



# Promoting Living Shorelines for Erosion Control

October 8, 2026

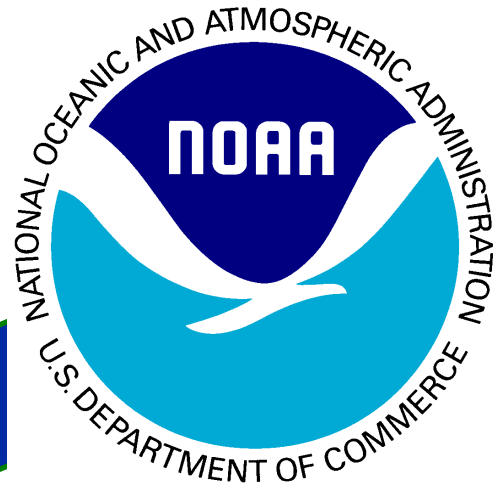


# National Estuarine Research Reserve System



# What is an estuary?



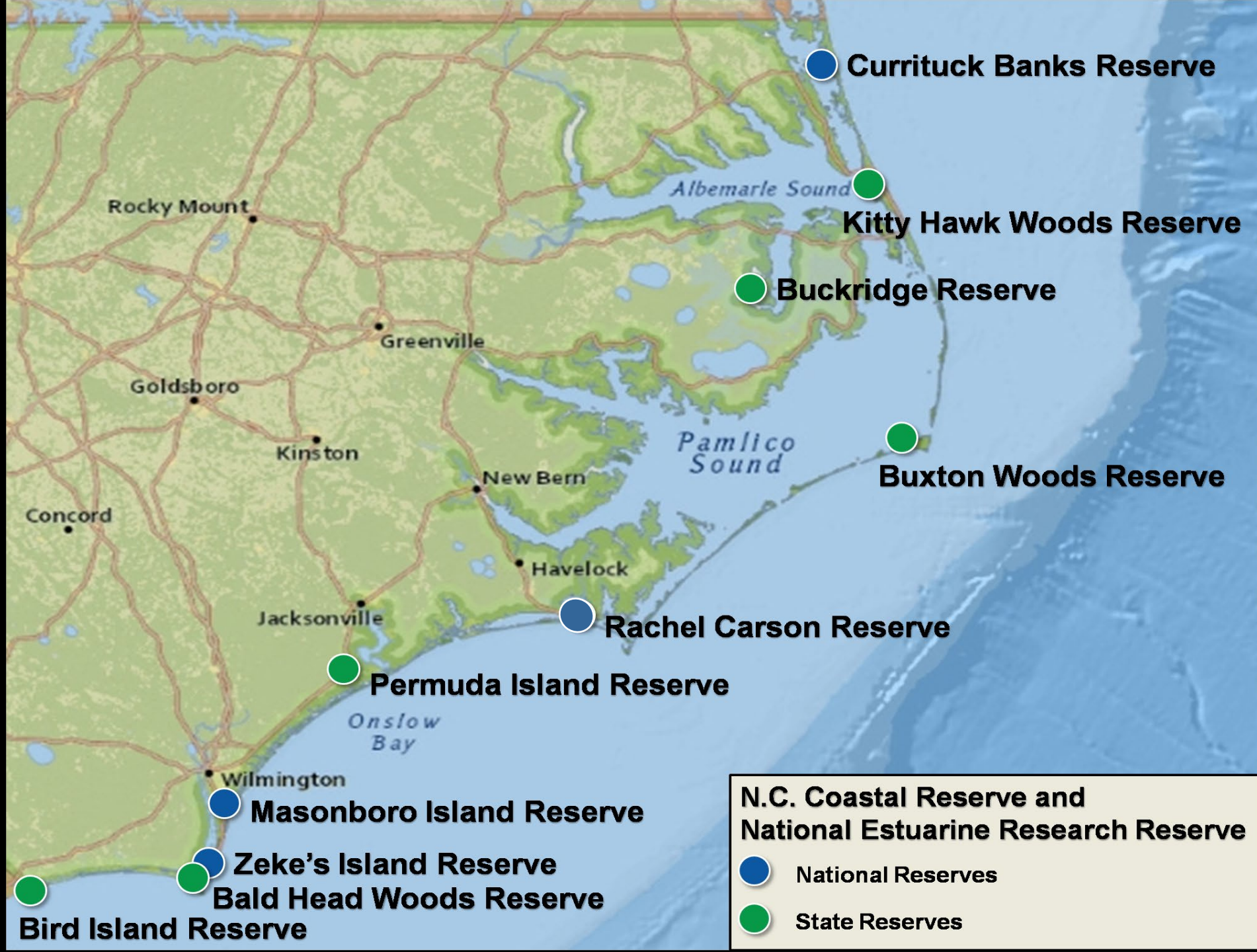


## **North Carolina Coastal Reserve**



## **North Carolina National Estuarine Research Reserve**

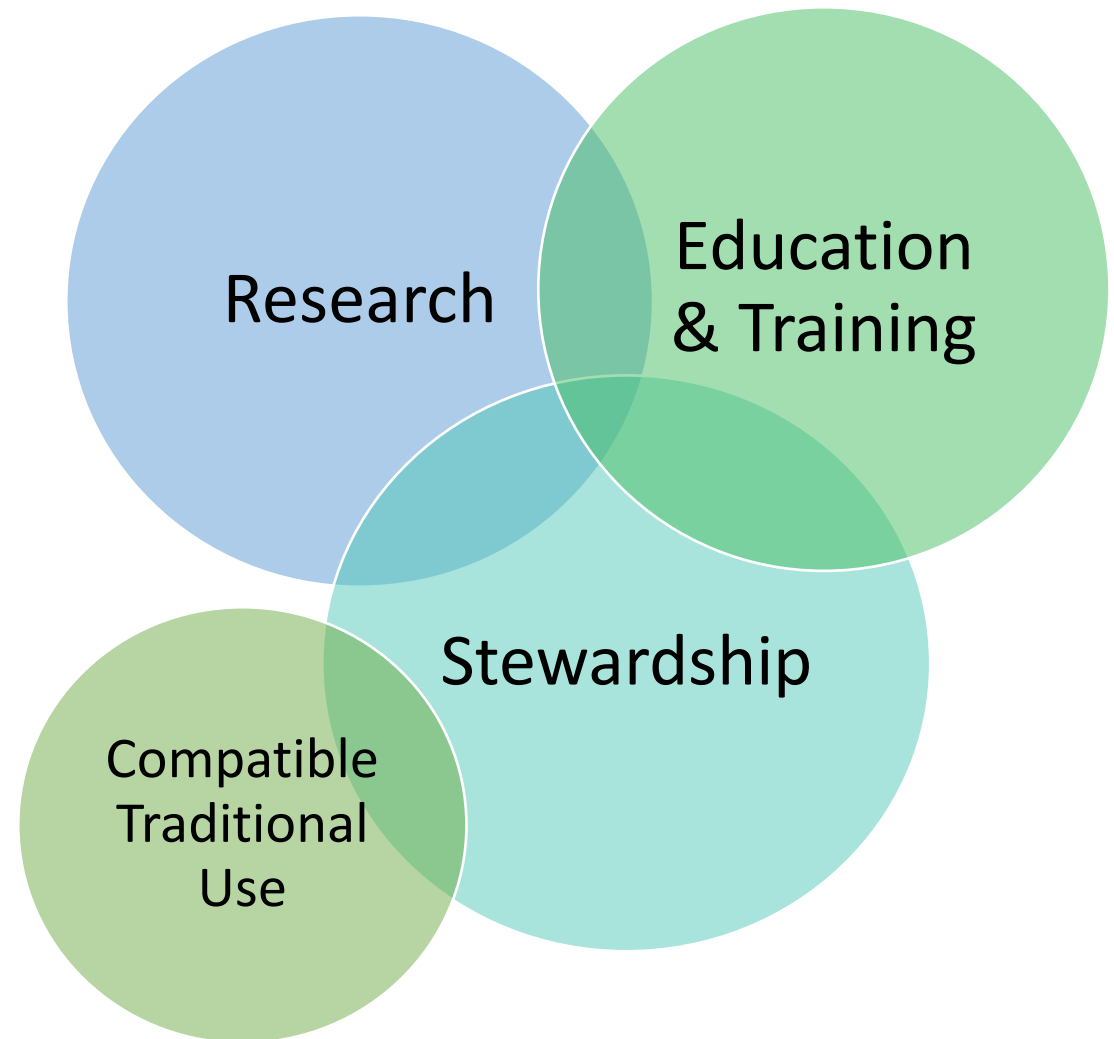




# Mission



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





# 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;
- Bring awareness to the Resilient Docks and Piers Toolkit to protect investments into these structures, safeguard local waterways, and contribute to a more resilient coast; and
- Provide you continuing education credits while increasing your professional knowledge.

# Agenda

9:15am

## **Living Shorelines: Benefits and Limitations**

Whitney Jenkins, N.C. Coastal Reserve

**9:45am**

## **10-Minute Break**

9:55am

## **Estuarine Shoreline Stabilization Design & Techniques**

Mariko Polk, North Carolina Sea Grant

**10:35am**

## **10-Minute Break**

10:45am

## **Permitting Living Shorelines**

Genny Ivec, N.C. Division of Coastal Management

**11:25am**

## **10-Minute Break**

11:35am

## **Best Practices for Working with Marsh Plants and Oyster Shell**

Georgia Busch, North Carolina Coastal Federation

**12:15pm**

## **10-Minute Break**

12:25pm

## **Resilient Docks & Piers Toolkit:** Kerri Allen, 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

# Next steps for continuing education credits

- License numbers will be uploaded to N.C. Real Estate Commission
- You'll receive an email with:
  - Link to workshop webpage (resources)
  - Confirmation that license number was uploaded
  - Workshop evaluation
- Certificates of Completion will be email individually



# 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



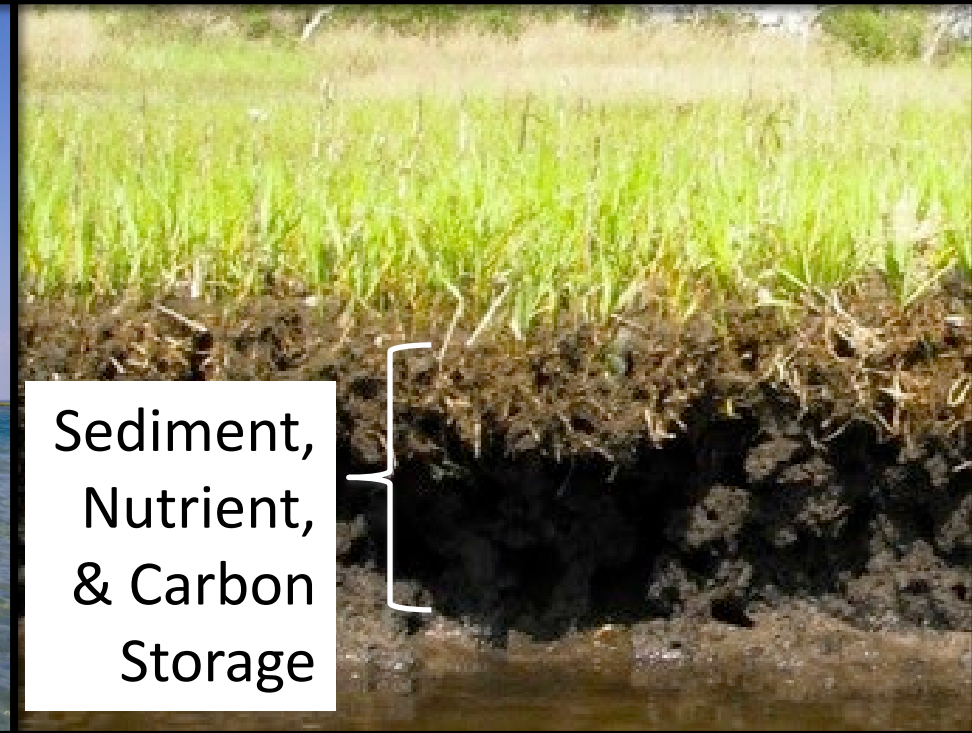
Shoreline Stabilization



Tourism, Recreation, Aesthetics



Sediment,  
Nutrient,  
& Carbon  
Storage





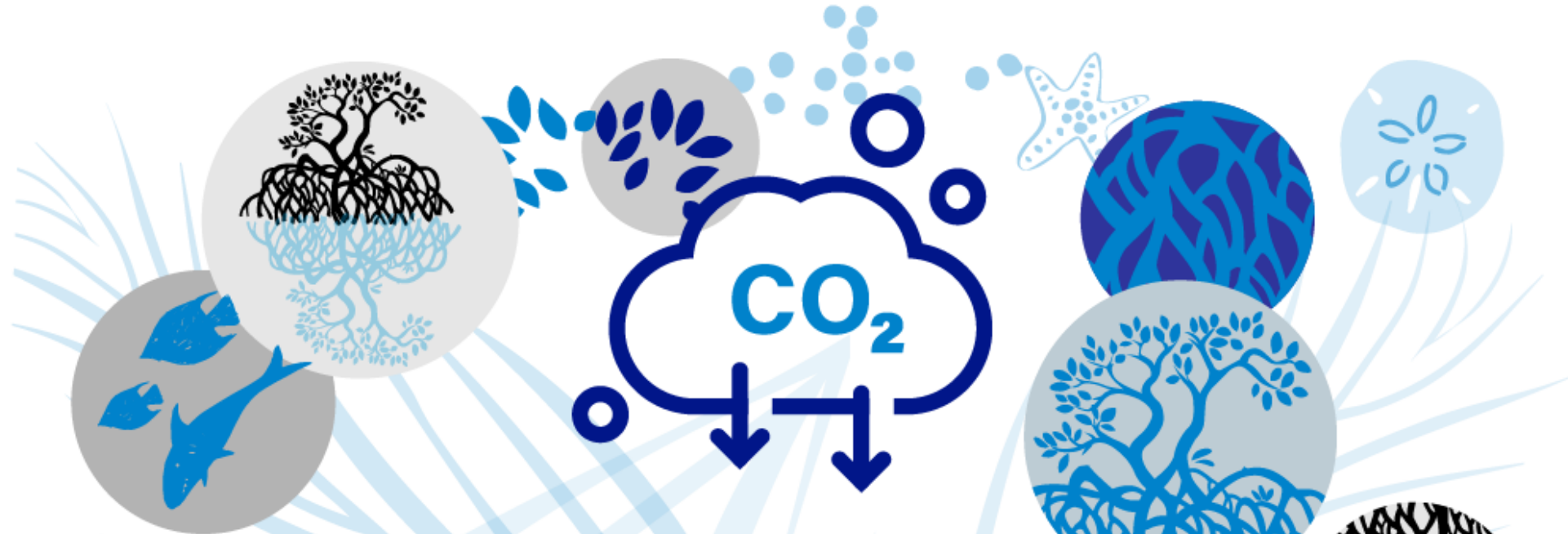
# Natural Infrastructure



Wetlands and reefs  
and mangroves...**oh my!**



Billions in savings (\$23 billion/year),  
services (water quality and storm protection),  
and value (37% higher property value).



# BLUE CARBON

**MANGROVES & SALT MARSHES** – Remove carbon at 10x greater rate than tropical forests

**Seagrasses** – 0.1% of world's seafloor, but store 11% of ocean's buried carbon



*The environmental and economic possibilities are endless!*



# 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



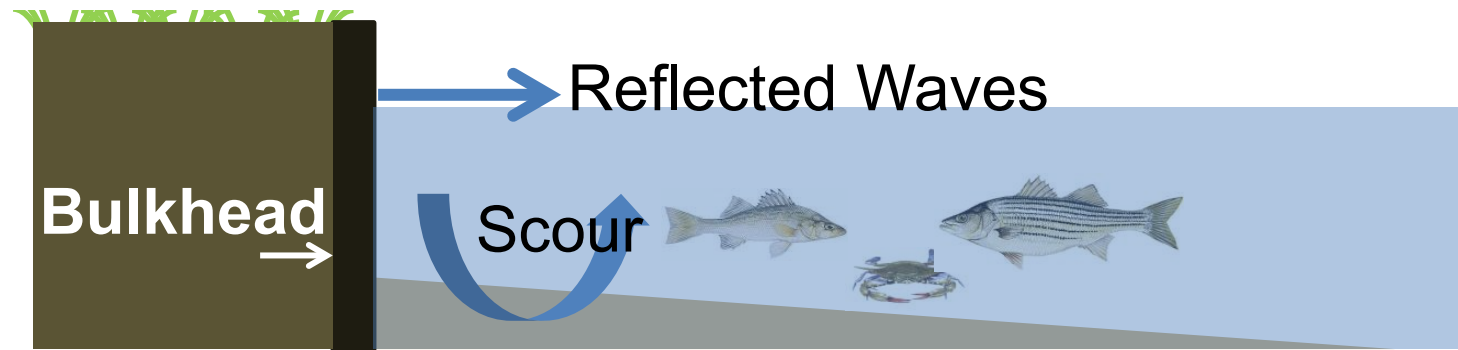
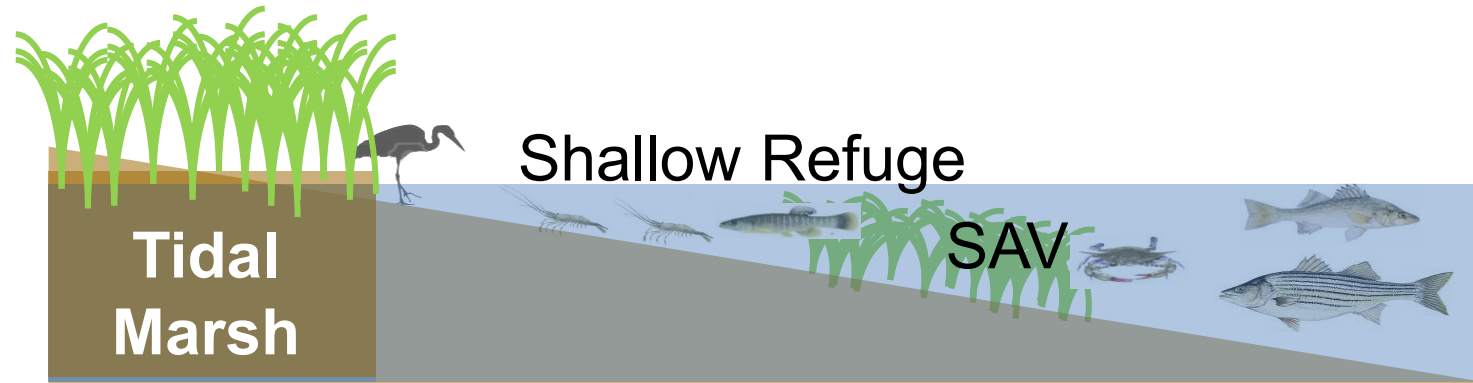


Fig. courtesy T. Jordan

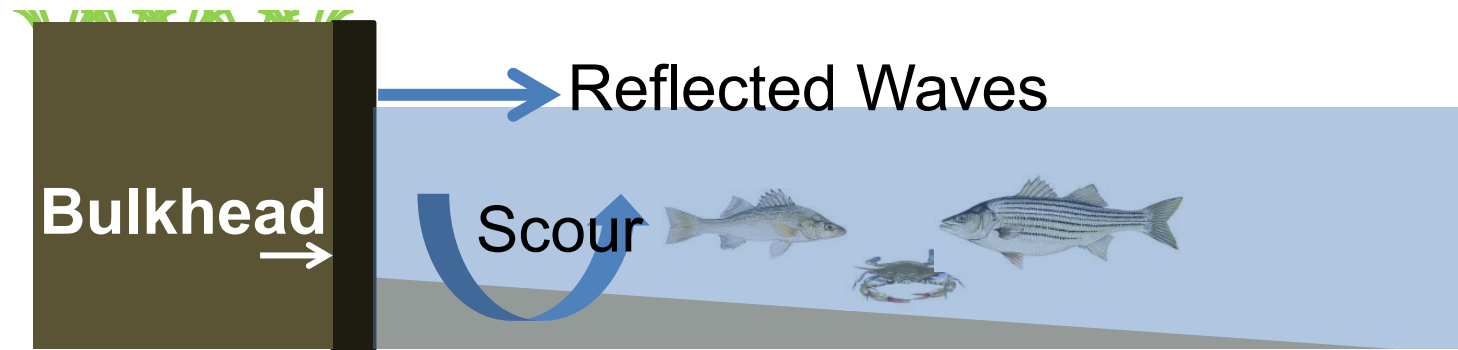


Fig. courtesy T. Jordan

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.

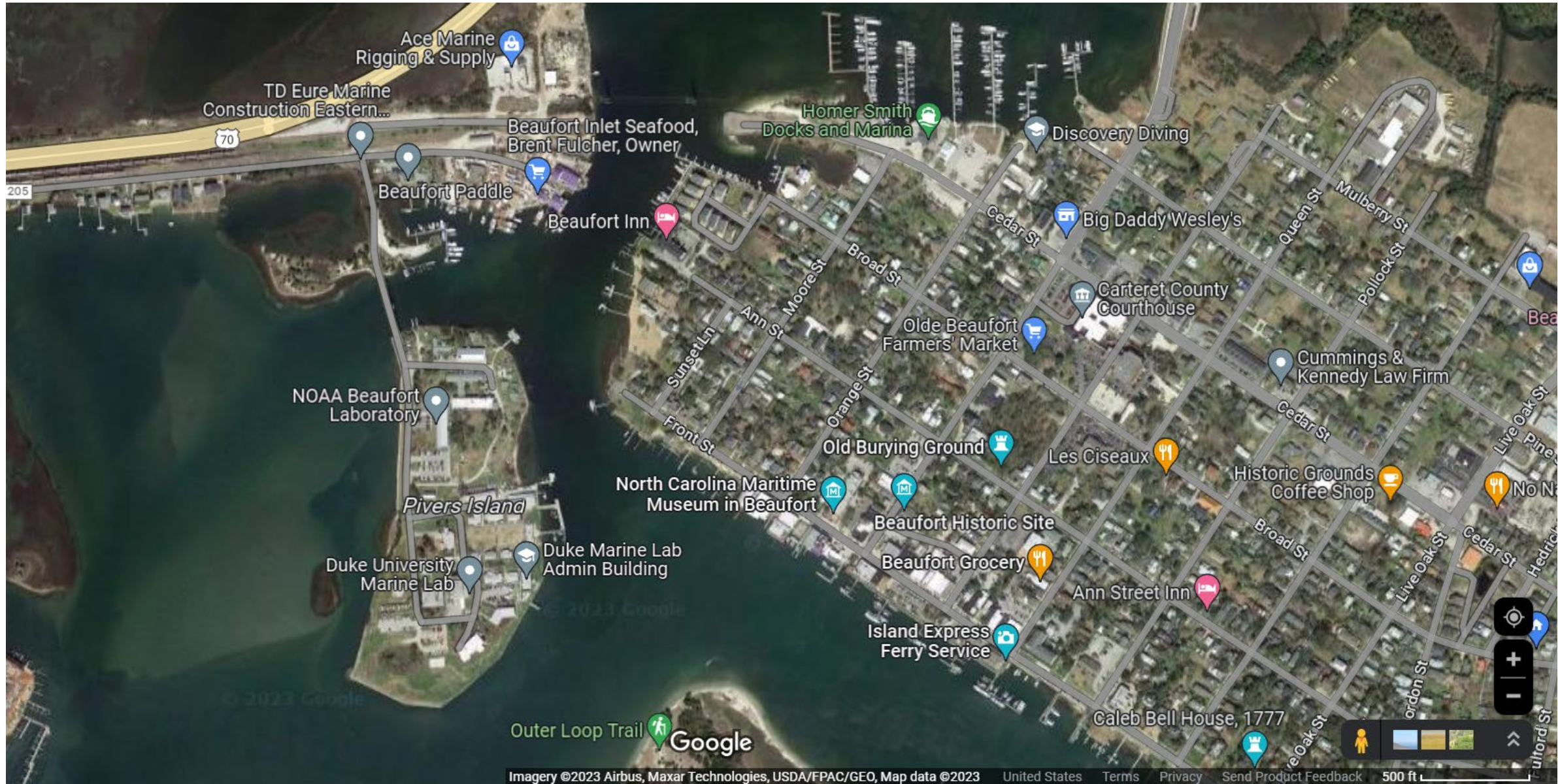
# What's the alternative?

**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

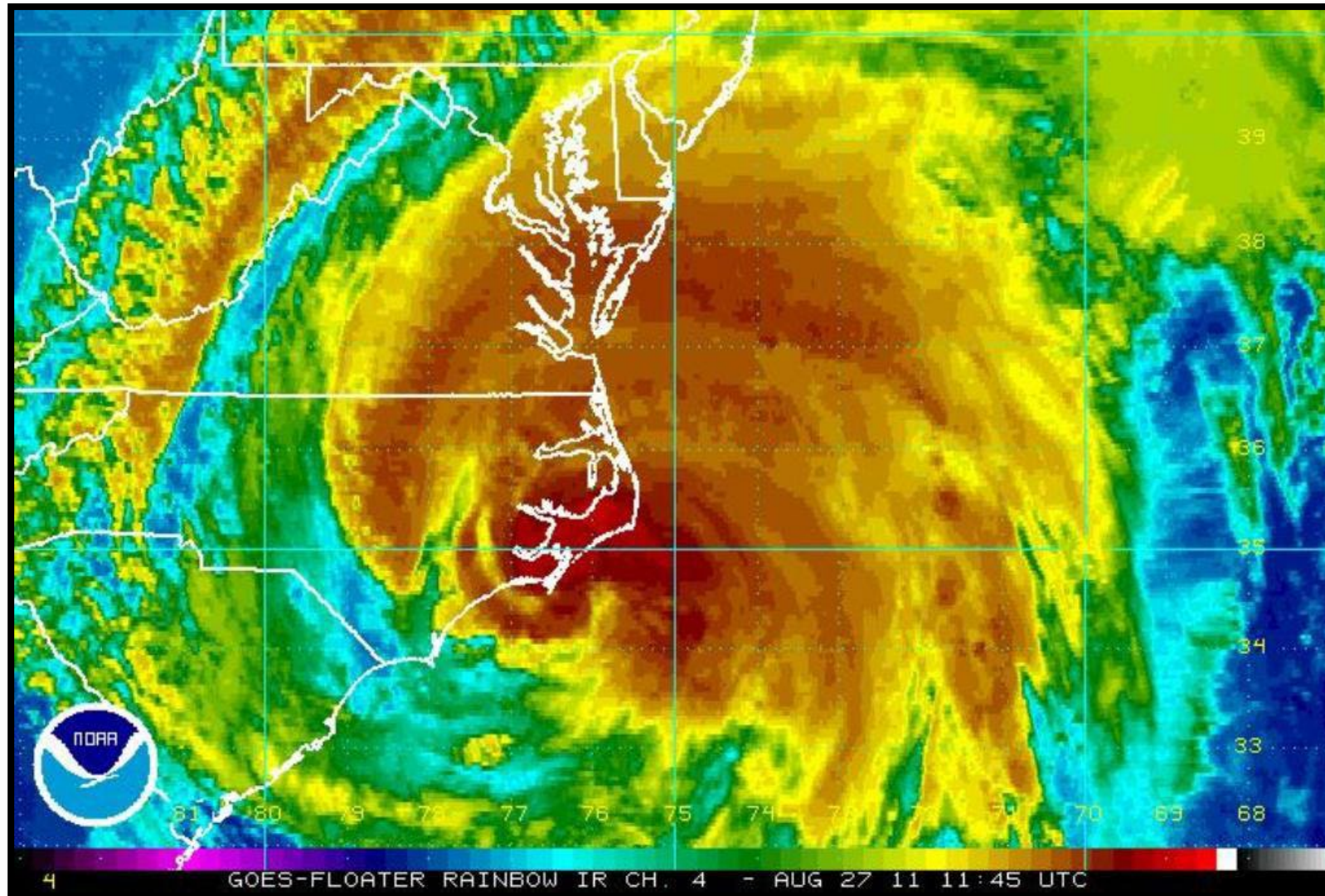
Shoreline Accreted Sediment

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



# What about hurricanes?

## Hurricane Irene 2011



# **Bulkhead vs. Living Shoreline**





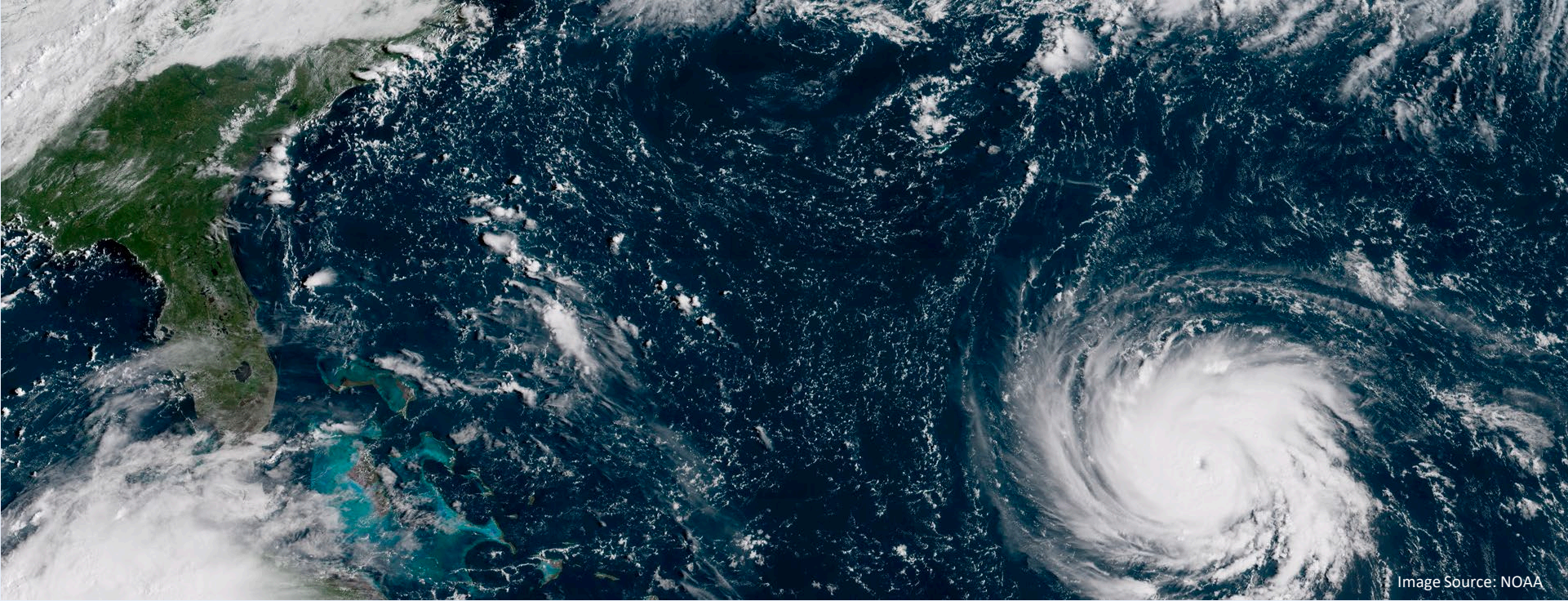


# Hurricane Matthew, 2016



Scour landward of the wall

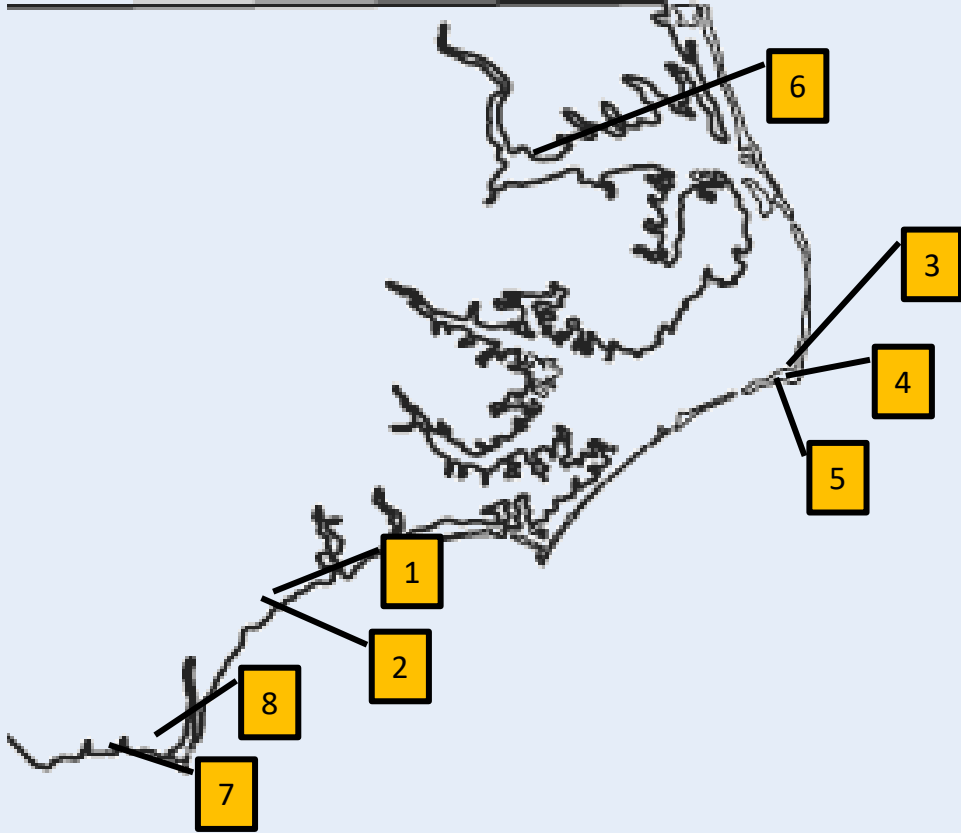




# Monitored living shorelines before and after Hurricane Florence

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

# LIVING SHORELINE EROSION POST HURRICANE FLORENCE

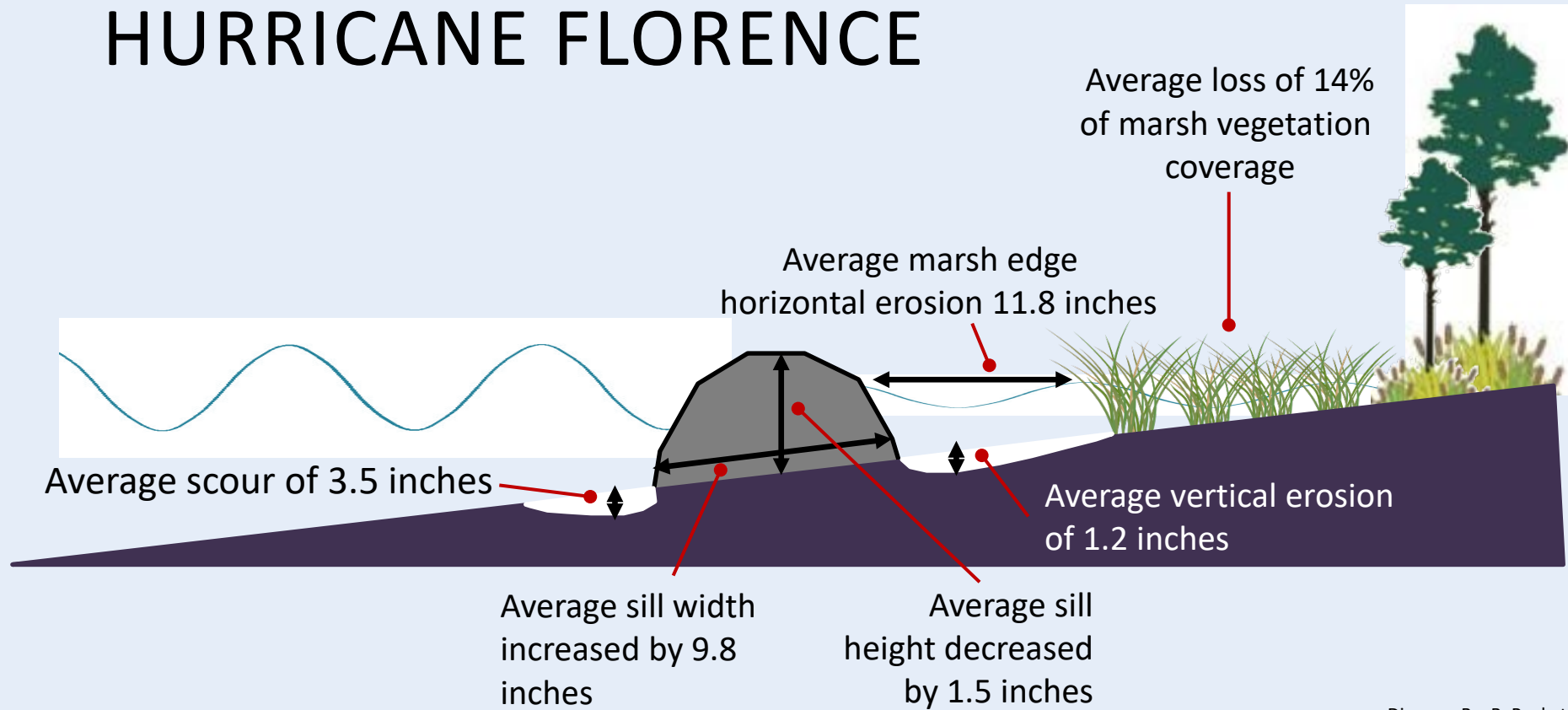


Diagram By: B. Puckett

# 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}



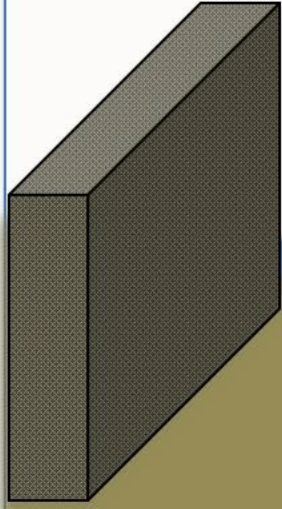
NOVEMBER  
{2 MONTHS POST STORM}



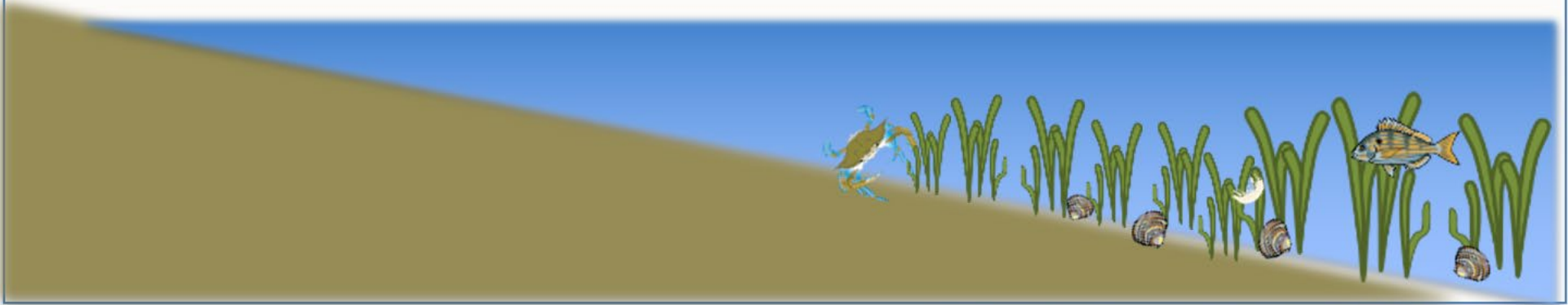
**What about habitat?**

Bulkhead vs. Living Shoreline

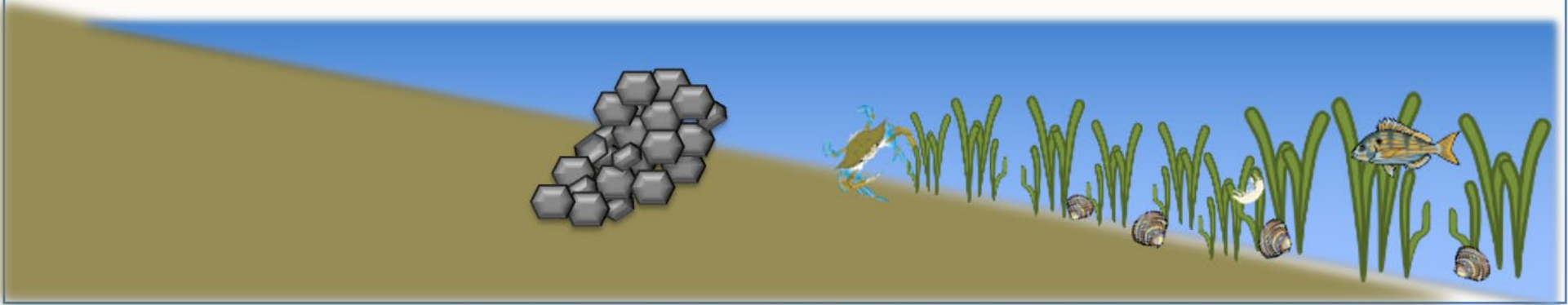
# Habitat Comparison



# Habitat Comparison



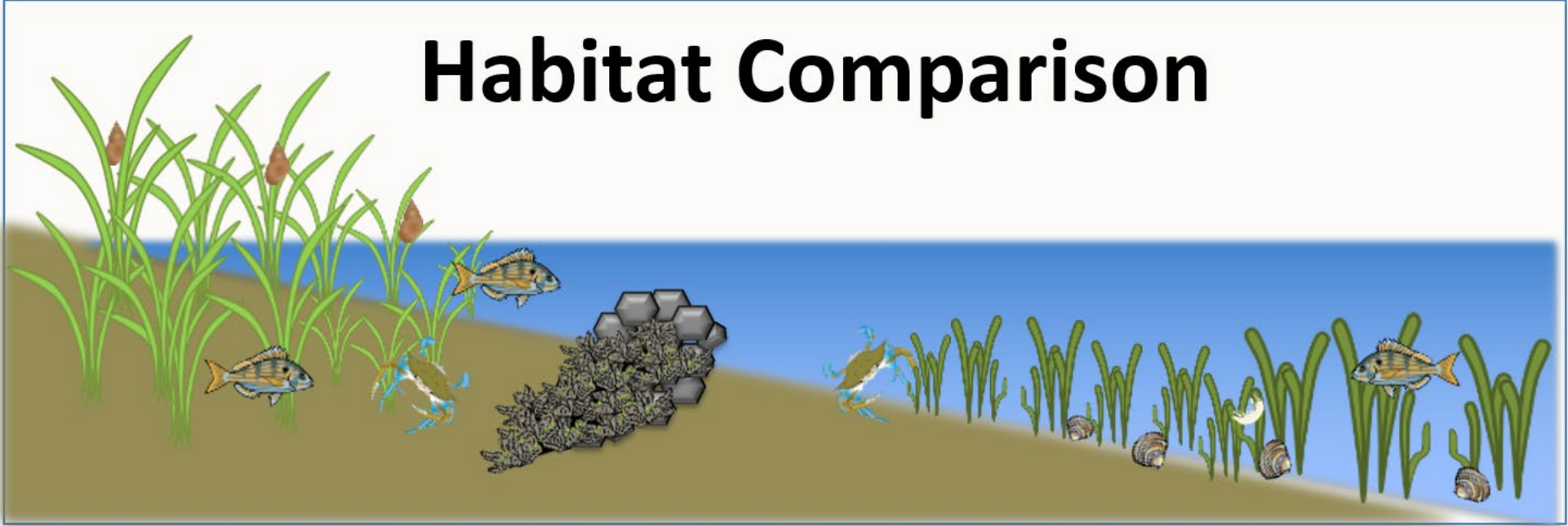
# Habitat Comparison



# Habitat Comparison



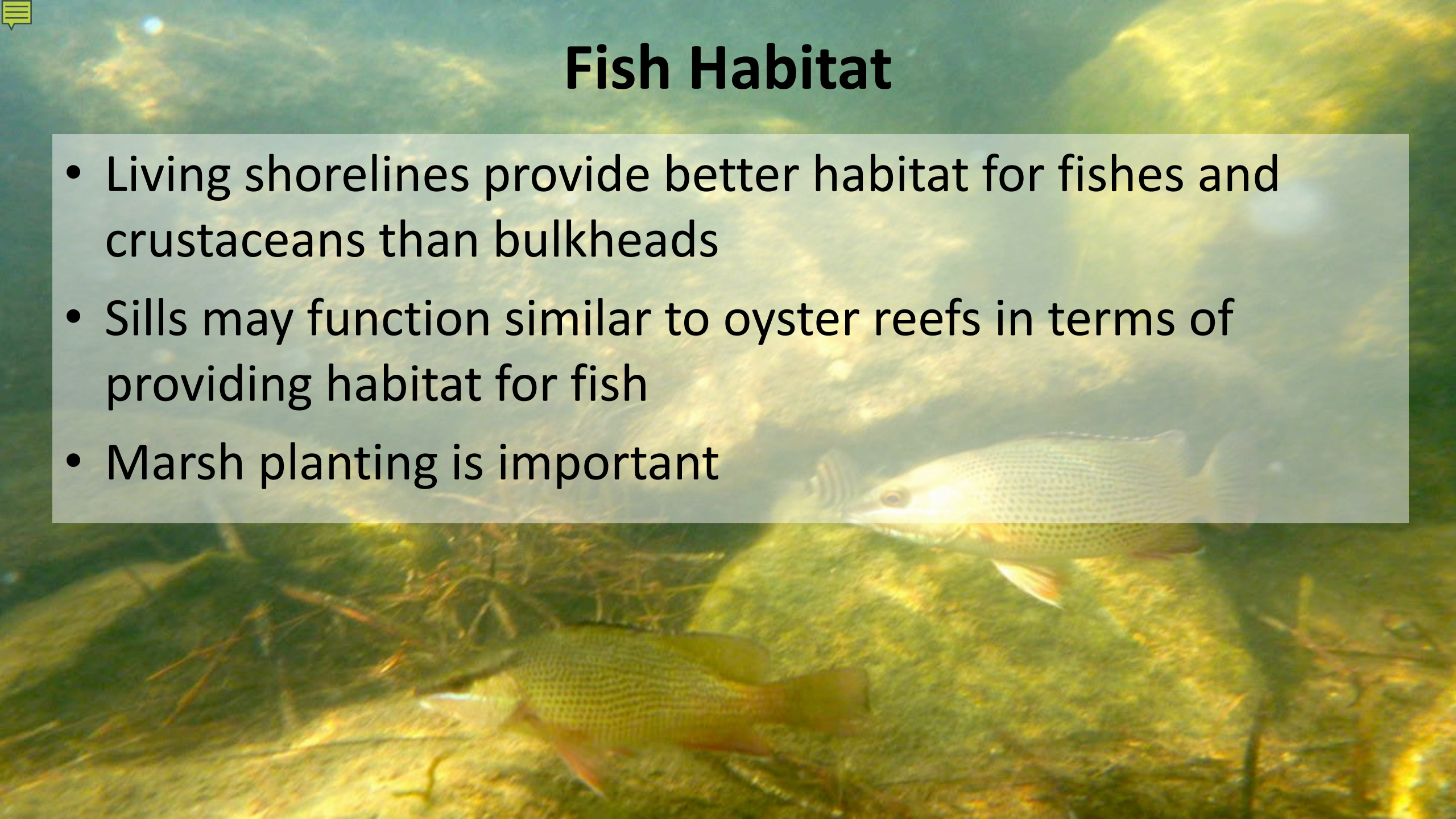
# Habitat Comparison





# 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

