



Promoting Living Shorelines for Erosion Control

March 25 & 26

Brunswick County Association of Realtors



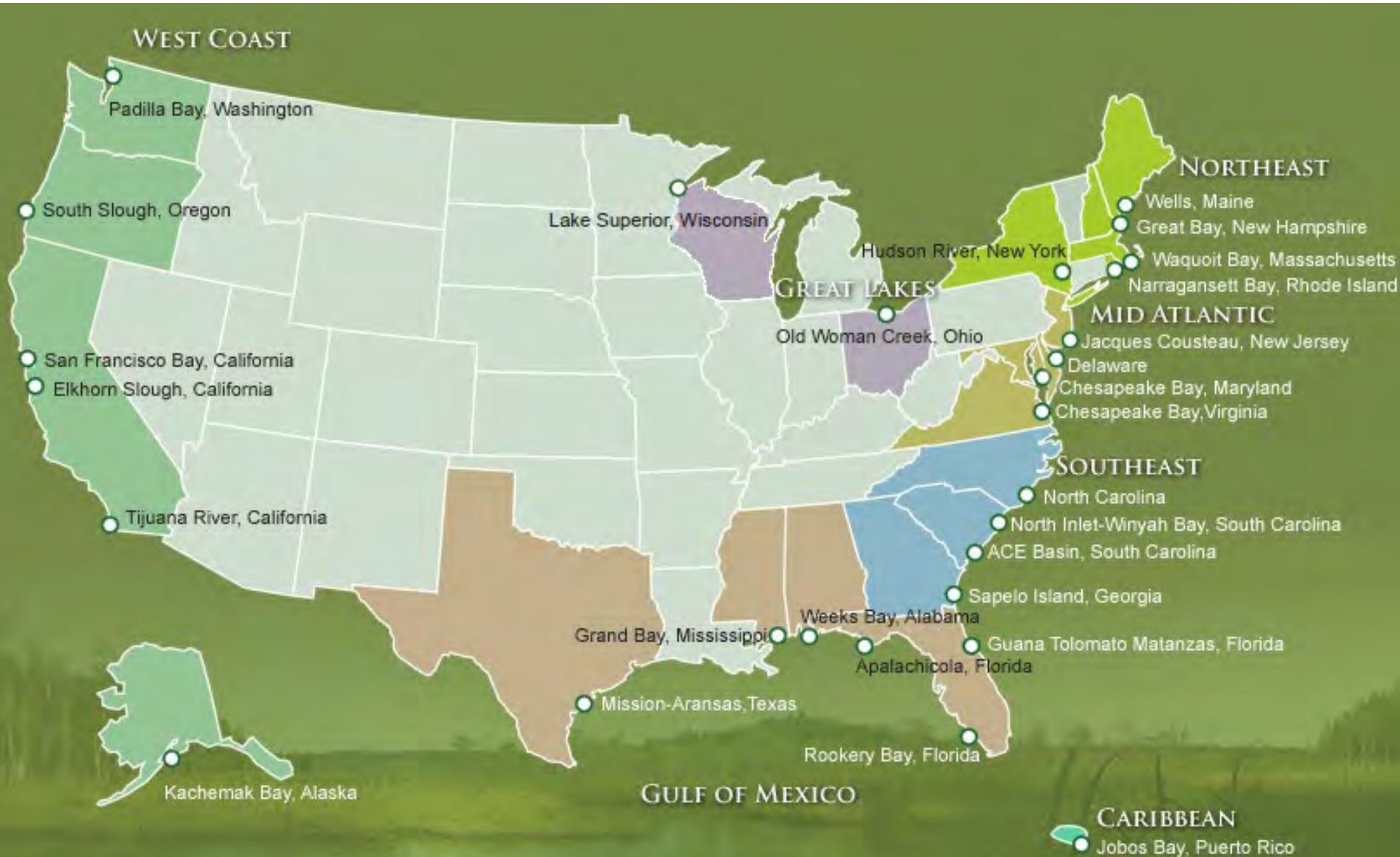
Coastal Management
ENVIRONMENTAL QUALITY



North Carolina
Coastal Federation



29 National Estuarine Research Reserves





Coastal Management
ENVIRONMENTAL QUALITY

North Carolina Coastal Reserve



**North Carolina
National Estuarine Research Reserve**



● **Currituck Banks Reserve**

● **Kitty Hawk Woods Reserve**

● **Buckridge Reserve**

● **Buxton Woods Reserve**

● **Rachel Carson Reserve**

● **Permuda Island Reserve**

● **Masonboro Island Reserve**

● **Zeke's Island Reserve**

● **Bald Head Woods Reserve**

● **Bird Island Reserve**

N.C. Coastal Reserve and National Estuarine Research Reserve

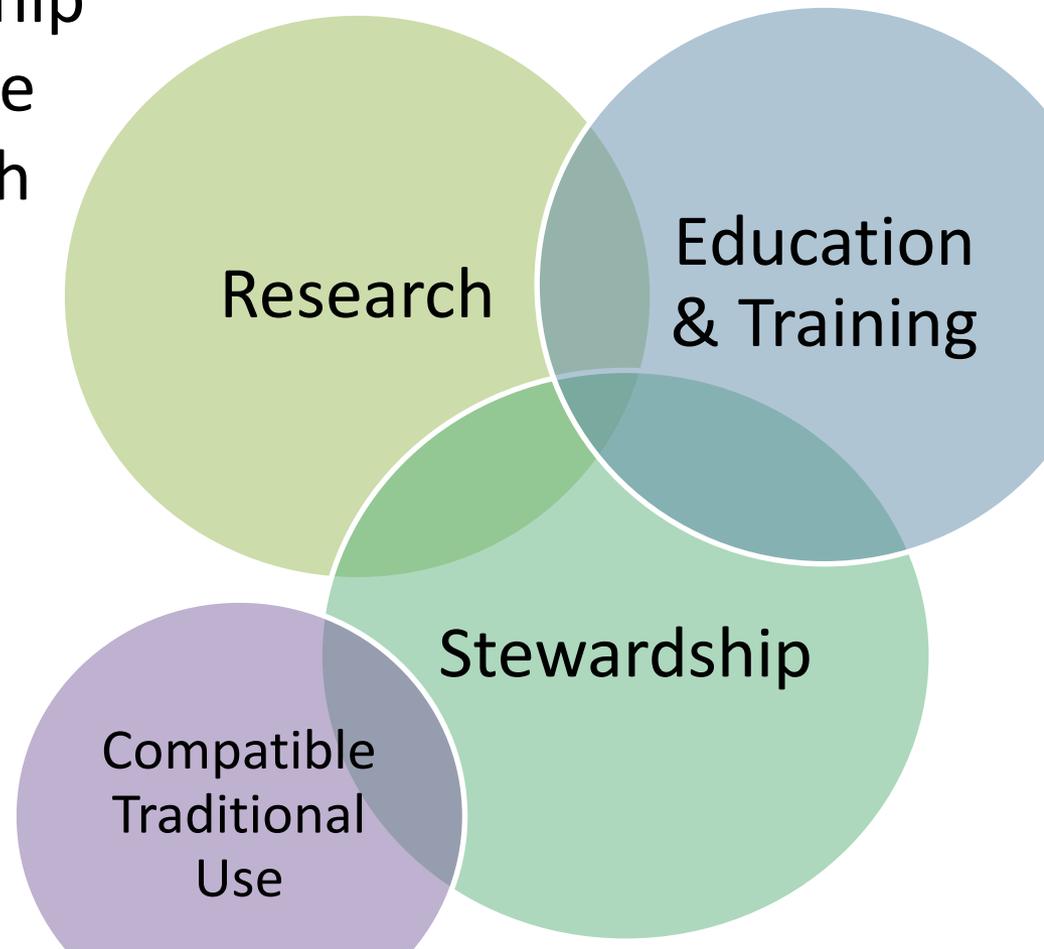
● National Reserves

● State Reserves

Mission



To promote informed management and stewardship of North Carolina's estuarine and coastal habitats through research, education, and example.



Connect with us!



North Carolina Coastal Reserve



@NCReserve

www.nccoastalreserve.net



Past Workshop Resources



To obtain additional course documents from past workshops, please contact Coastal Training Program Coordinator [Whitney Jenkins](#) at 252-838-0882.

— Promoting Living Shorelines for Erosion Control - March 25 & 26, BCAR

[March 25 Agenda](#) [↗](#)

Coastal Training Program

[Scheduled Workshops](#)

[Past Workshops](#)

deq.nc.gov/past-workshops

Resources For Homeowners and Professionals

Below is a list of available resources for homeowners and technical professionals (e.g., marine contractors, landscape architects, engineers, etc.) who are interested in learning more about implementing a living shoreline.

How to Protect your Property from Shoreline Erosion: A Handbook for Estuarine Property Owners in North Carolina - [Weighing Your Options](#) [↗](#)

- This guide serves as a tool for those interested in learning about the options available in for shoreline stabilization in North Carolina. In addition to providing information about stabilization methods, permitting, and costs, the guide also has a worksheet that asks site-specific questions designed to help users learn more about their estuarine shoreline property before making a decision about which control option to implement.

[Living Shoreline Workshops](#) [↗](#)

- The [N.C. Coastal Reserve & National Estuarine Research Reserve's](#) [↗](#) Coastal Training Program held a living shorelines workshop - *Living Shorelines for Erosion Control on Estuarine Shorelines* - for realtors and technical professionals. Click on the link to access presentations by speakers from partnering organizations, like DCM, the N.C. Coastal Federation, and N.C. Sea Grant.

[Shoreline Erosion Control Using Marsh Vegetation and Low-Cost Structures](#) [↗](#)

- North Carolina Sea Grant developed this helpful publication that not only explains the role of marsh vegetation in reducing shoreline erosion but also highlights the types of plants that work best based on site-specific characteristics and provides advice for planting various types of vegetation.

Estuarine Shoreline Stabilization

[How to Stabilize Your Estuarine Shoreline](#)

[NC CCAP](#)

[Estuarine Shoreline Mapping Project](#)

[Living Shoreline Research](#)

[Stabilization Options](#)

Resources For Homeowners and Professionals

[Marsh Grass Suppliers](#) ↗

- North Carolina Sea Grant developed this list of marsh grass suppliers. The Division of Coastal Management does not endorse these entities.



- This video is a compilation of presentation by various experts about living shorelines.

N.C. Coastal Federation - [Living Shorelines](#) ↗

- The N.C. Coastal Federation has been involved in numerous living shoreline projects in North Carolina. Details and photos from projects in the northeast, central, and southeast regions of our coast are available on this site.

Virginia Institute of Marine Science's Center for Coastal Resources Management (CCRM) [website](#) ↗.

• CCRM exists to develop and support integrative and adaptive management of Virginia's

Search: NC DCM
Resources for
Homeowners &
Professionals

Or

<https://deq.nc.gov/about/divisions/coastal-management/coastal-management-estuarine-shorelines/stabilization/resources-homeowners-professionals>

Living Shorelines: Benefits & Limitations

Adapted from Carolyn Currin & Rachel Gittman



North Carolina Coastal Habitats



Coastal Habitat Benefits

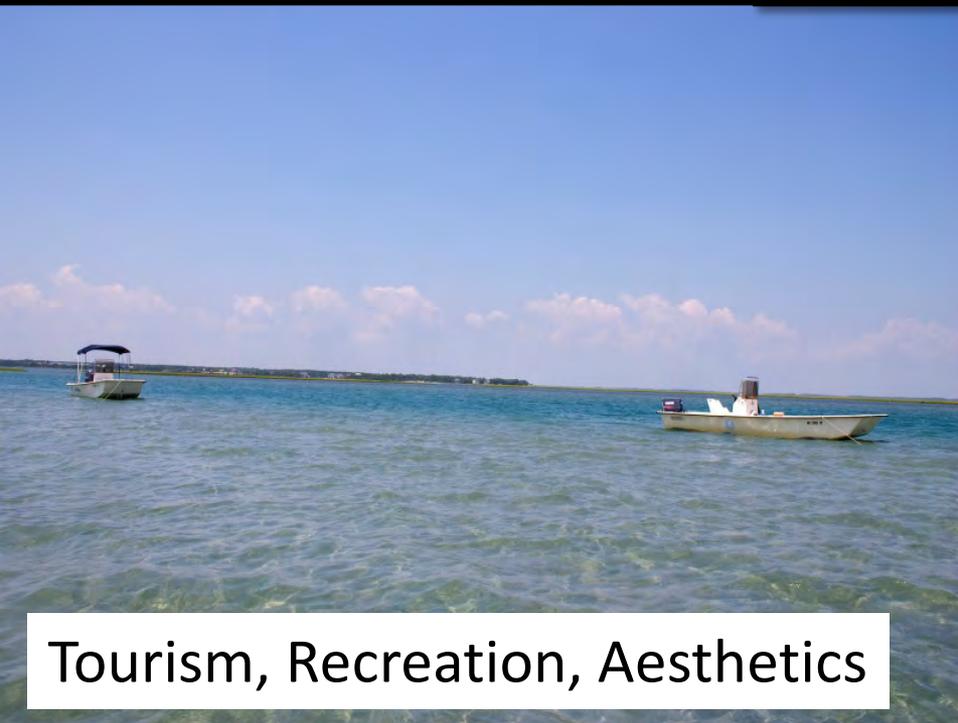
Habitat



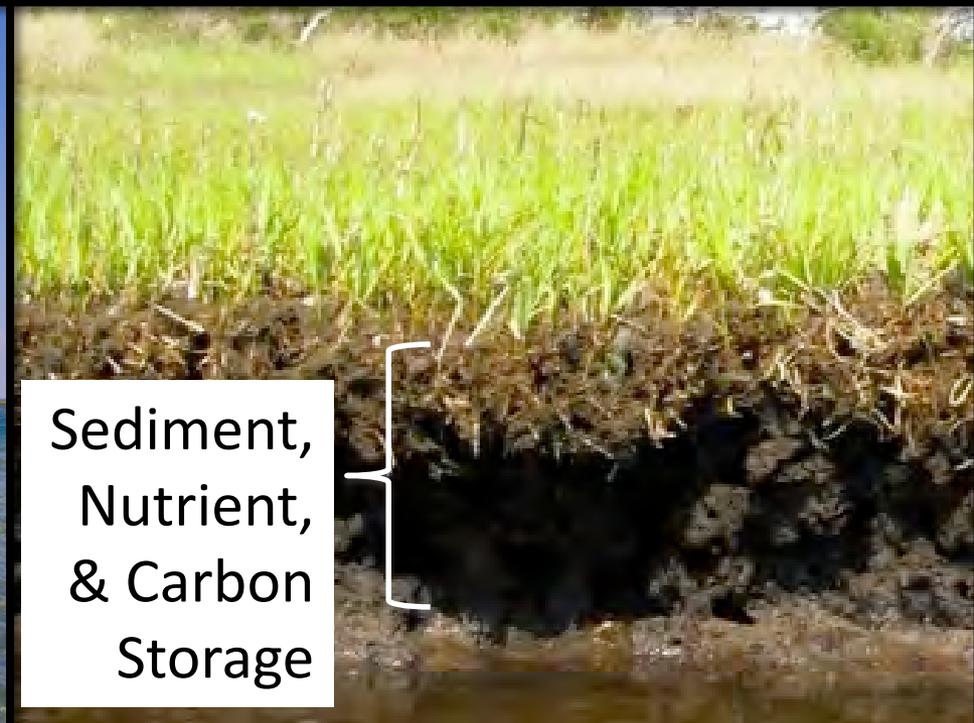
Shoreline Stabilization



Tourism, Recreation, Aesthetics



Sediment,
Nutrient,
& Carbon
Storage





North Carolina Coastal Habitats

Shoreline Erosion



Sediment bank

Causes:

- Natural wave energy
- Storm events
- Disruption in sediment supply
- Changes in shoreline topography
- Removal of vegetation
- Boat wakes



Salt marsh



Forest

Shoreline Hardening

Bulkhead



Groin/Jetty



Riprap Revetment

Seawall



Breakwater Photo credit: VIMS

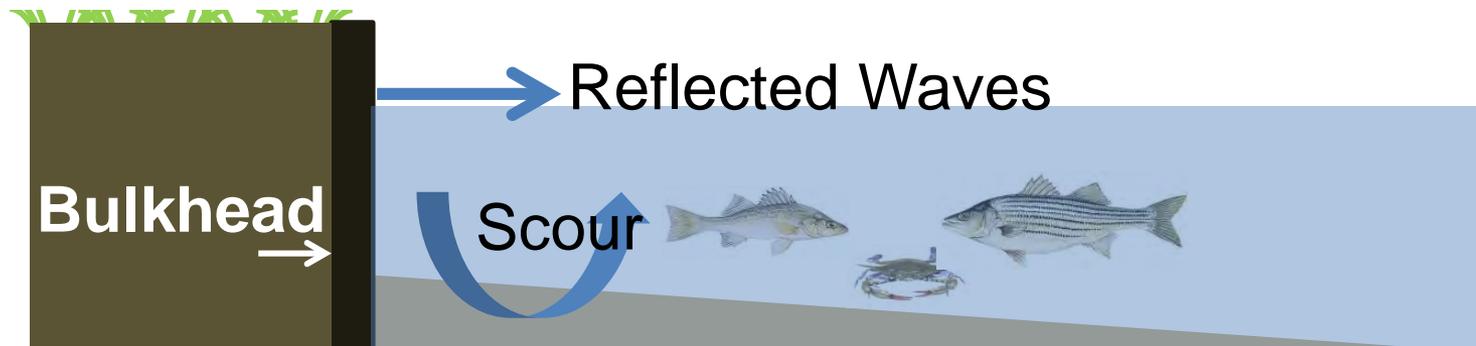
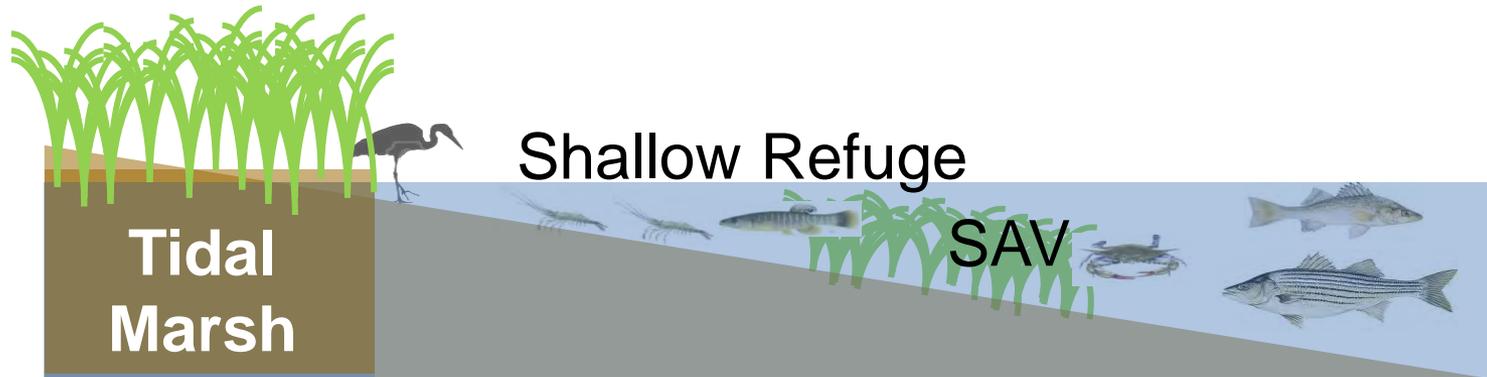


Fig. courtesy T. Jordan

Changes occur **BELOW** the MHW line:

- Sediment transport & particle-size change
- Vegetation loss
- Animal abundance reduced
- Ability to remove nitrogen is reduced

...all of which are negative impacts to our public trust resources.

What's the alternative?

Living shorelines are erosion control methods that include a suite of options

- Marsh grasses
- Sills made of stone, oyster shell, or wood
- Maintain connections between upland, intertidal, and aquatic areas
- Proven effective erosion control during hurricanes



Living Shoreline Types

Marsh Plants



Living Shoreline Types

Marsh Plants



Living Shoreline Types – Sills



Living Shoreline Types

Oyster Bag Marsh Toe Revetment



Living Shoreline Types

Loose Oyster Shell



Living Shoreline Types

Oyster Shell



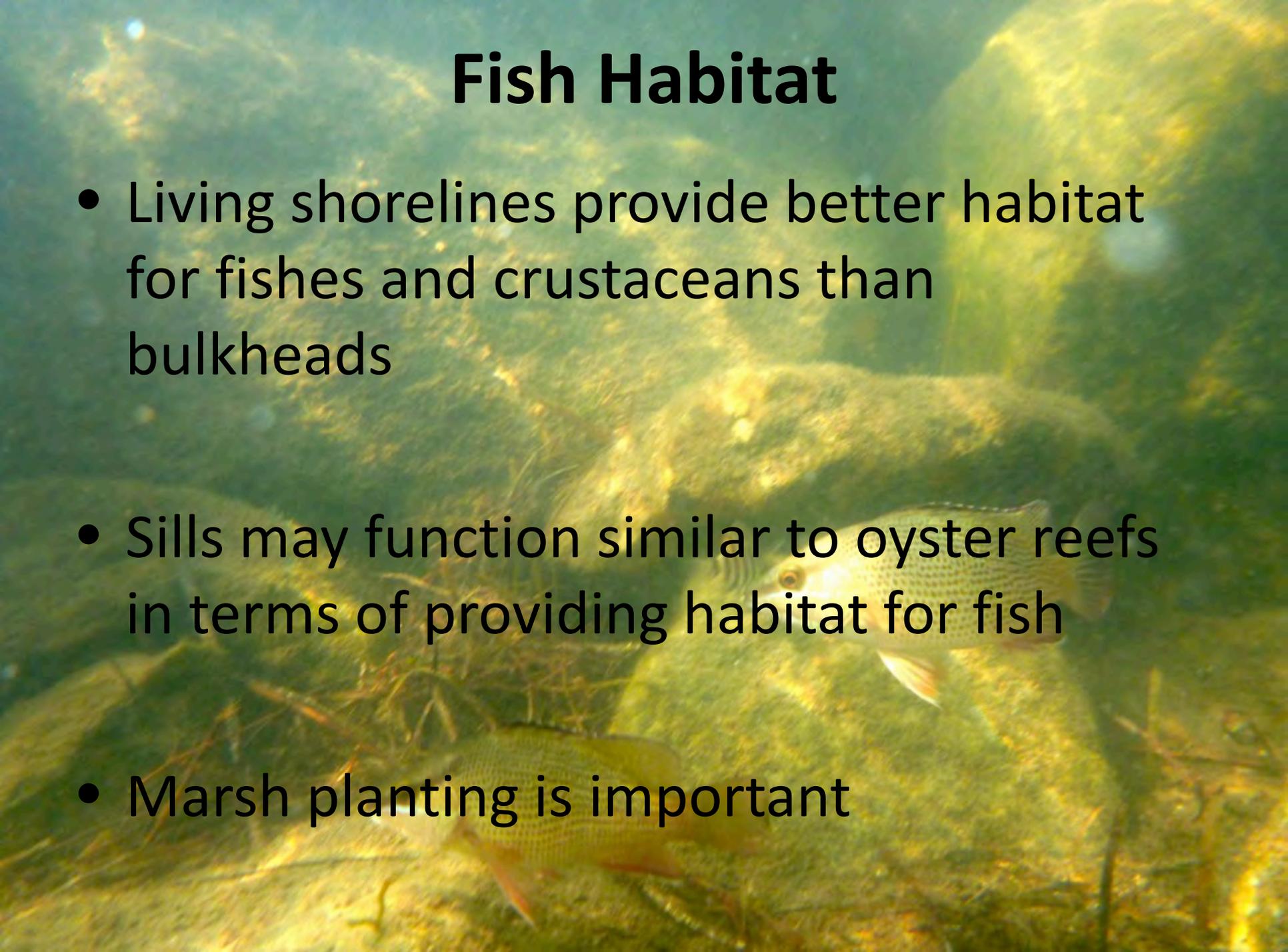
Living Shoreline Types



Habitat Comparison



Fish Habitat

- Living shorelines provide better habitat for fishes and crustaceans than bulkheads
 - Sills may function similar to oyster reefs in terms of providing habitat for fish
 - Marsh planting is important
- 
- An underwater photograph showing a sandy seabed with patches of green seagrass. Two fish are visible: one in the foreground, slightly out of focus, and another in the middle ground, facing left. The water is clear and sunlit, creating a bright, natural environment.

Marshes Dampen Wave Energy



How long before you see the benefits of a living shoreline?



Year 1



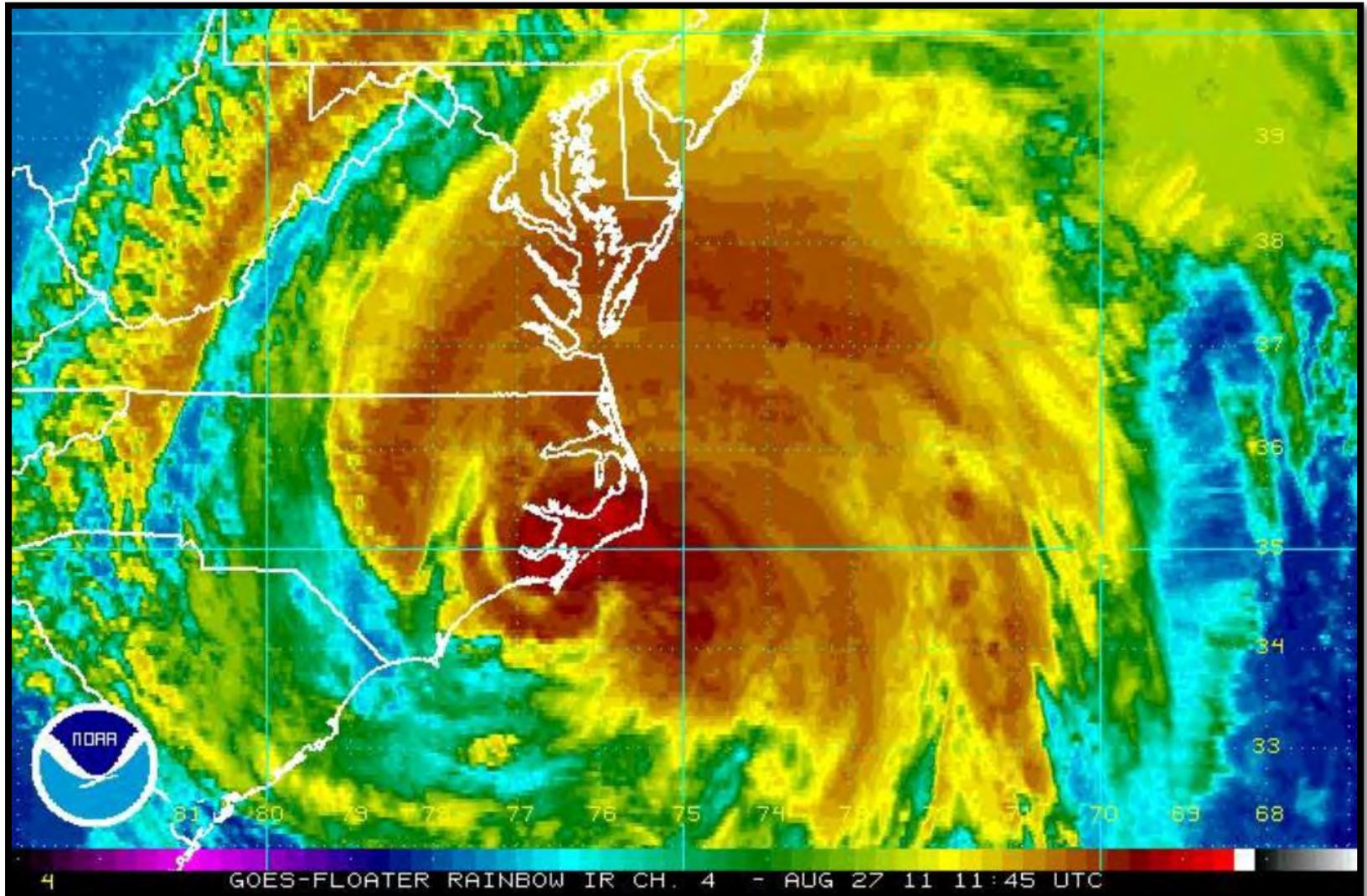
Year 3



Year 5

What about hurricanes?

Hurricane Irene 2011



Bulkhead vs. Living Shoreline

Before



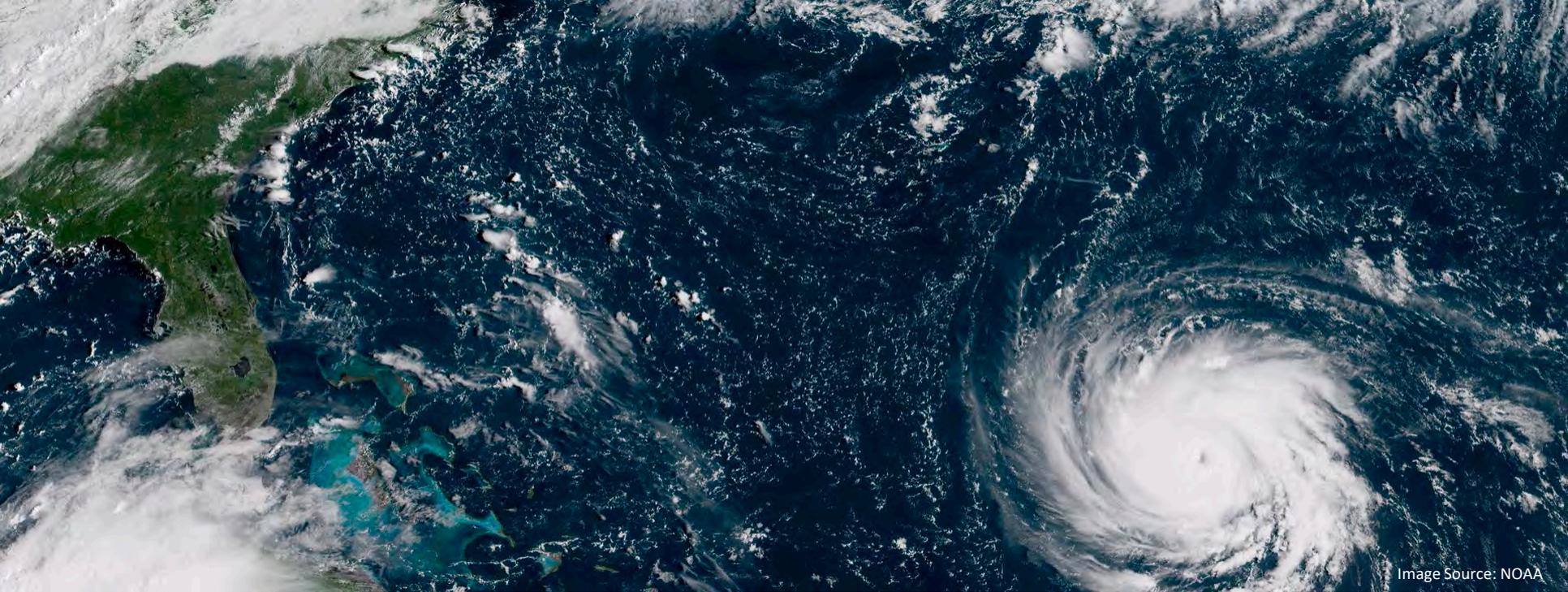
Hurricane Matthew (2016)



Pivers Island Living Shoreline

After Hurricane Irene – 2011
Shoreline Accreted Sediment

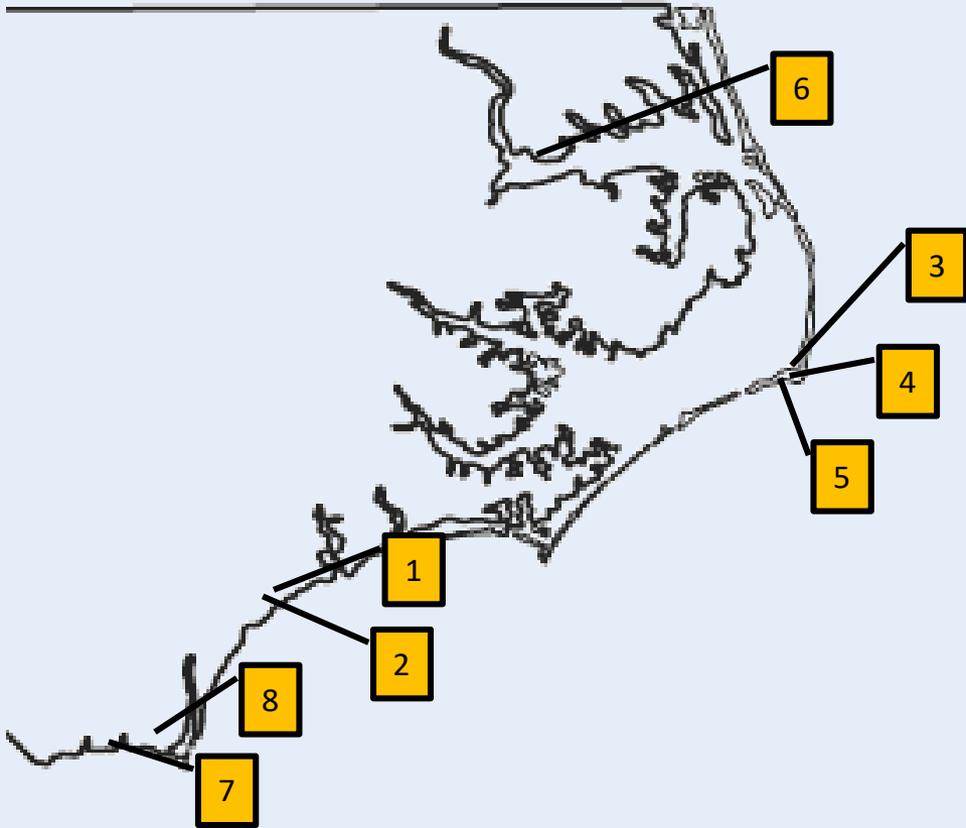




Monitored living shorelines before and after Hurricane Florence

8 living shorelines monitored
along the coast

List of Monitored Living Shorelines



1. Morris Landing Rock Sill-
Wilmington
2. Morris Landing Oyster Sill-
Wilmington
3. Springers Point Rock Sill-
Ocracoke
4. Woodall Rock Sill- Ocracoke
5. Cahoon-Davis Oyster Sill-
Ocracoke
6. Chowan River Boat Ramp Rock
Sill- Edenton
7. St. James Oyster Sill-
Wilmington
8. Southport Rock Sill-
Wilmington

LIVING SHORELINE EROSION POST HURRICANE FLORENCE

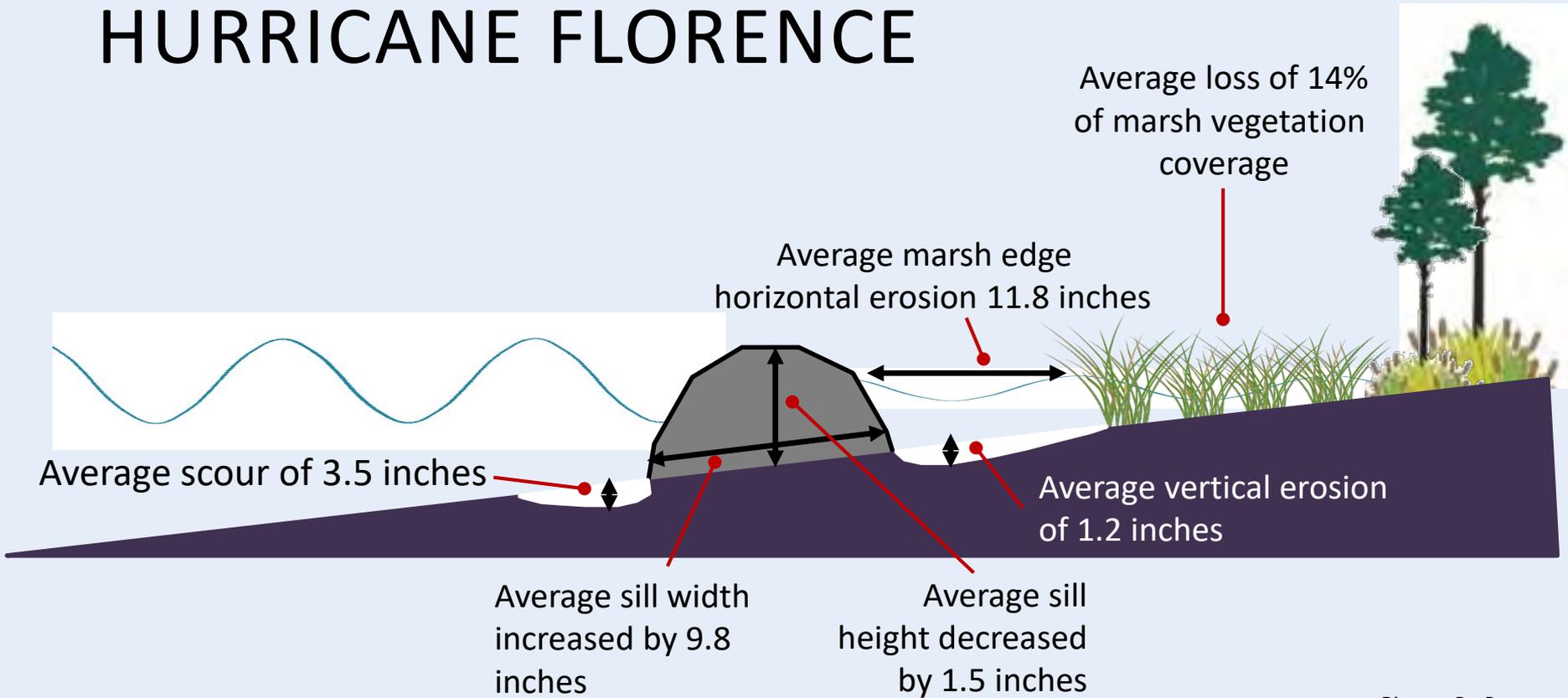


Diagram By: B. Puckett

Morris Landing Rock Sill - Wilmington

AUGUST
{1 MONTH PRE STORM}



OCTOBER
{1 MONTH POST STORM}



Springers Point Rock Sill - Ocracoke

AUGUST

{1 MONTH PRE STORM}



DECEMBER

{3 MONTHS POST STORM}



Woodall Rock Sill - Ocracoke

AUGUST

{1 MONTH PRE STORM}



DECEMBER

{3 MONTHS POST STORM}



Chowan River Boat Ramp Rock Sill - Edenton

AUGUST
{1 MONTH PRE STORM}



OCTOBER
{1 MONTH POST STORM}



St. James Oyster Sill - Wilmington

AUGUST
{1 MONTH PRE STORM}



NOVEMBER
{2 MONTHS POST STORM}



Summary

- Hardened structures (bulkheads/riprap) do not provide the ecosystem services that natural shorelines do, and may not perform as well during storm events
- Lack of design standards may contribute to overuse of hard structures
- In N.C., intertidal oysters are a viable alternative to stone sills in many settings
- Marshes and oyster reefs can increase their elevation, unlike hardened structures
- Incorporating marsh and oyster reefs into a 'living shorelines' approach to shoreline stabilization can result in cost-effective and sustainable shoreline protection