterbodies.