

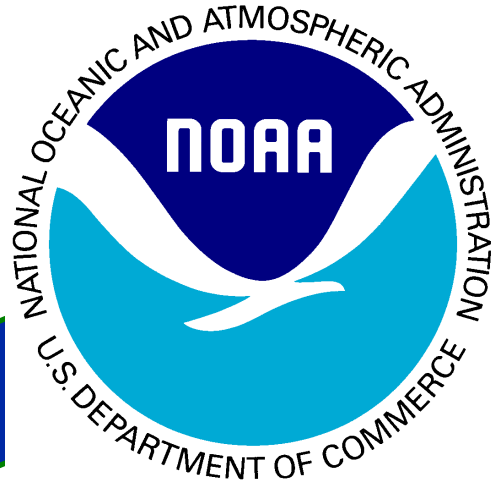
Promoting Living Shorelines for Erosion Control

September 19, 2024



National Estuarine Research Reserve System



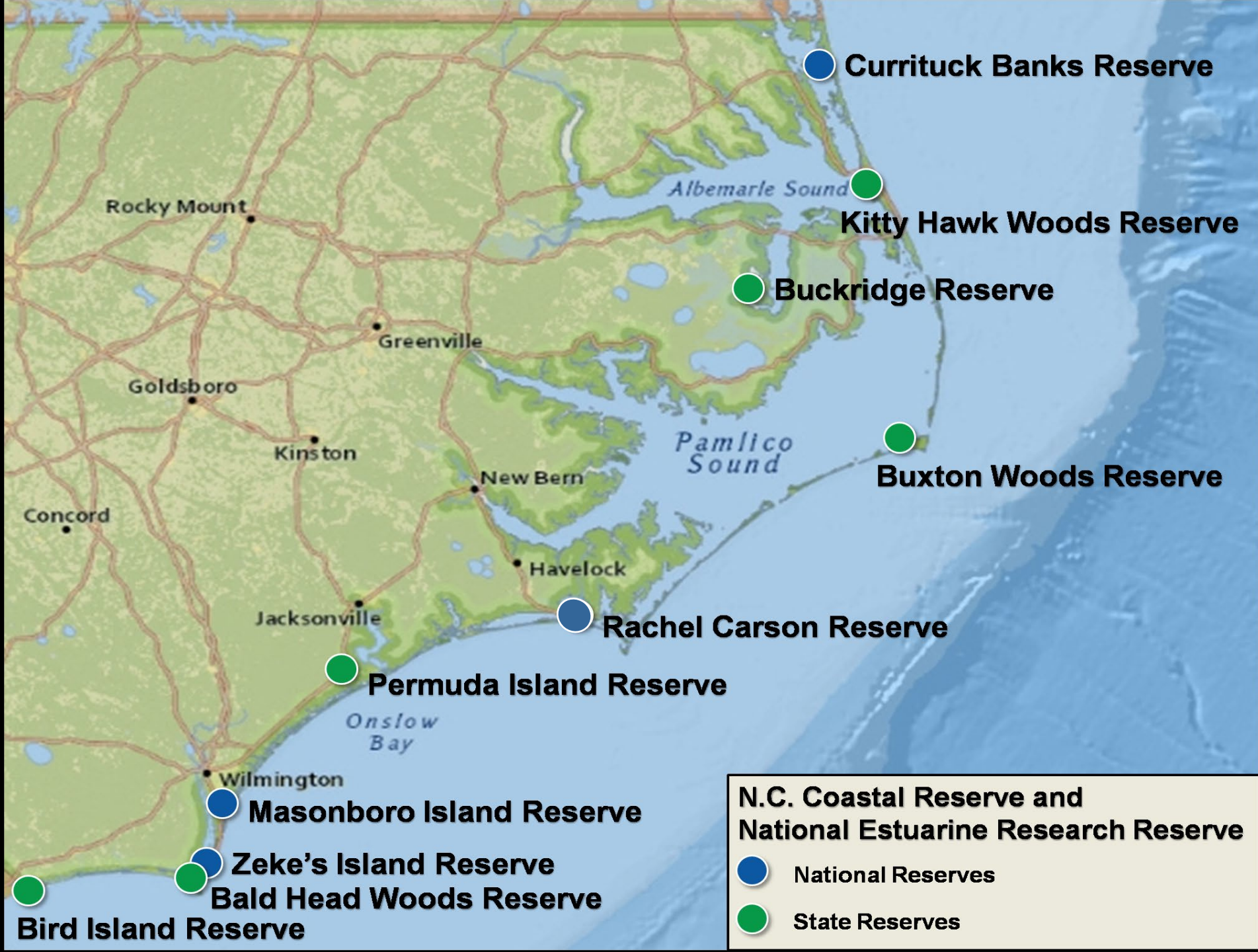


North Carolina Coastal Reserve



**North Carolina
National Estuarine Research Reserve**

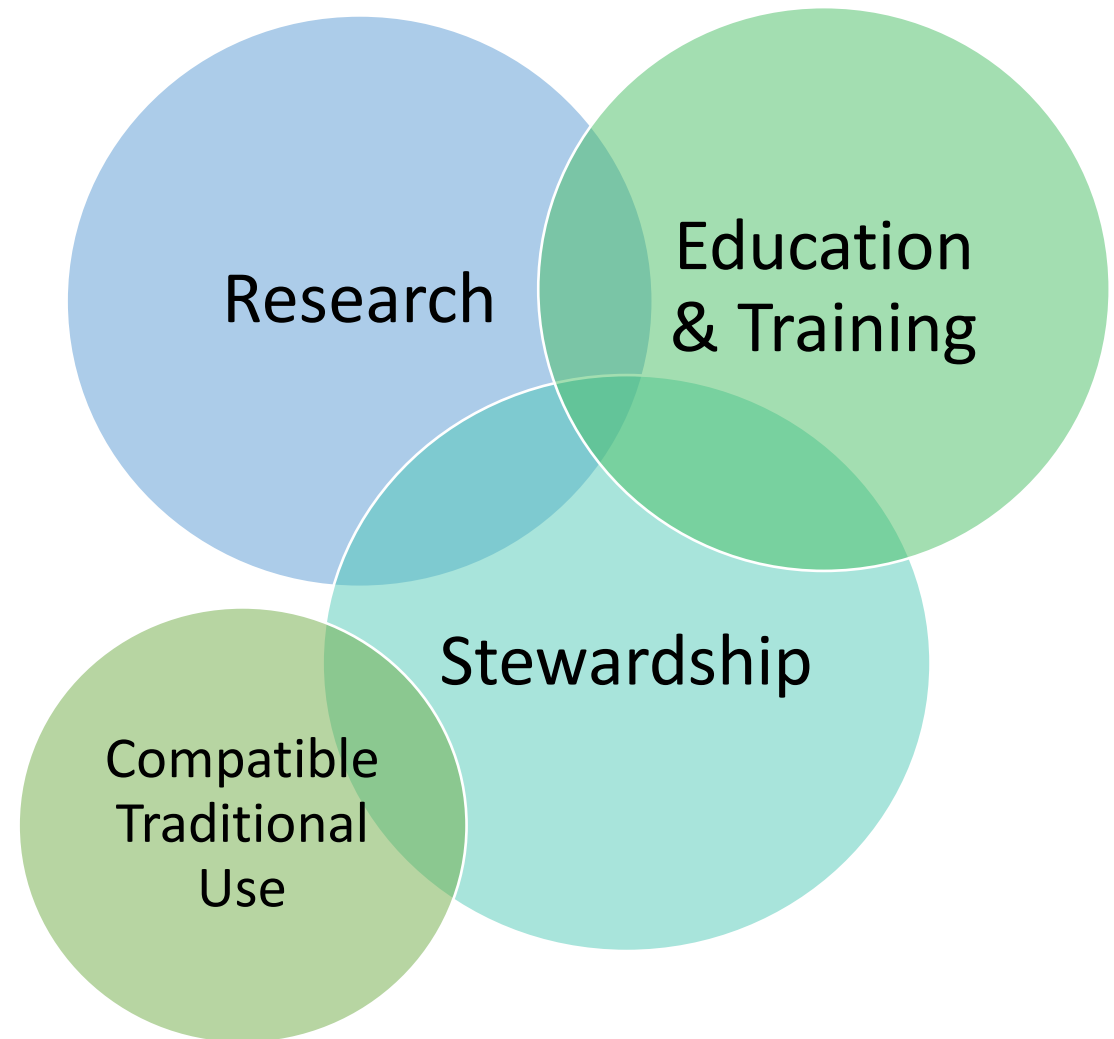




Mission



To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.



Social Media



North Carolina Coastal Reserve



Rachel Carson Reserve



Masonboro Island Reserve



@NCReserve



@NCReserve



Today's Purpose

- Bring awareness to the importance of North Carolina's estuarine habitats and the benefits they provide;
- Make you aware of a habitat-friendly method of shoreline stabilization, known as living shorelines, that are effective and resilient to storms;
- Enable you, when working with estuarine shoreline property owners, to advocate for the use of living shorelines over bulkheads or other hardened structures;
- Provide you continuing education credits while increasing your professional knowledge.

Agenda

- 9:15am **Living Shorelines: Benefits and Limitations**
Whitney Jenkins, N.C. Coastal Reserve
- 10:00am **10-Minute Break**
- 10:10am **Estuarine Shoreline Stabilization Design & Techniques**
Mariko Polk, North Carolina Sea Grant
- 11:00am **20-Minute Break – Lunch**
- 11:20am **Permitting Living Shorelines**
Jason Dail, N.C. Division of Coastal Management
- 12:05pm **10-Minute Break**
- 12:15pm **Best Practices for Working with Marsh Plants and Oyster Shell**
Georgia Busch, North Carolina Coastal Federation
- 1:00pm **Adjourn**



Past Workshop Resources



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

Coastal Training Program

[Scheduled Workshops](#)

[Past Workshops](#)

<https://deq.nc.gov/past-workshops>



Promoting Living Shorelines for Erosion Control – A Workshop for Real Estate Professionals

Living Shorelines: Benefits & Limitations

Adapted from Dr. Carolyn Currin & Dr. Rachel Gittman



North Carolina Coastal Habitats



What benefits do you think these coastal habitats provide?

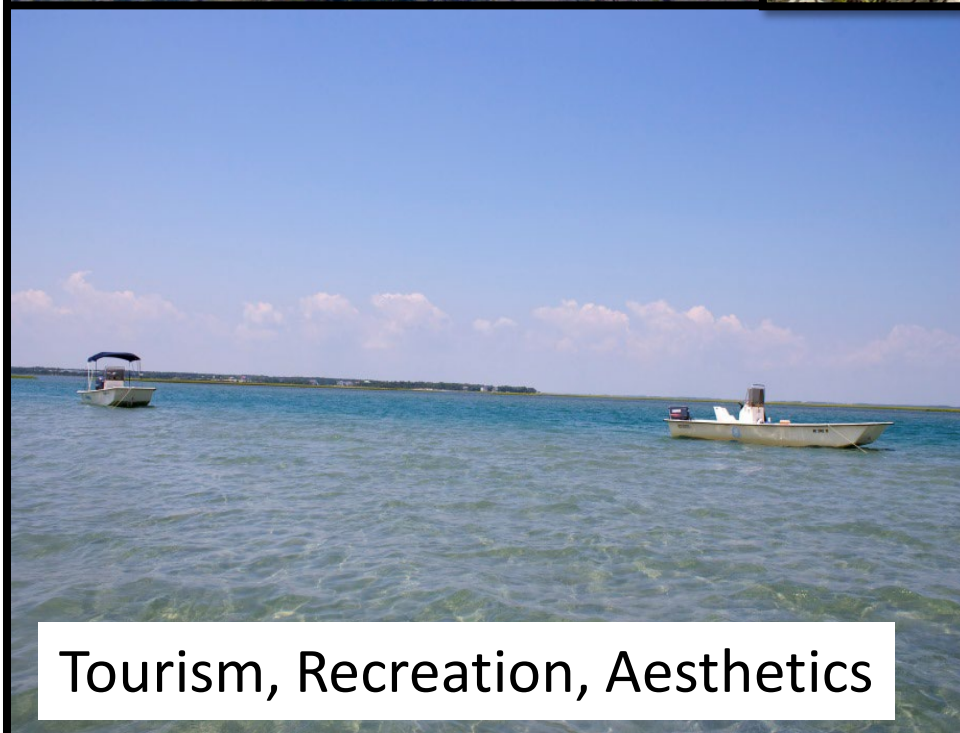
Coastal Habitat Benefits



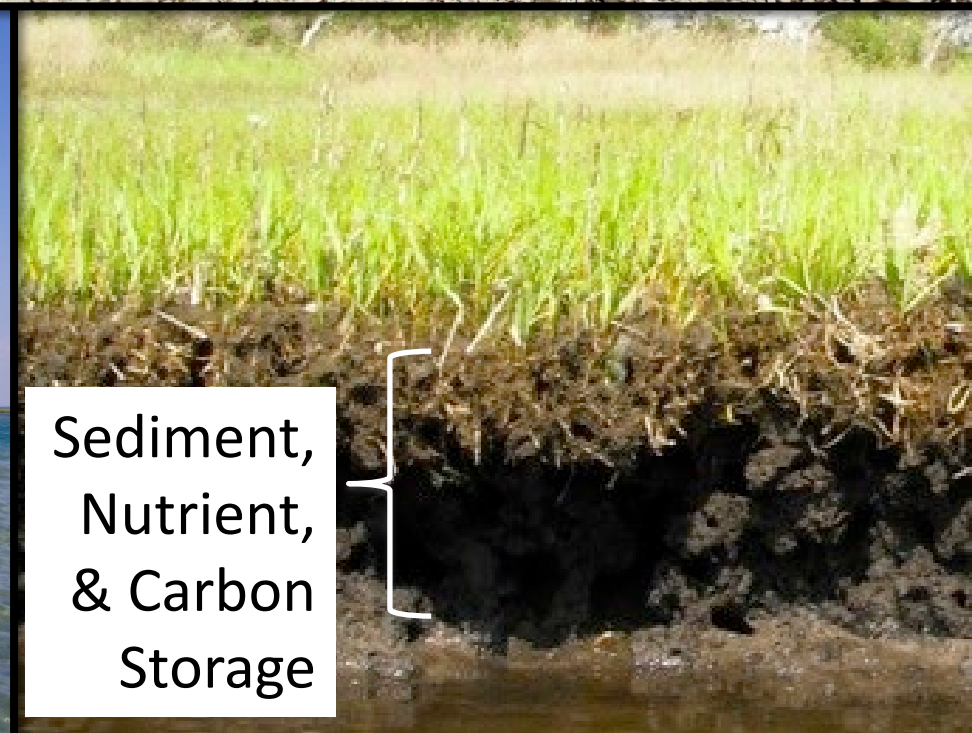
Habitat



Shoreline Stabilization



Tourism, Recreation, Aesthetics



Sediment,
Nutrient,
& Carbon
Storage



North Carolina Coastal Habitats

Do you work with properties on estuarine shorelines?

If you work with properties on estuarine shorelines,
do many of these properties had some sort of
shoreline stabilization?

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



Groyne/Jetty

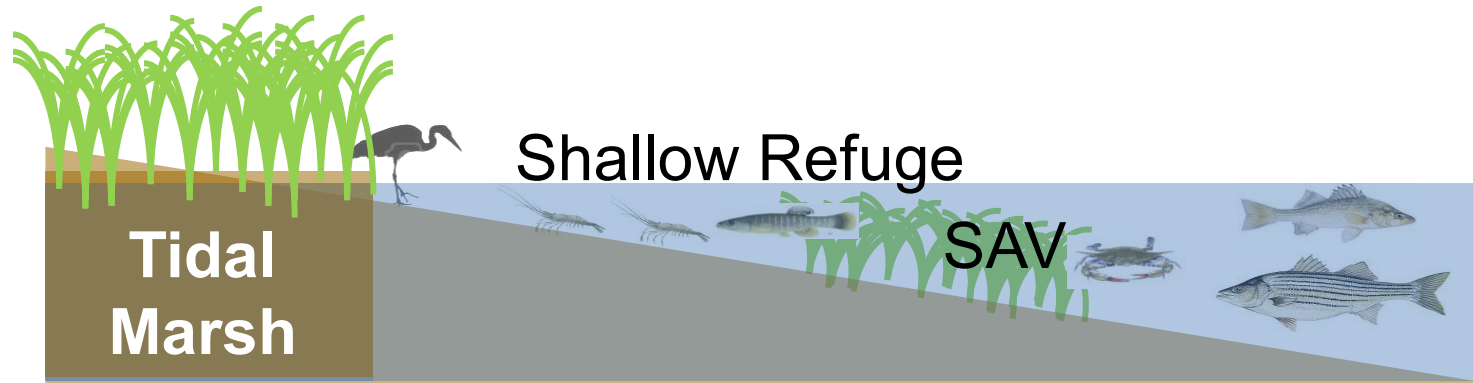


Riprap Revetment

Seawall



Breakwater Photo credit: VIMS



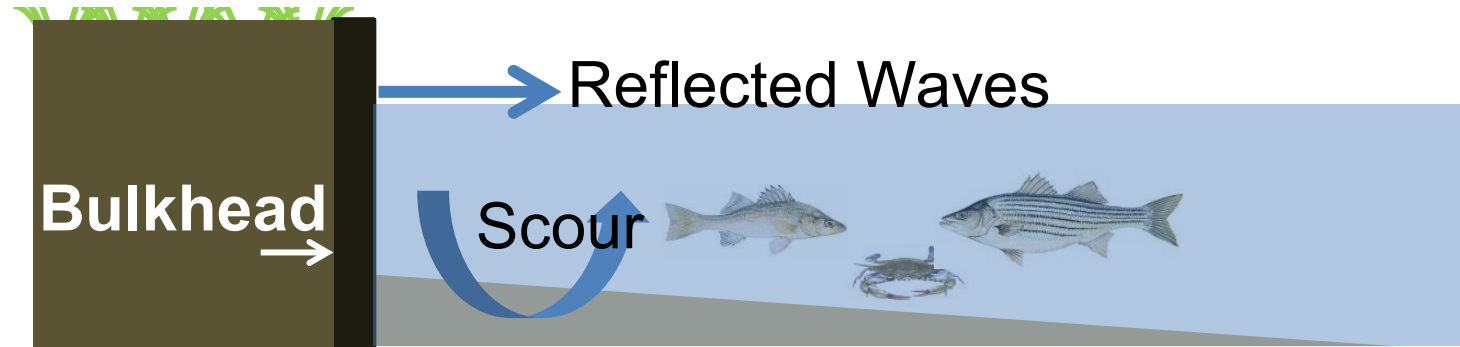


Fig. courtesy T. Jordan

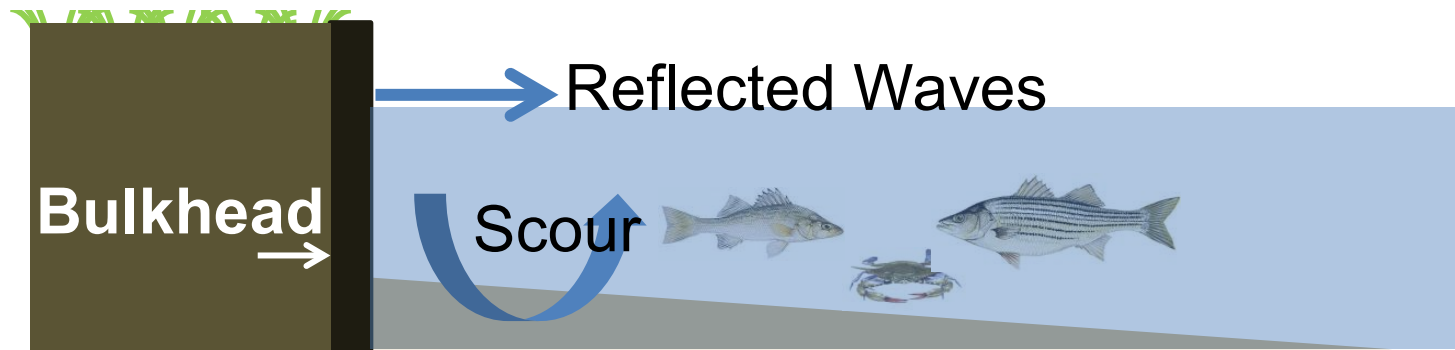


Fig. courtesy T. Jordan

Changes occur **BELOW** the “mean high water” 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.

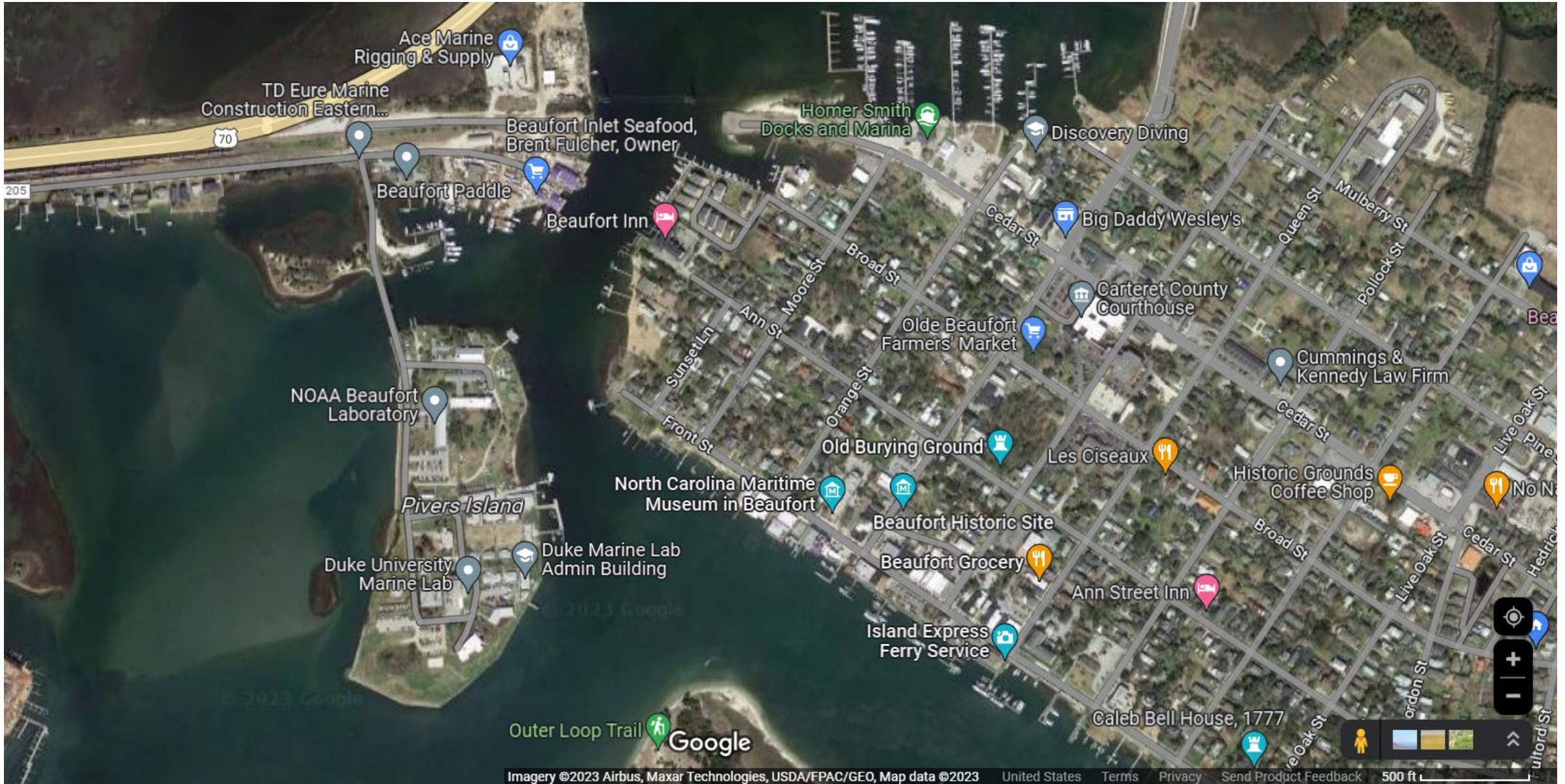
What's the alternative?

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 resilient to hurricanes
- Comparable in cost to bulkheads



Pivers Island Living Shoreline



Pivers Island Living Shoreline



Pivers Island Living Shoreline

March 2001



Pivers Island Living Shoreline

March 2001



Pivers Island Living Shoreline

Oyster shells applied in 2000 and 2006



Pivers Island Living Shoreline



Pivers Island Living Shoreline

June 2003



Pivers Island Living Shoreline

July 2006



Pivers Island Living Shoreline

May 2014



Pivers Island Living Shoreline

September 2024



Marshes Dampen Wave Energy





Pivers Island Living Shoreline

After Hurricane Irene – 2011

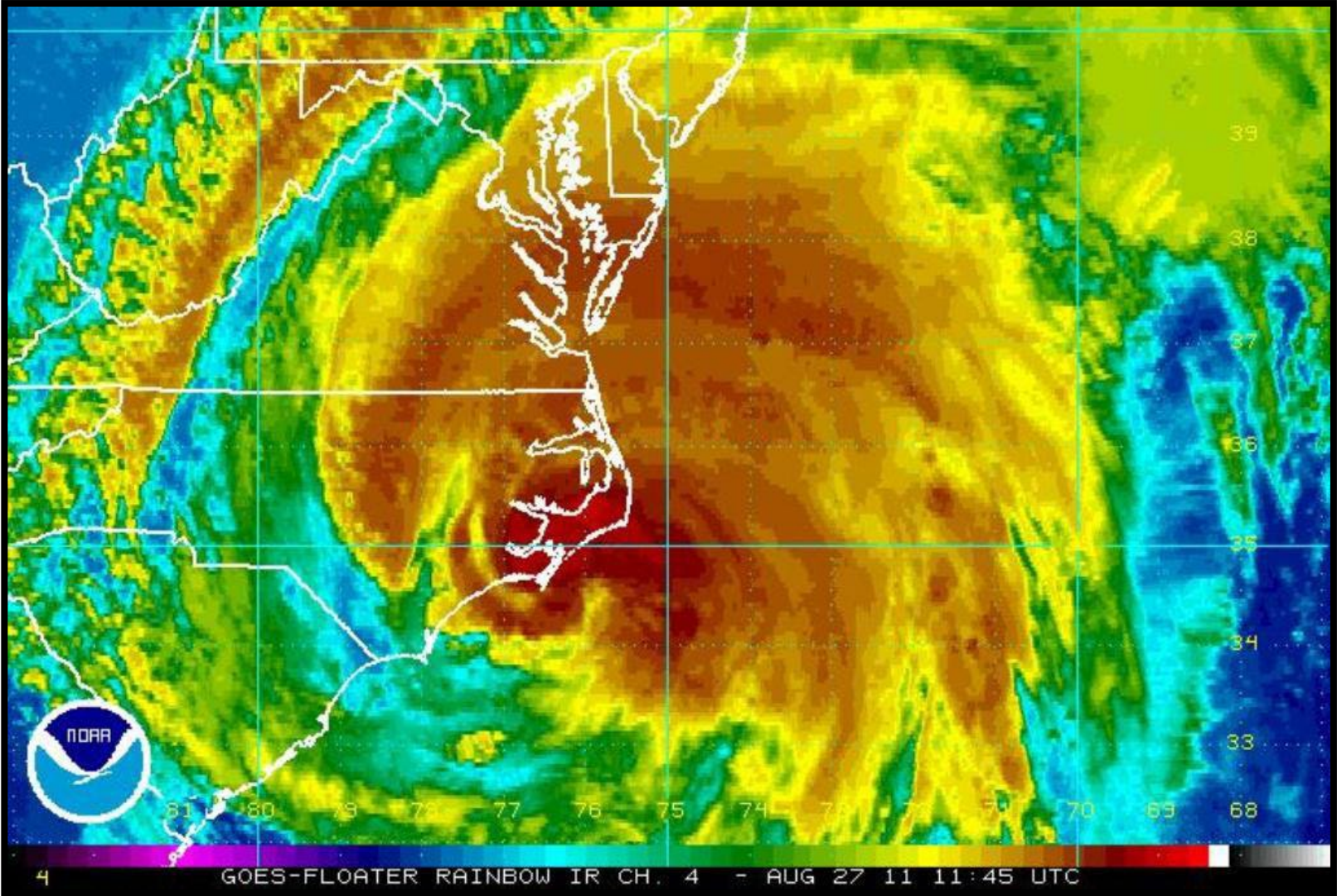
Shoreline Accreted Sediment

Have you ever worked with a property that had a living shoreline?



What about hurricanes?

Hurricane Irene 2011



Bulkhead vs. Living Shoreline



Photos: Rachel Gittman



Hurricane Matthew, 2016



Scour landward of the wall

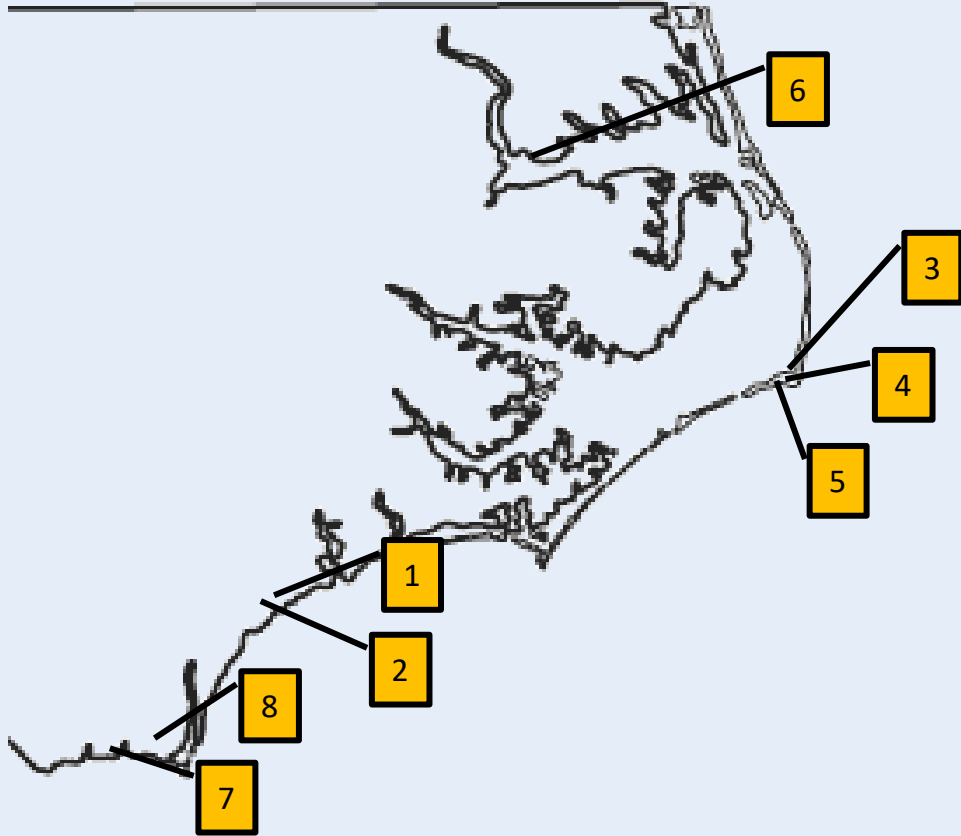




Monitored living shorelines before and after Hurricane Florence

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. Edenhouse Boat Ramp, Chowan River – Edenton
7. St. James Oyster Sill – Wilmington
8. Southport Rock Sill – Wilmington

LIVING SHORELINE EROSION POST HURRICANE FLORENCE

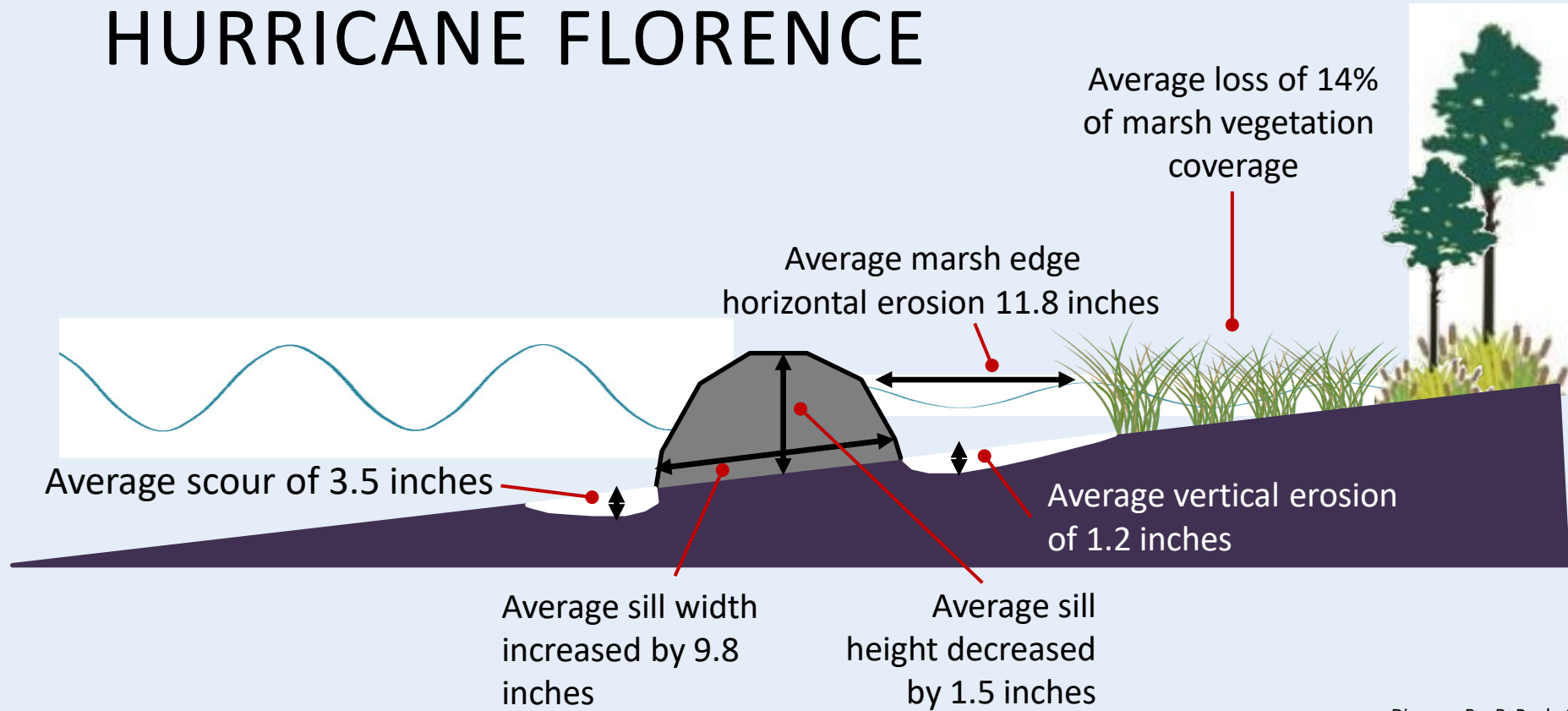


Diagram By: B. Puckett

Morris Landing Rock Sill – Wilmington

AUGUST

{1 MONTH PRE STORM}



OCTOBER

{1 MONTH POST STORM}



Woodall Rock Sill – Ocracoke

AUGUST
{1 MONTH PRE STORM}



DECEMBER
{3 MONTHS POST STORM}



Edenhouse Boat Ramp, Chowan River – Edenton

AUGUST
{1 MONTH PRE STORM}



OCTOBER
{1 MONTH POST STORM}



St. James Oyster Sill – Wilmington

AUGUST
{1 MONTH PRE STORM}



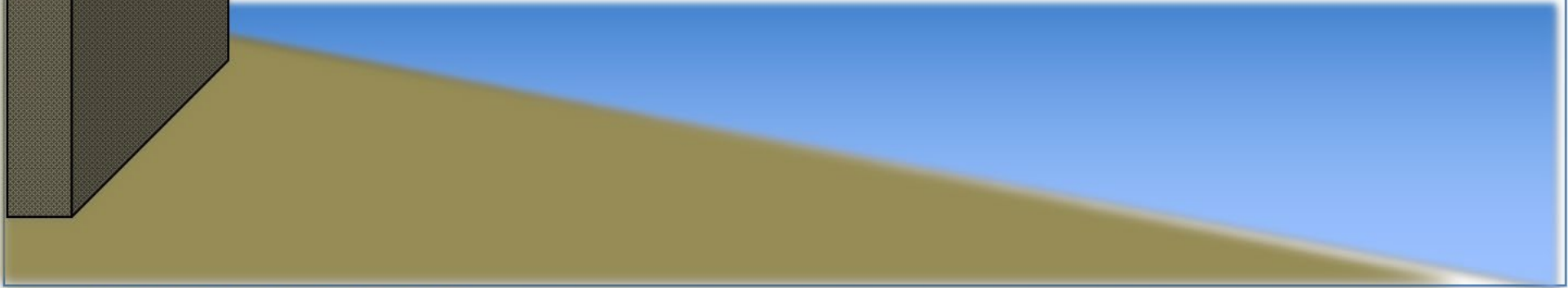
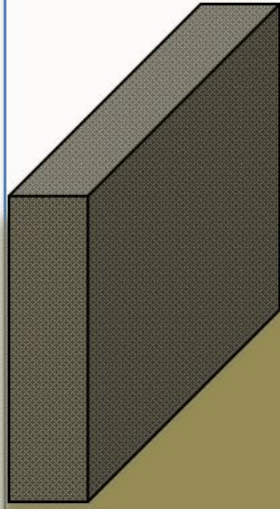
NOVEMBER
{2 MONTHS POST STORM}



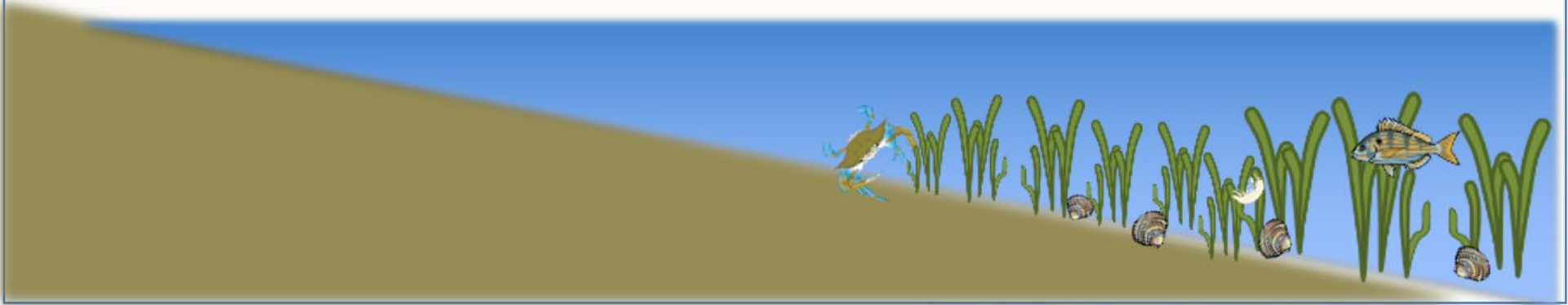
What about habitat?

Bulkhead vs. Living Shoreline

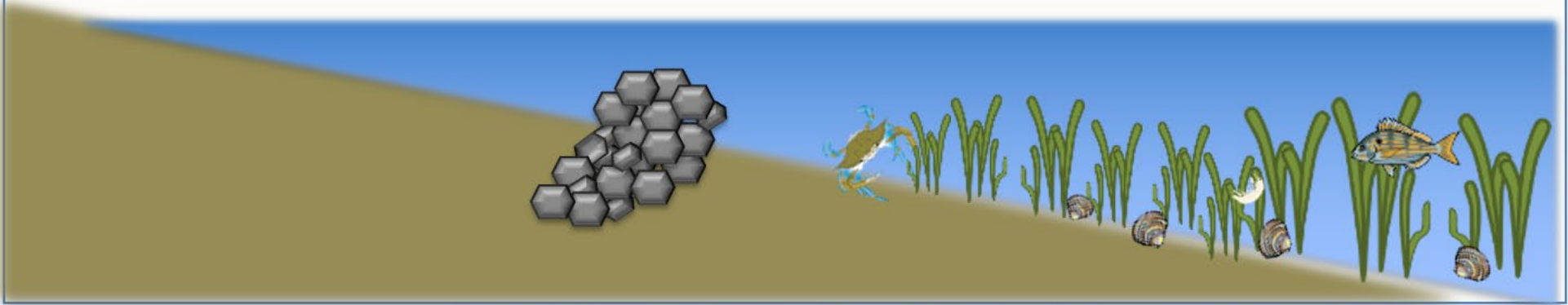
Habitat Comparison



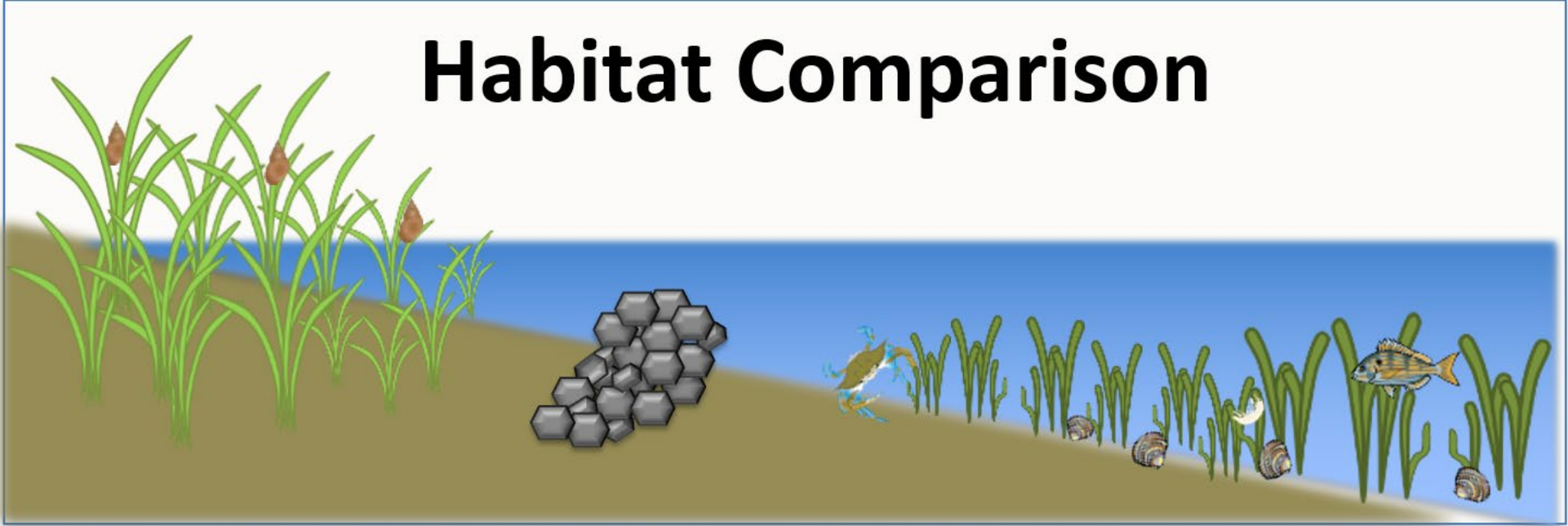
Habitat Comparison



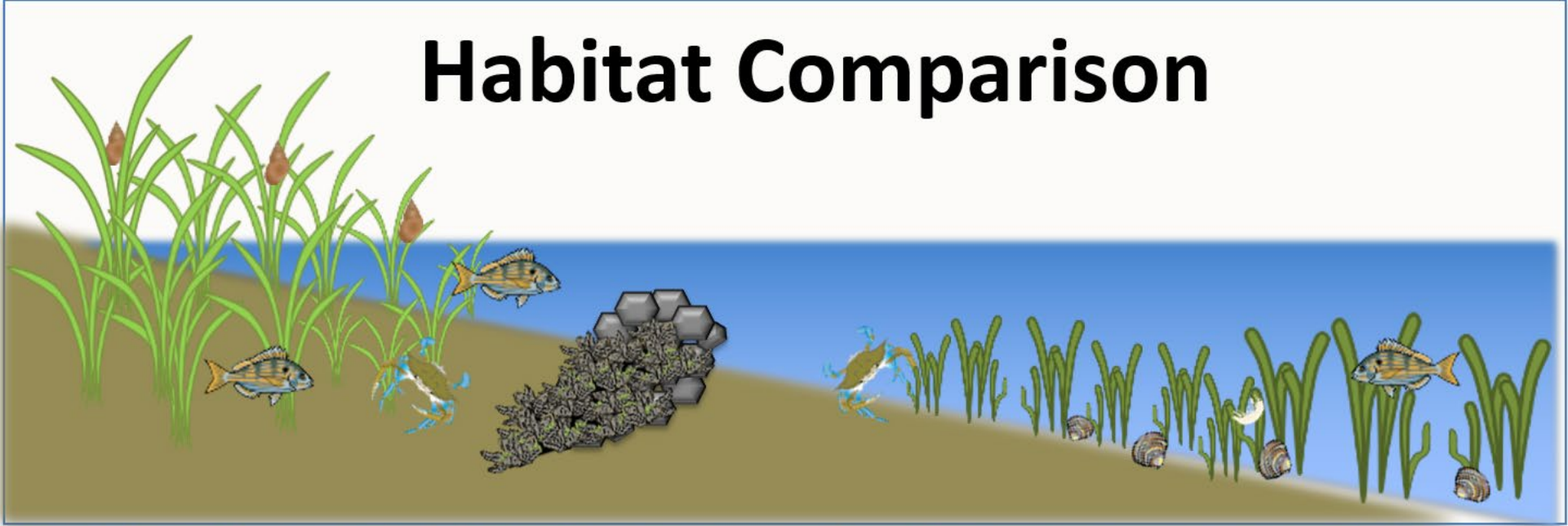
Habitat Comparison



Habitat Comparison

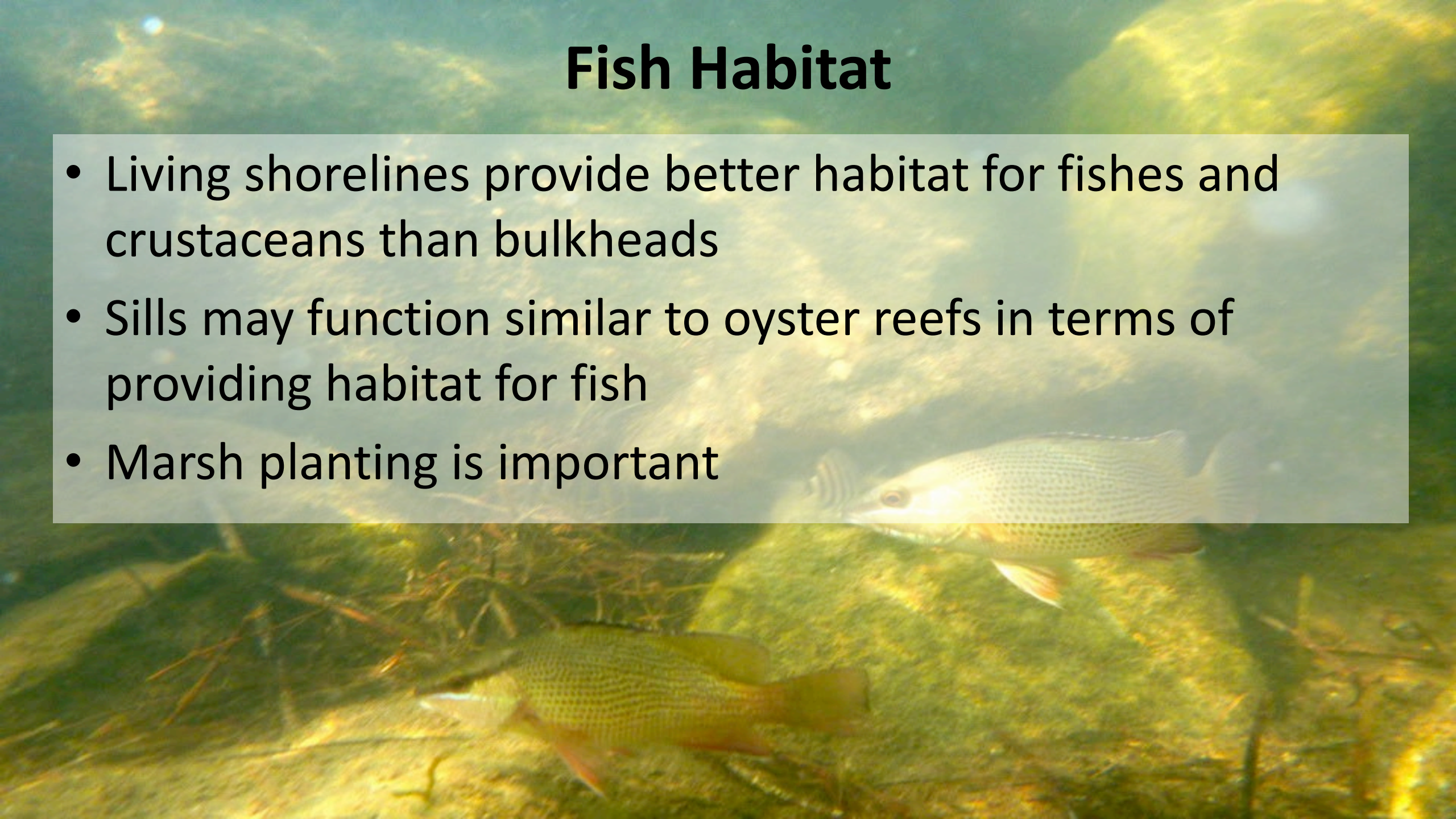


Habitat Comparison



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



Living shorelines maintain connections

Upland

Aquatic

Intertidal



Summary

- Hardened structures (bulkheads/riprap) do not provide the ecosystem services that natural shorelines do
- 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 natural materials into a 'living shorelines' approach can result in cost-effective, sustainable, and resilient shoreline protection

Pivers Island Living Shoreline

