Living Shorelines
Designs & Techniques

North Carolina
Coastal Federation
Working Together for a Healthy Coast

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Presentation Overview

- Introduction to NC Coastal Federation
- Coastal Environmental Issues & Shoreline Erosion
- Traditional Stabilization Techniques
- Solutions: Living shorelines + Types & Materials
- Q & A

North Carolina Coastal Federation

Non-profit Organization

- Three offices in each region
- 36 staff and 30 board members
- Protect and restore the coast!

Key Goals

- Healthy **Water Quality**
- Promote **Living Shorelines**
- Restore **Oyster** Habitat
- Advocate for Responsible **Coastal Management**
- Reduce **Marine Debris**

40 YEARS North Carolina Coastal Federation
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Coastal Environmental Issues

Climate Change, Water Quality, Flooding, Polluted Habitats

Shoreline Erosion | Stormwater Runoff | Marine Debris

Shoreline Erosion

Hard Structures

Bulkheads

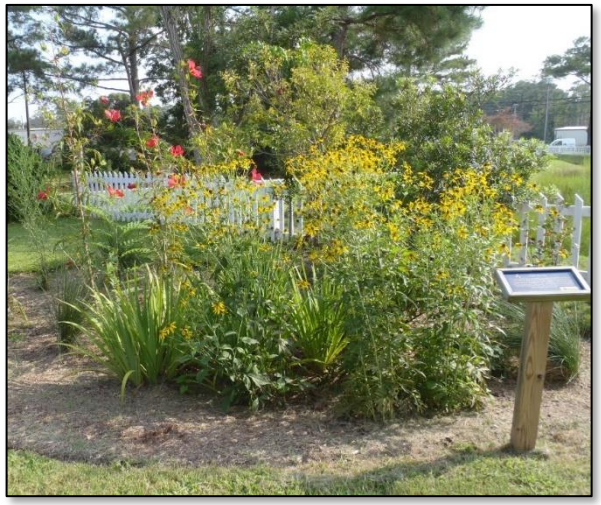
Seawalls

Rip Rap

Bulkhead Failures

Coastal Resiliency & Solutions

Living Shorelines| Nature Based Solutions | Education



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Living Shorelines

Living Shorelines

Terminology:

Living Shoreline: stable, coastal edge constructed of natural materials like plants, shell, rock, sand

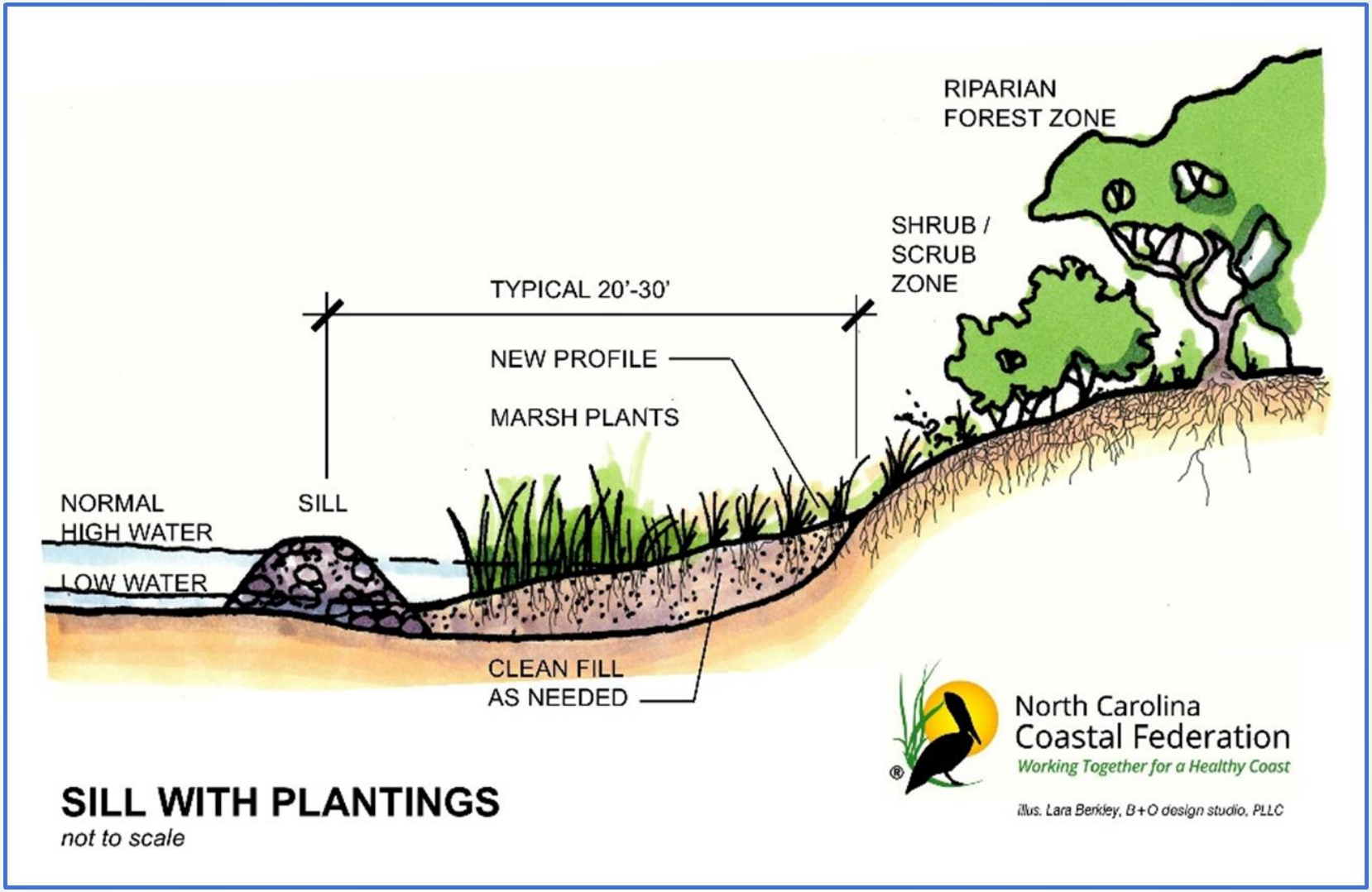
Escarpment: area of erosion with drastic elevation change, cliff-like

Sill: the elevated structure of the living shoreline

Revetment: barrier applied to the bank

Normal High Water: elevation on shore established by tidal fluctuations

Riparian Zone: banks situated near the river/waterway



SILL WITH PLANTINGS

not to scale

Living Shoreline Types

Marsh-toe Revetment

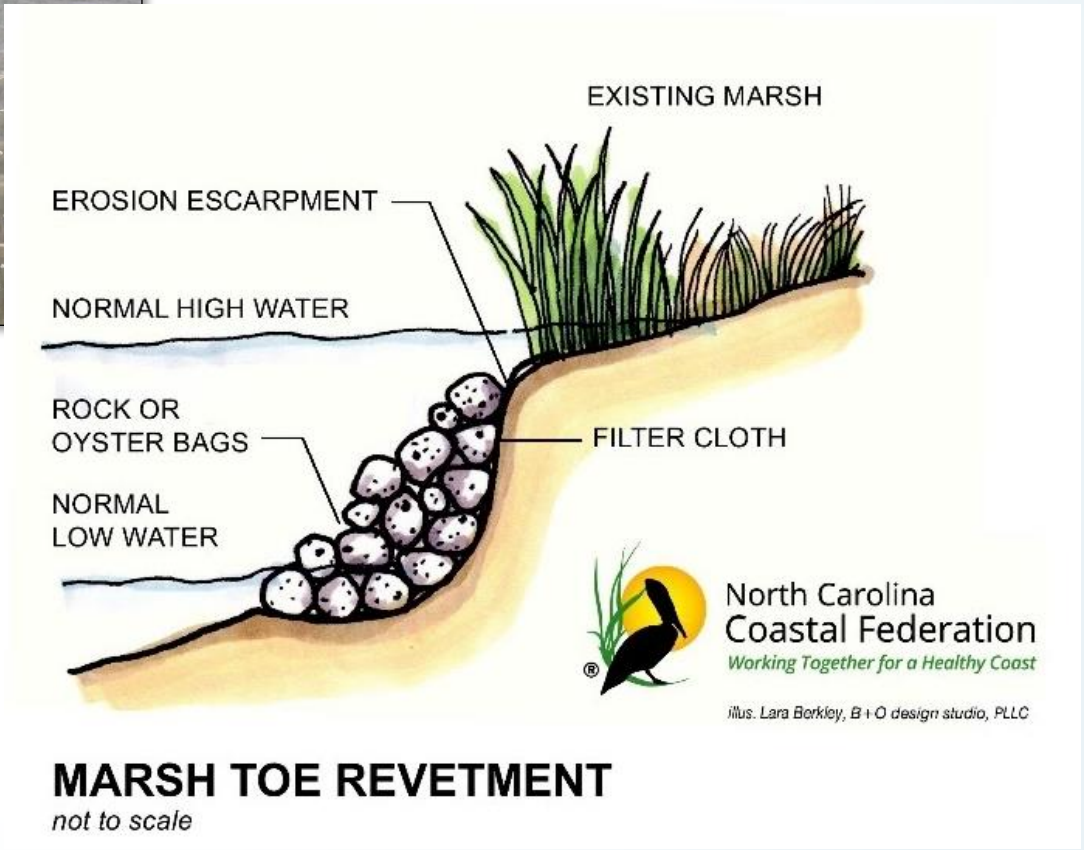
Offshore Sill

Vertical Wall

Marsh Grass Planting

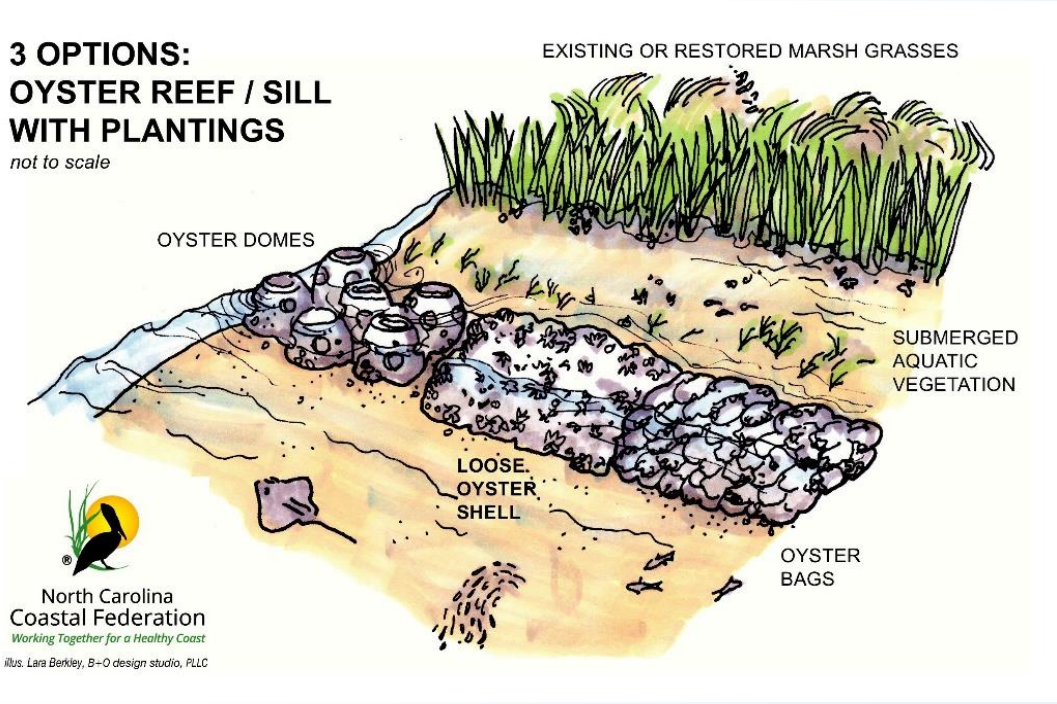
Marsh-toe Revetment

- Extreme escarpments
- Heavy loss of sediment
- Protects existing marsh from further erosion



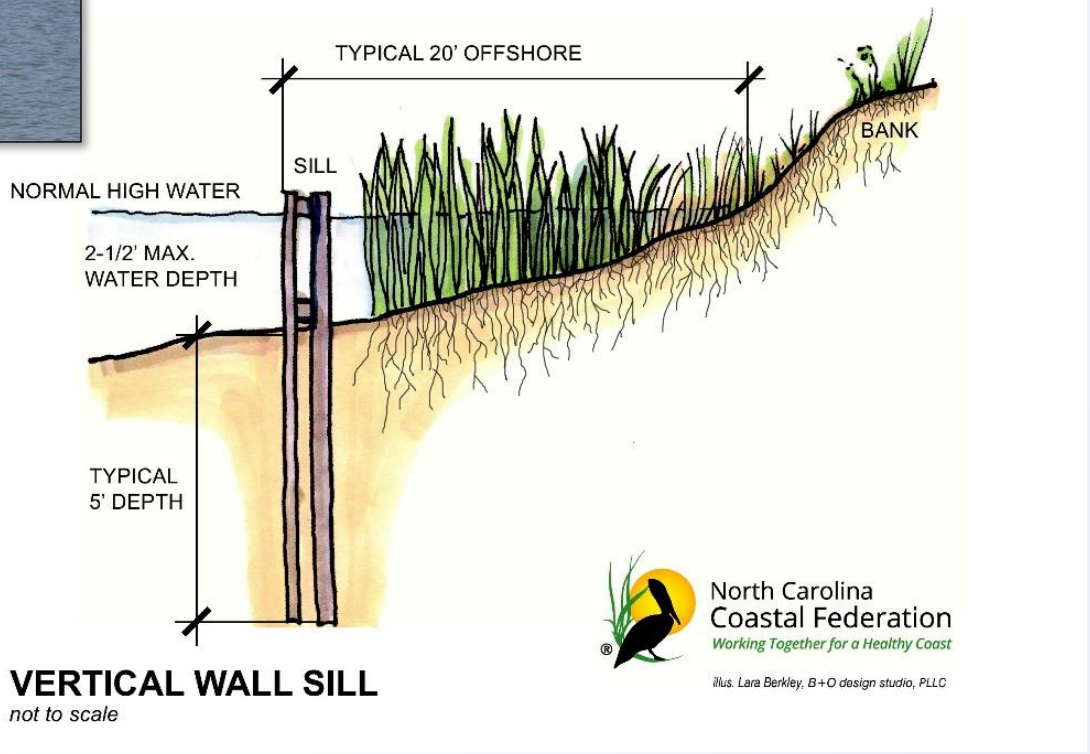
Offshore Sill

- Bottom support for heavy materials
- Lots of material options
- Paired with marsh grass plantings



Vertical Wall (Sill)

- Narrow canals
- Bottoms that don't support weight of heavy stone/bags
- Areas subject to low/moderate energy conditions



VERTICAL WALL SILL
not to scale

Living Shoreline Materials

Bagged Oyster Shell

Granite

Concrete

Marine Limestone ("Marl")

Bagged Oyster Shell

Granite, Concrete, & Marl

Innovative Living Shoreline Designs

Oyster Catcher™ by Sandbar Oyster Co.

SANDBAR
OYSTER COMPANY
Shellfishly Motivated

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Innovative Living Shoreline Designs

Oyster Domes/Reef Balls

Innovative Living Shoreline Designs

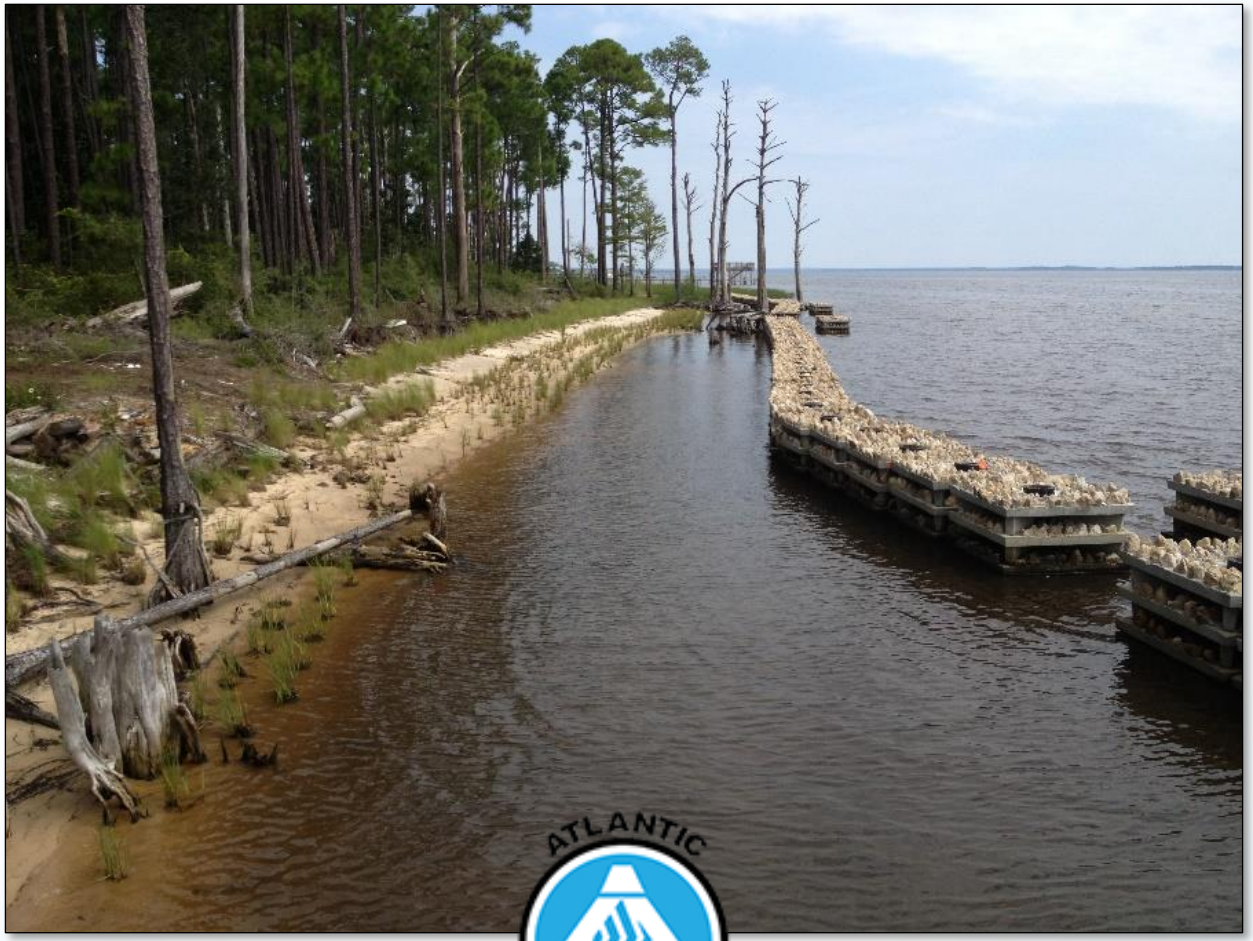
QuickReef™ by Native Shorelines, LLC

Innovative Living Shoreline Designs

Oyster Castles

Innovative Living Shoreline Designs

Atlantic ReefMaker EcoSystems



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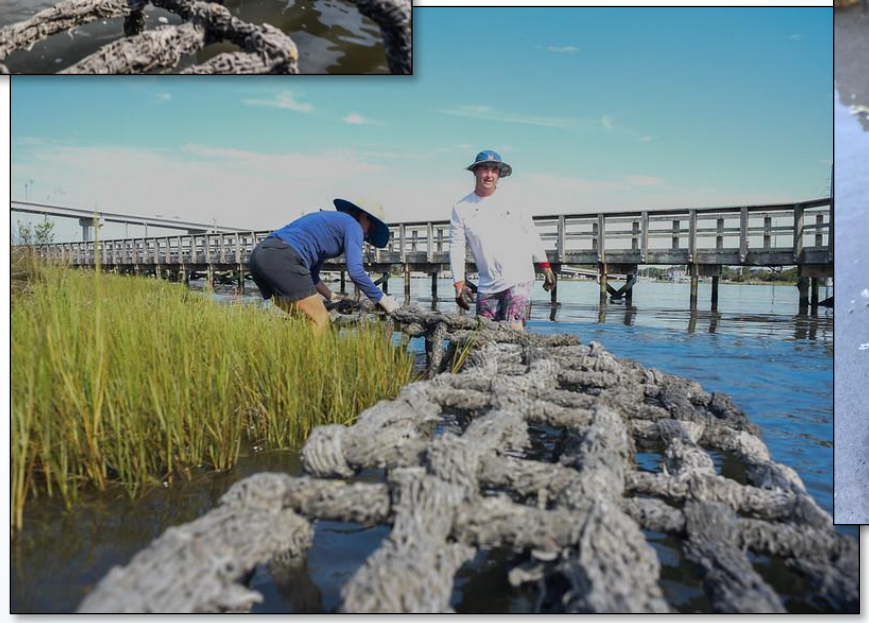
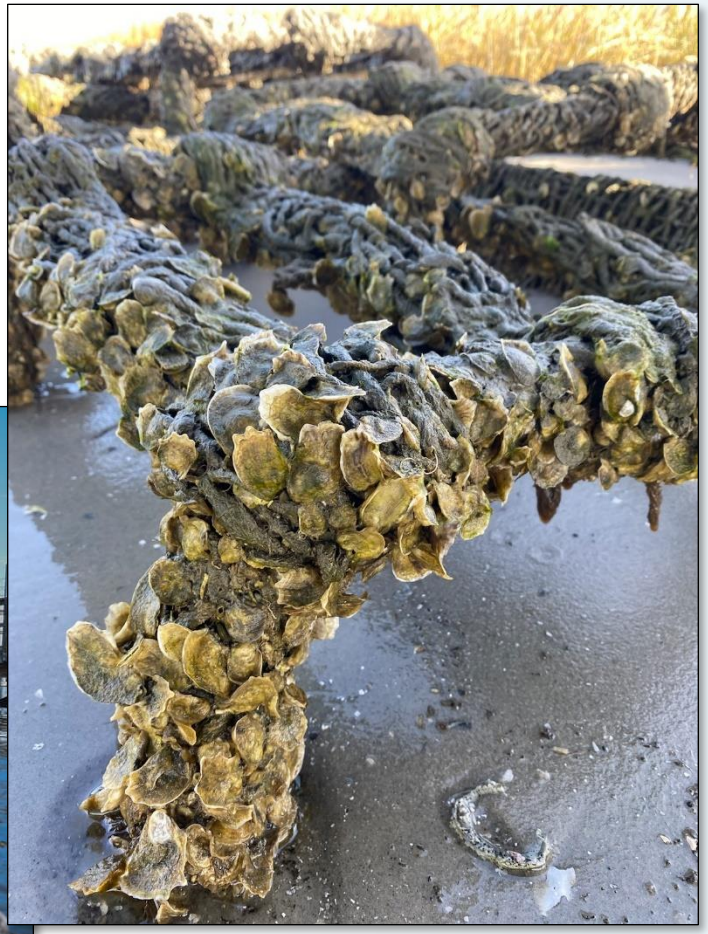
Soundside Park, Surf City

Oyster Catcher™





SANDBAR
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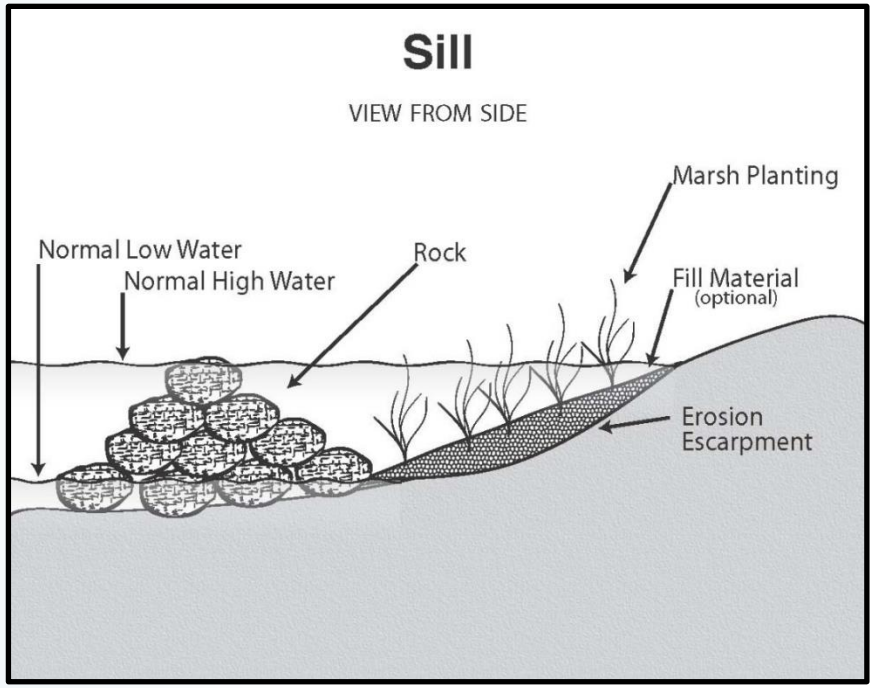
Living Shoreline Design Considerations



- Wave energy
- Fetch
- Predominant wind direction
- Water depths
- Proximity to navigation channels
- Shoreline orientation
- Extent of erosion
- Slope
- Natural abundance of oysters
- Cost
- Property owner preference

Living Shoreline Permitting

- Salt marsh planting alone: no permit required
- Marsh sill and marsh-toe revetment: Coastal Area Management Act (CAMA) General Permit
  - $200 fee
  - Project location map and designs
  - Adjacent property owner signatures
  - Valid for 120 days
- CAMA Major Development Permit
  - $400 fee
  - Additional application materials
  - Reviewed by 13 state and federal agencies
  - Receive permit within 75 days of application acceptance
  - Valid for 3 years

Typical Costs for Living Shorelines by Material

~50 Linear Feet

<u>Bagged Oyster Shell: need 14 bags/lf</u>

- $4/bushel x 175 bushels = $700 in shell
- Mesh bags = $375
- Labor $5/bag = $3,500

<u>Stone:</u>

- $250 - $400/lf for labor and materials
- Estimated costs = $10,000 - $20,000

<u>Plants:</u>

- $2 - $3 installed
- 1,500 plants = $3,000 - $4,500

Before

After

Living Shorelines: Takeaways

- Human disturbances can influence shoreline erosion
  - Development
  - Boat Wakes
- Traditional approaches often damage valuable marsh and oyster habitat
- We can work with nature and use solutions that stabilize the shoreline and provide habitat (*nature-based solutions*)

Are You Interested in a Living Shoreline for Your Property?

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nccoast.org/protect-the-coast/estuarine-shorelines/

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Questions about **Living Shorelines** or the **North Carolina Coastal Federation?**

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