

Living Shoreline Case Study

Lewes Ball Field, Lewes

DNREC Wetland Monitoring and Assessment Program

Project Details

Goals:

- Shoreline Position
- Habitat

Energy Environment:

- Low- predominantly
Periodic moderate boat wakes from nearby ramps

Construction Dates:

- 2014: 92ft.
- 2021: 160ft. extension

Partners:

- 2014: DNREC Wetland Monitoring and Assessment and Partnership for the Delaware Estuary (PDE)
- 2021: DNREC, PDE, USFWS Delaware Bay Estuary Project, and Lewes Historical Society

See the Site Before and After

Pre-installation March 2014



Post installation August 2018



Baseline Conditions

March 2014

Cusping erosion of shoreline



October 2020

Calving and erosion of shoreline in control area



Baseline Conditions

Issues:

- An undercut, calving and deteriorating existing salt marsh shoreline

Site Characteristics/Important Features to Consider:

- Low fetch, moderate boat wake, existing mussel and oyster beds, high turbidity, silty sediments, high sun exposure, native low marsh plant community to connect with, boat access, land access by foot or wheelbarrow only.

Living Shoreline Installation

Design Elements:

- Terraced, intertidal design with internal compartmentalization
- Subtidal oyster toe was selected
- Installed in April 2014, with additional materials installed in October 2014

Permitting:

- State—Delaware Statewide Activity Approval (SAA) for Shoreline Stabilization Projects
- Federal—Army Corps Nationwide Permit No. 27 Aquatic Habitat Restoration

Materials and Placement:

- Coir logs, fiber mats, and natural twine, 4ft. and 5ft. oak stakes, *Spartina alterniflora* plugs, salvaged *Spartina* clumps from on-site, and recycled oyster shell bags
- Due to a large elevation drop along waterward edge, a double log, two-tiered treatment was needed to elevate the created marsh to meet minimal vertical mean water requirements for target vegetation: double stack of seven 12ft. x 16inch coir fiber logs
- The waterward cusp of 16inch diameter coir fiber logs was placed at $\sim -0.6\text{m}$ elevation, with a final target elevation of $\sim -0.3\text{m}$ desired after settling
- A second tier of 16inch logs were added just 6 months after initial installation when sediment had filled in up to the top of the first log
- Treatment was 84ft. long and was placed 6.2m from the existing marsh edge, with a total elevation change of $\sim 1.2\text{m}$
- Oyster shell bags were arranged in front of the waterward cusp to further armor the shoreline and absorb wave energy
- Purchased plugs and salvaged, calved clumps of *Spartina alterniflora* from intertidal areas in close proximity to each site were planted in the living shoreline treatment in summers 2014 and 2015

Monitoring Efforts

To monitor for progress three transects running parallel to the shoreline were set up prior to installation . Five monitoring points along each transect was established starting with point 1 in the water and ending with point 5 in the high marsh. Pre-installation monitoring collected baseline information to compare the effects of the treatment against

Metric	Method
Vertical shoreline position	RTK
Horizontal shoreline position	RTK
Mussels and oysters	1m plot lip counts
Mussels and oysters	Shell bag examination
Vegetative robustness	Horizontal veg obstruction
Plant species	1m veg plot cover



Measured Environmental Results

- Area gained 73.0m² of salt marsh habitat, whereas the control area lost 49.1m² in four years
- The living shoreline treatment met its stated goals of shoreline stabilization and ecological enhancement
- Shoreline position at the treatment area moved waterward and continues to be stable
- The wetland plant community is robust and healthy and has been sustained at the current elevation
- A solid population of ribbed mussels have become established in the newly formed *Spartina* marsh and significant oyster colonization has been documented along the front toe edge stemming from the oyster shell bags

Adaptive Management/Lessons Learned

- Some ice damage required a section of coir log to be replaced with oyster shell bags
- Extremely soft, newly deposited sediment within the treatment cells made reaching the monitoring plots all but impossible for 2-3 years without causing damage to new materials
- We found that salvaged clumps of plants and mussels (i.e. clumps of live plants that have broken completely from the nearby shoreline and were rolling around in the tide) survived and grew better than purchased plugs
- Several monitoring plot marker posts in the control area fell in and were washed away due to untreated erosion. High suspended sediments allowed areas inside coir logs to fill in naturally and quickly
- Had remarkable colonization of oysters onto the oyster shells in just 2-3 years which further strengthened the treatment and added to the water quality benefits of the project

Project Photos

June 2021

Coir log and shell bag installation on expansion



August 2019

5 year progress of original Living Shoreline



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