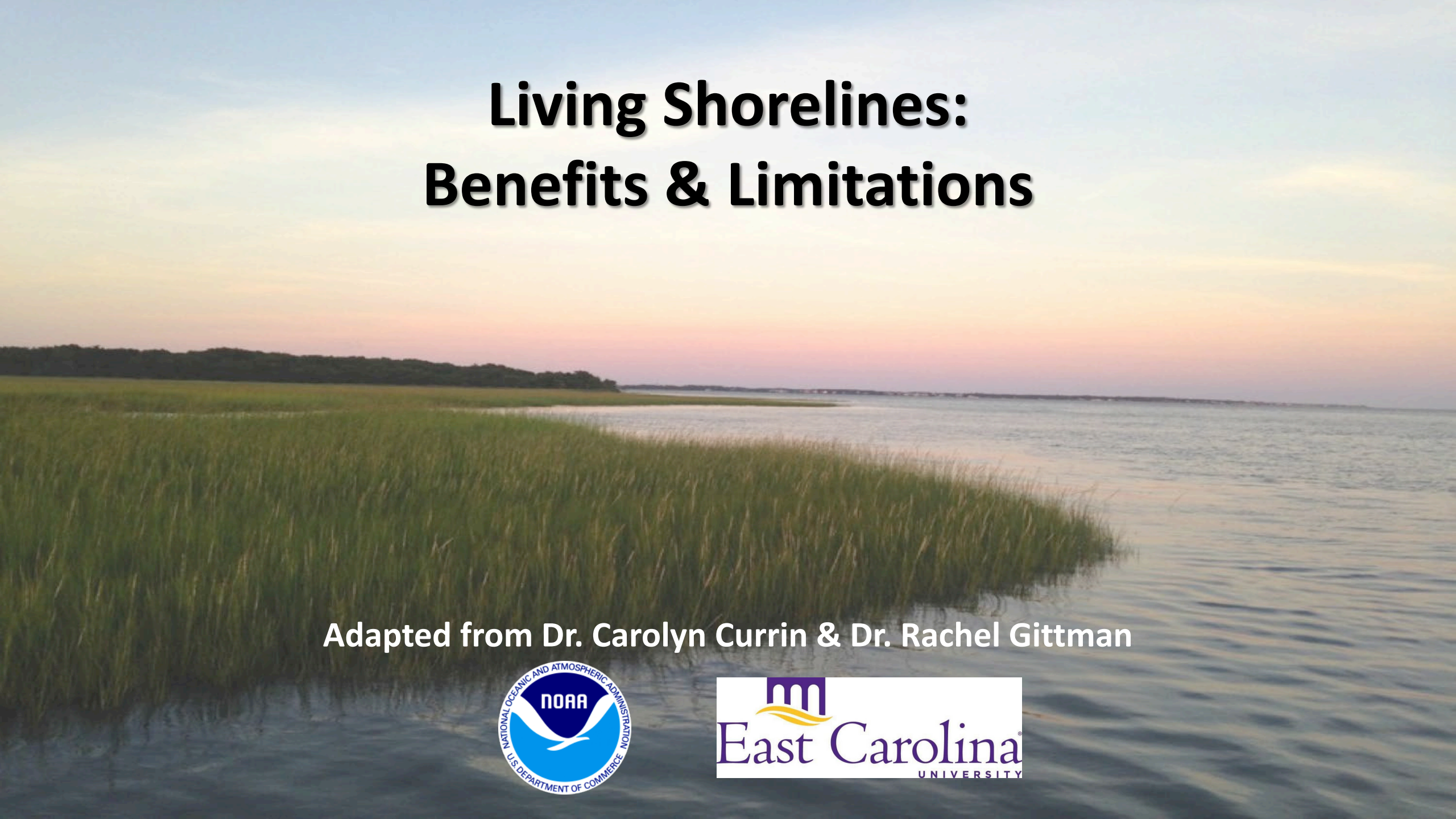
Living Shorelines: Benefits & Limitations



Adapted from Dr. Carolyn Currin & Dr. Rachel Gittman

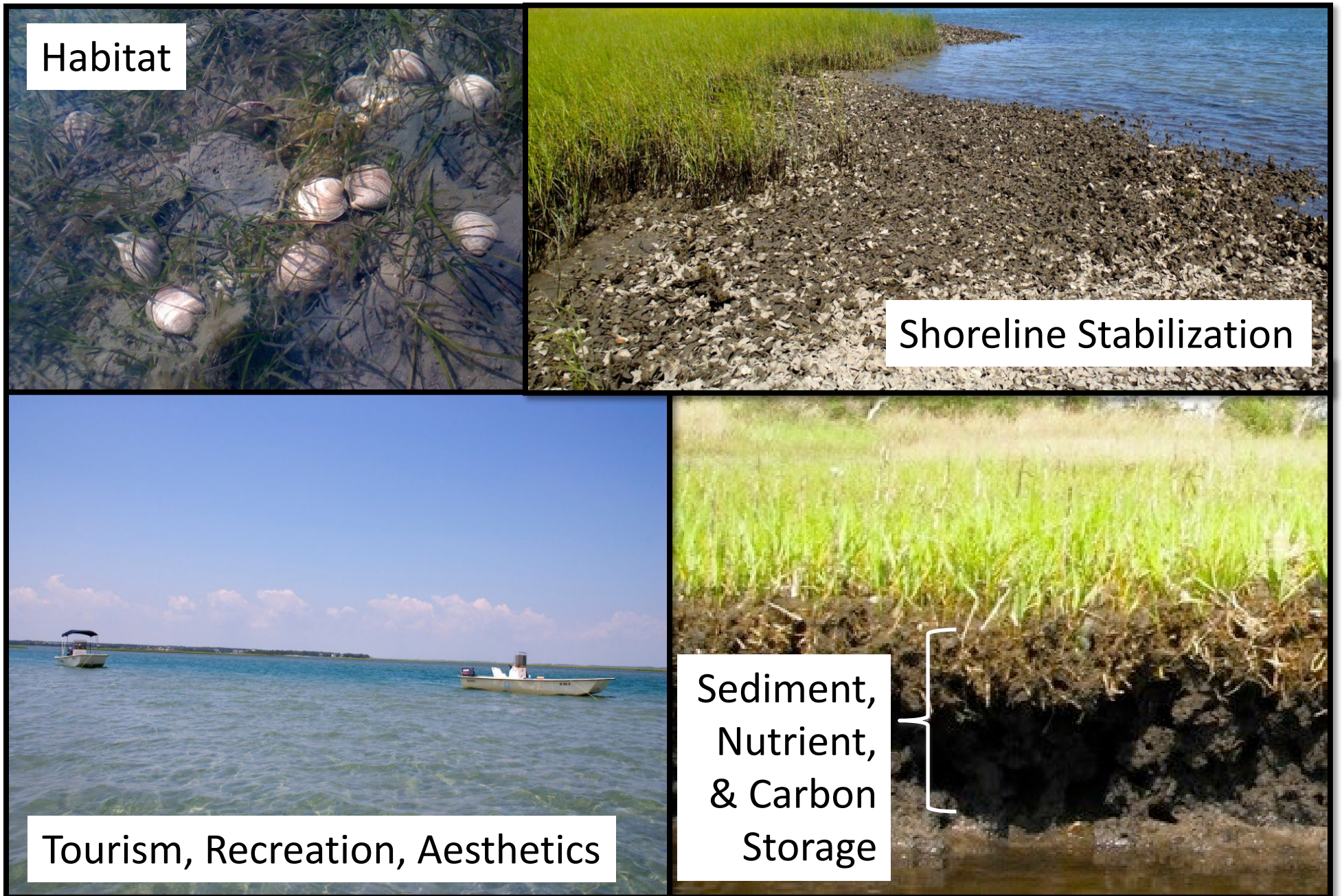
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

East Carolina
UNIVERSITY

North Carolina Coastal Habitats

What benefits do you think these coastal habitats provide?

Coastal Habitat Benefits



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

Causes:

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

Shoreline Hardening

Bulkhead

Groin/Jetty

Riprap Revetment

Seawall

Breakwater

Photo credit: VIMS


Shallow Refuge
Tidal Marsh
SAV

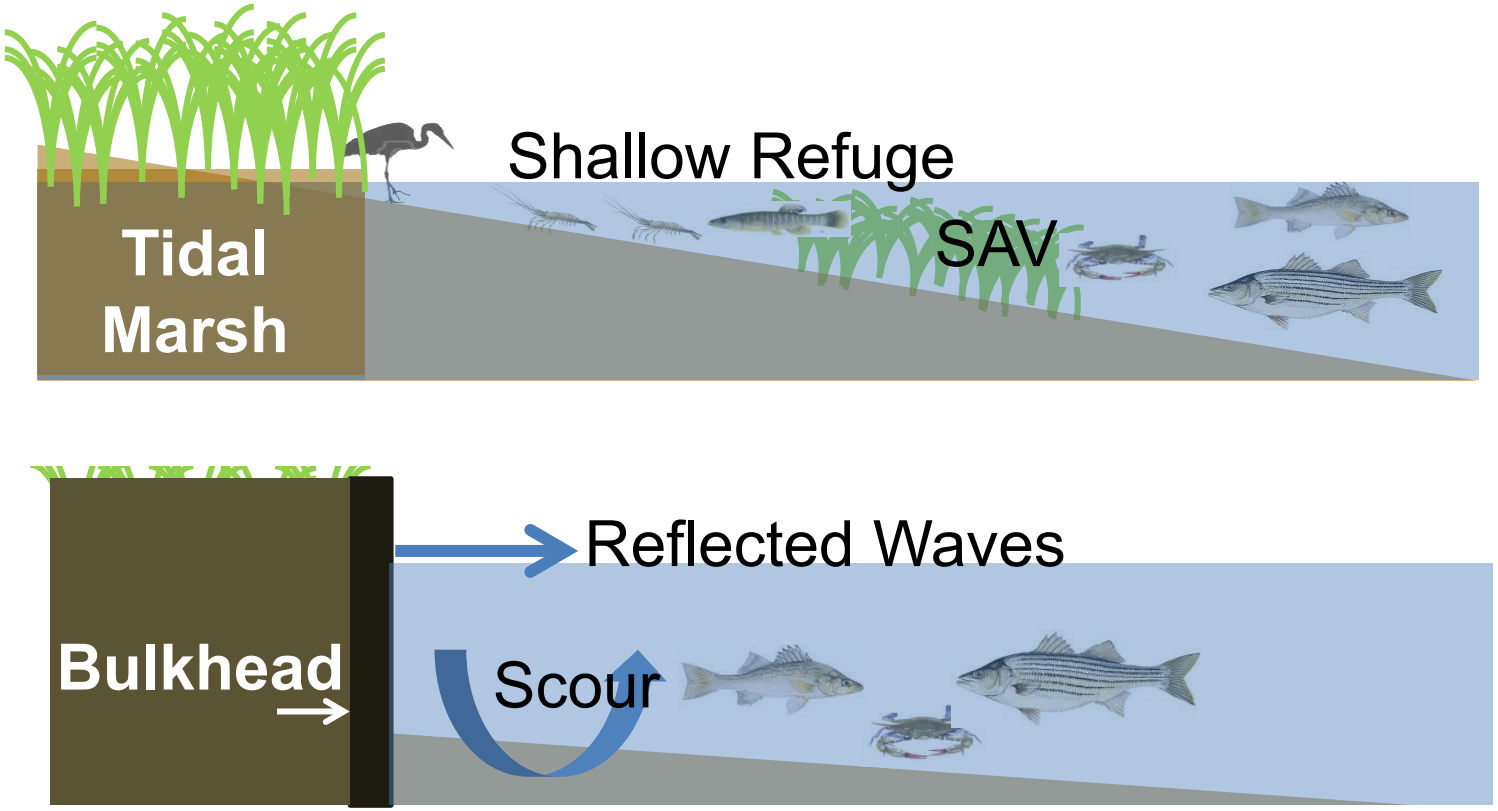


Fig. courtesy T. Jordan

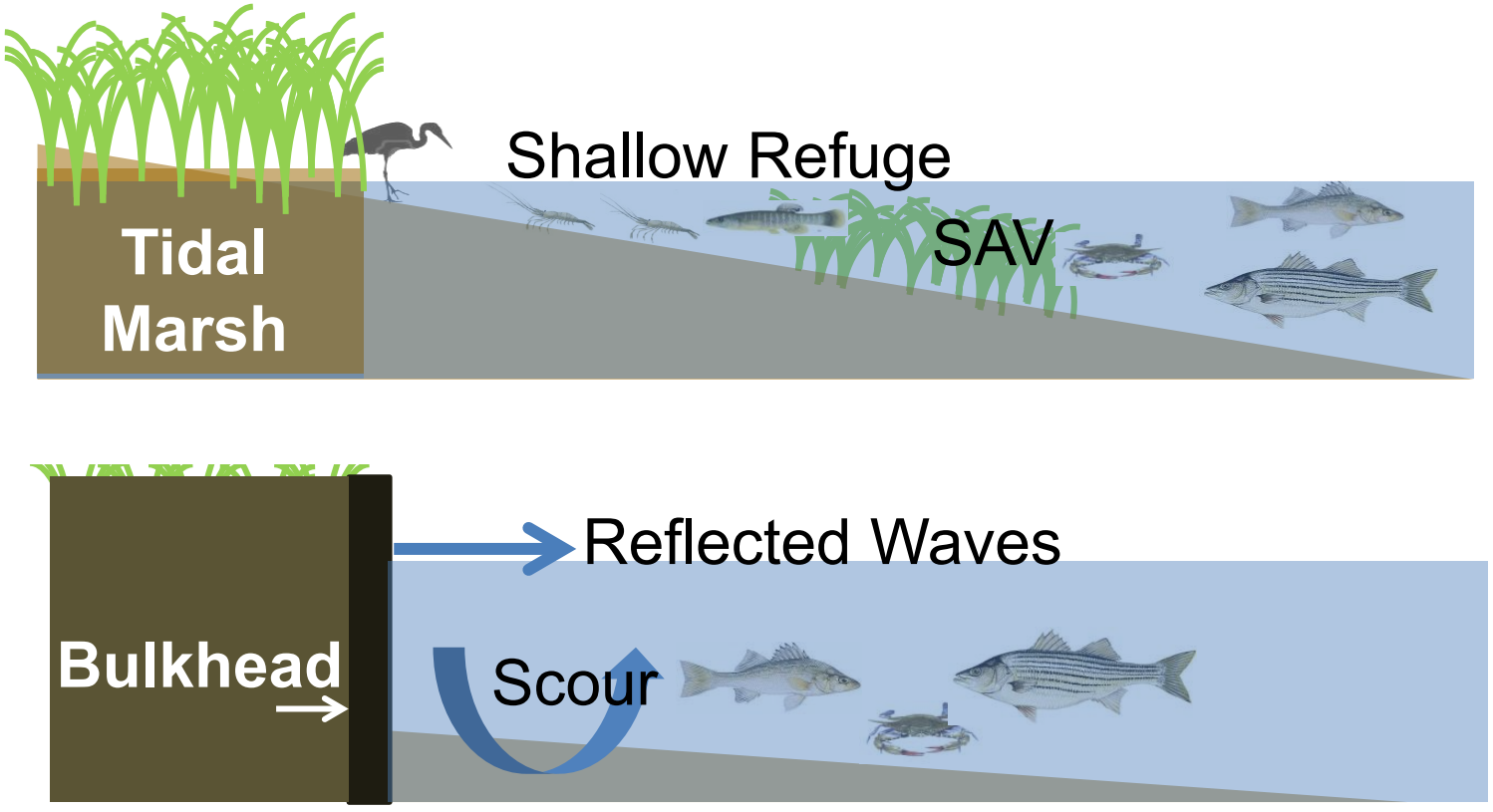


Fig. courtesy T. Jordan

Changes occur **BELOW** the “mean high water” line:

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

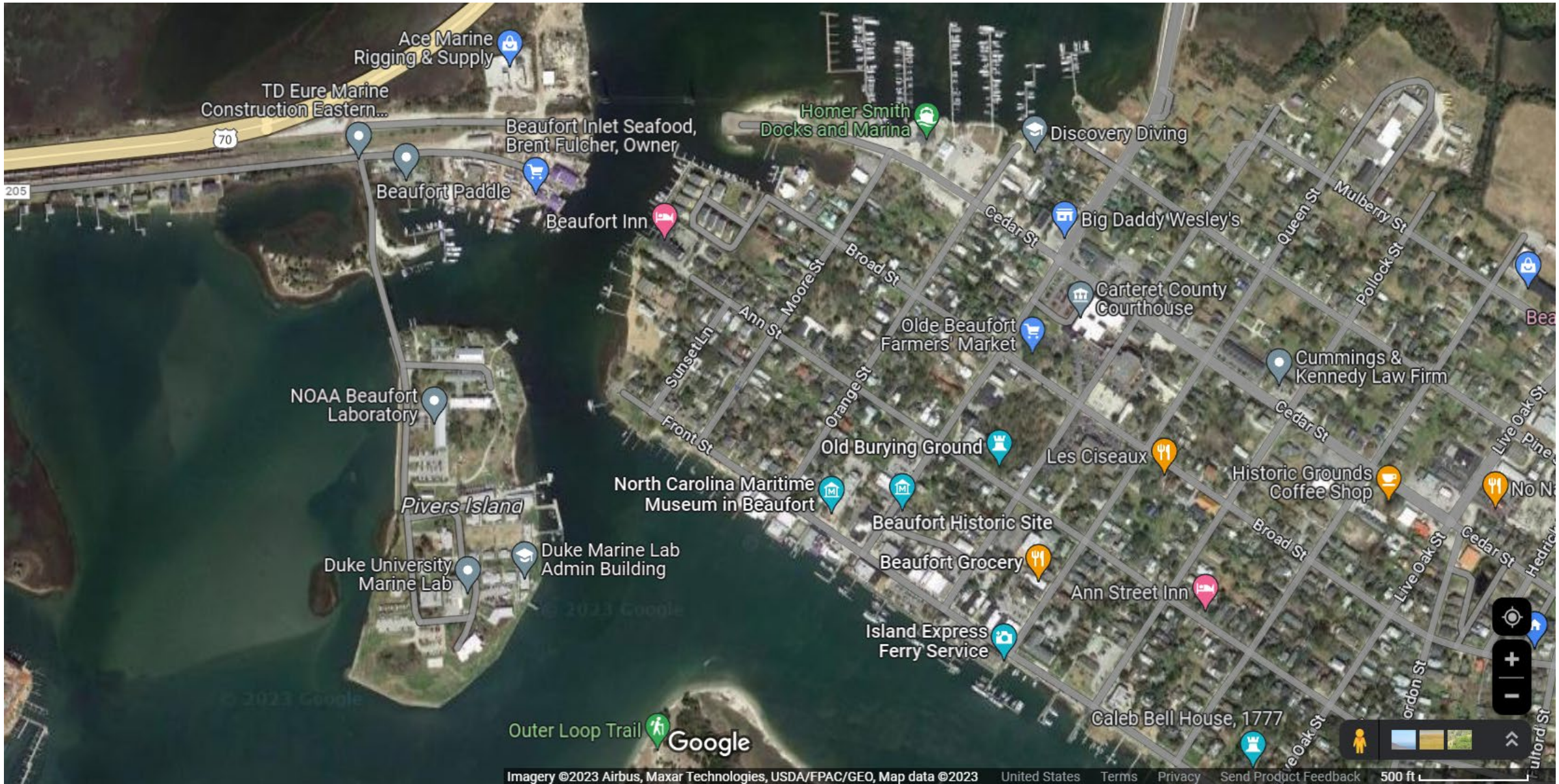
…all of which are negative impacts to our public trust resources.

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

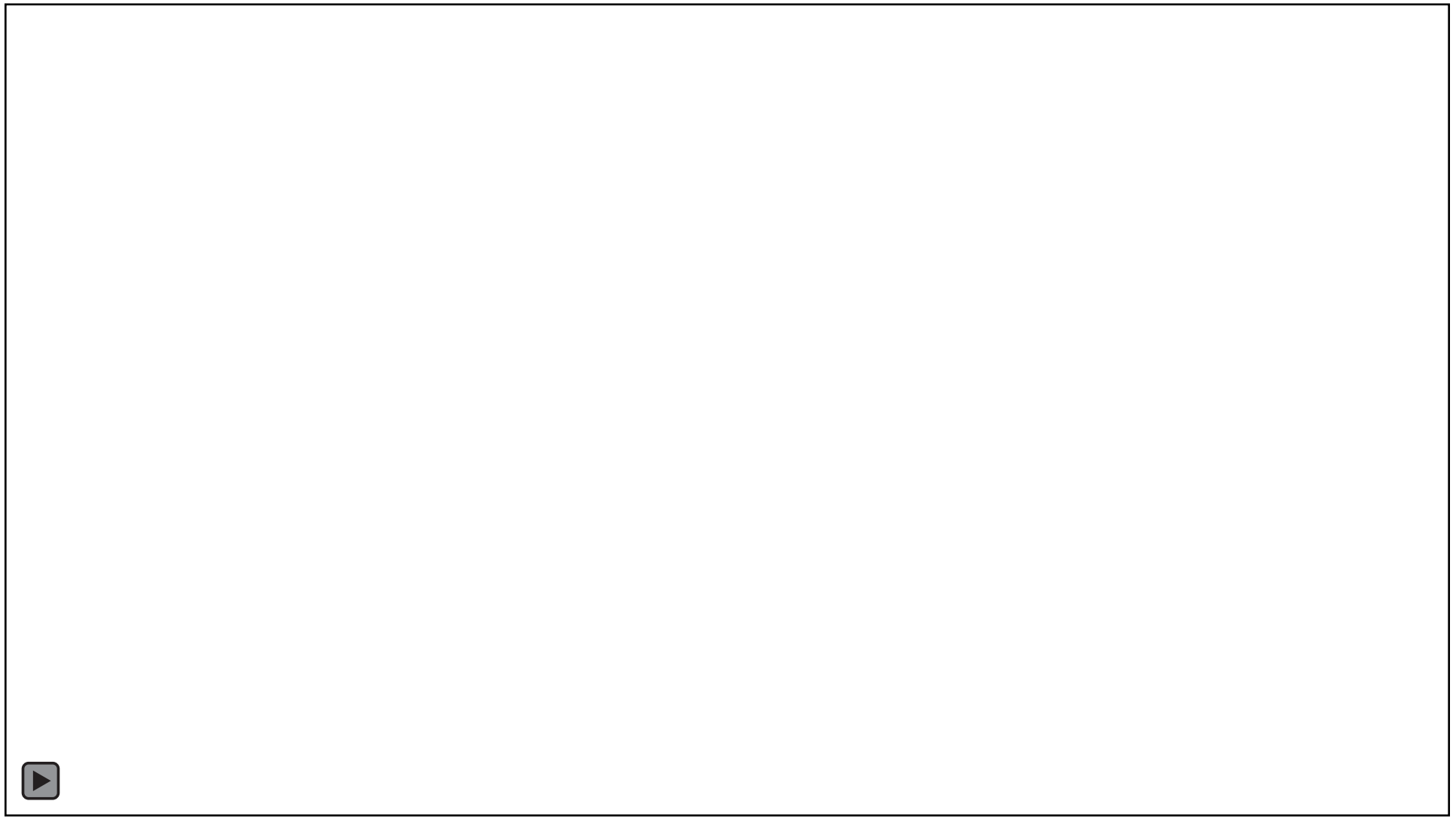
Pivers Island Living Shoreline

May 2014

Pivers Island Living Shoreline

September 2014

Marshes Dampen Wave Energy



Pivers Island Living Shoreline

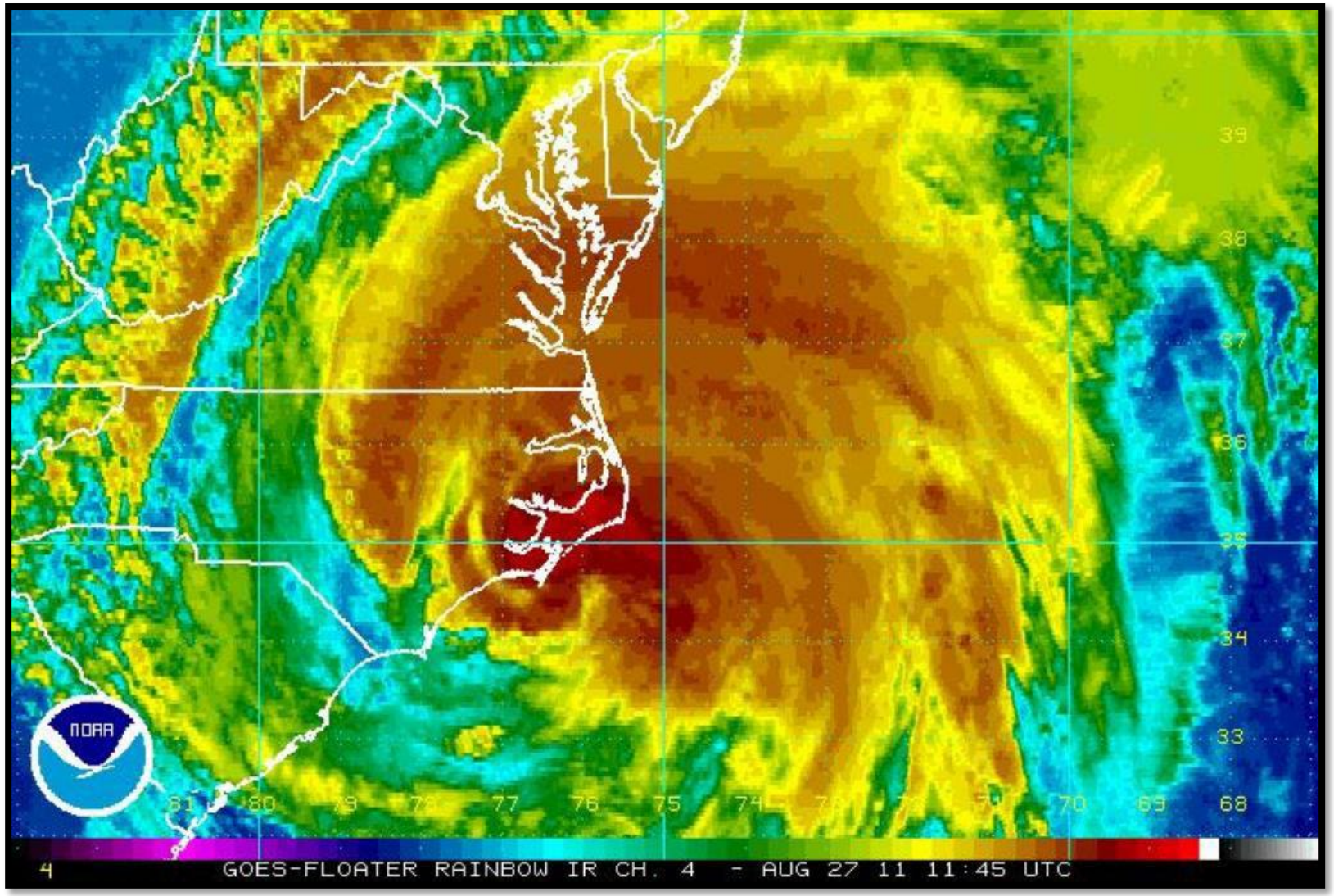
After Hurricane Irene – 2011

Shoreline Accreted Sediment

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

What about hurricanes?

Hurricane Irene 2011



NOAA 2011

Bulkhead vs. Living Shoreline

Photos: Rachel Gittman

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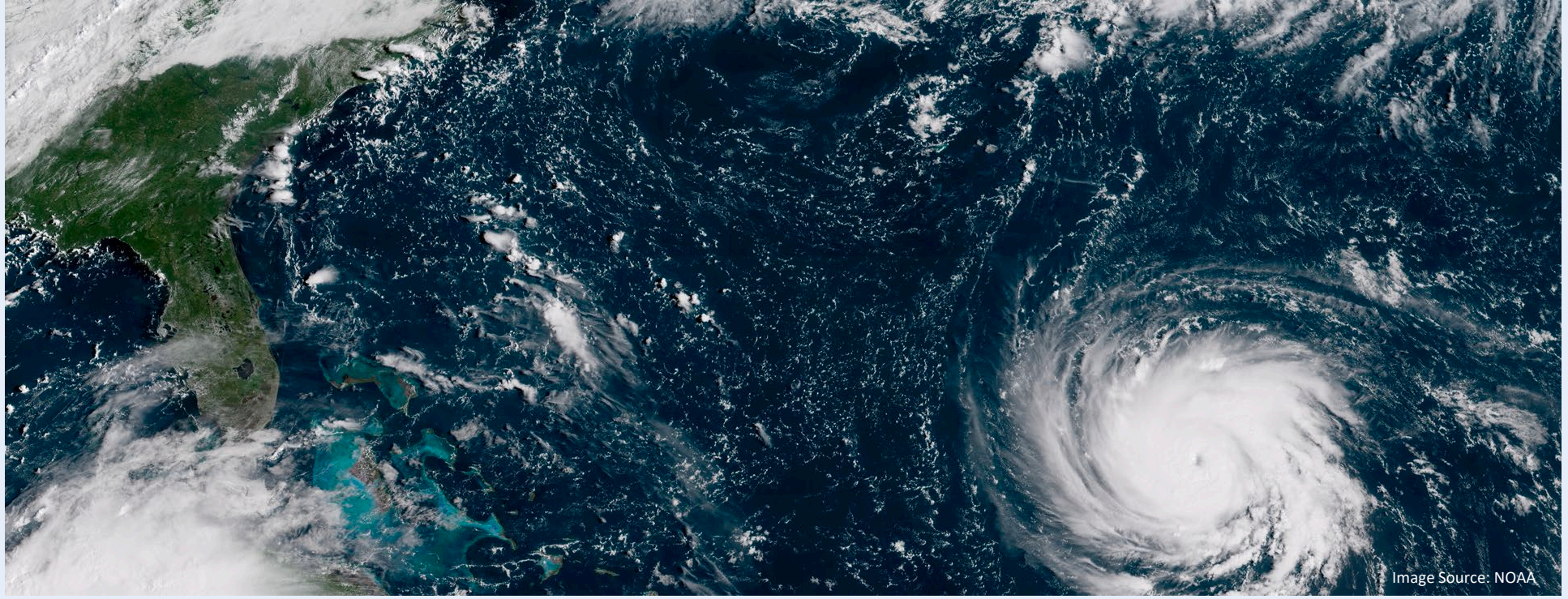
Hurricane Matthew, 2016

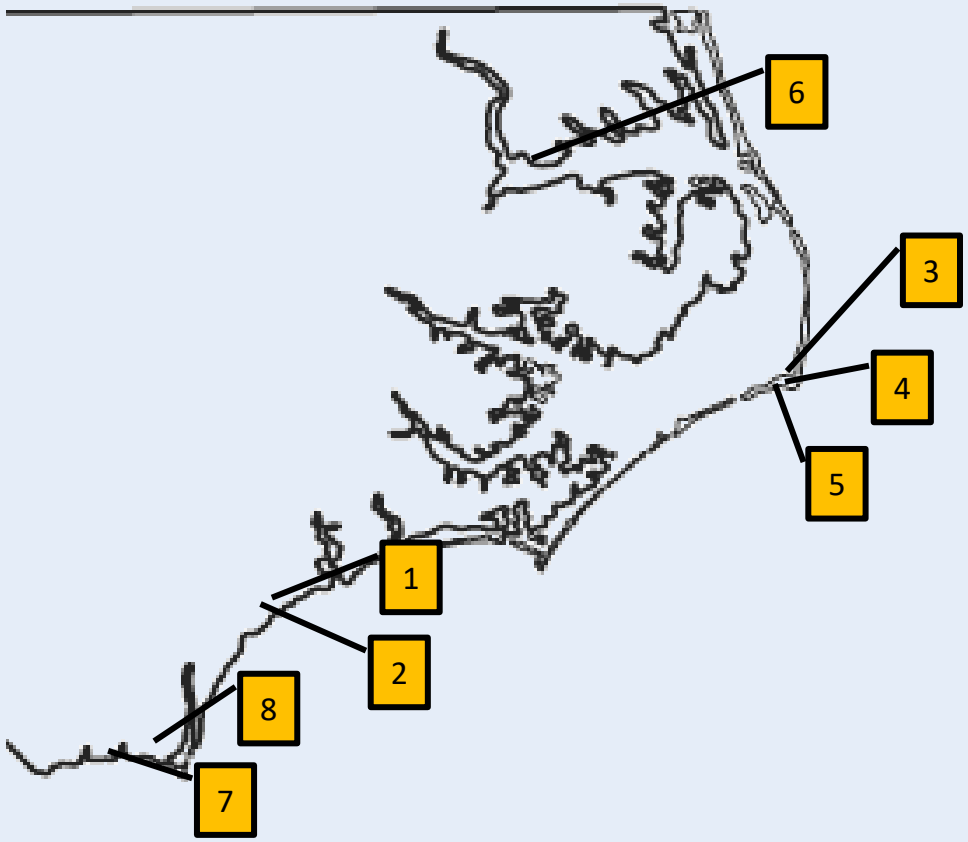
Scour landward of the wall



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

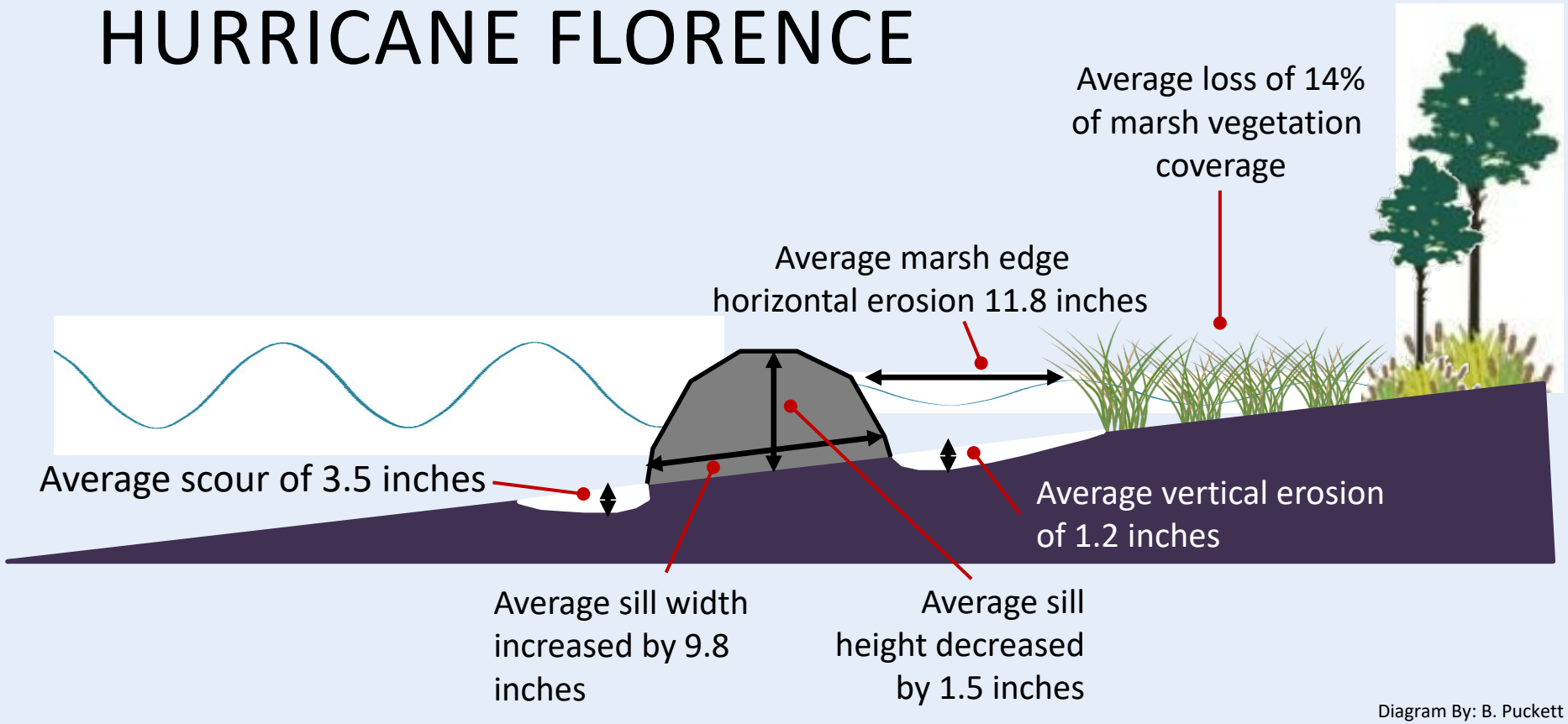


Diagram By: B. Puckett

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}

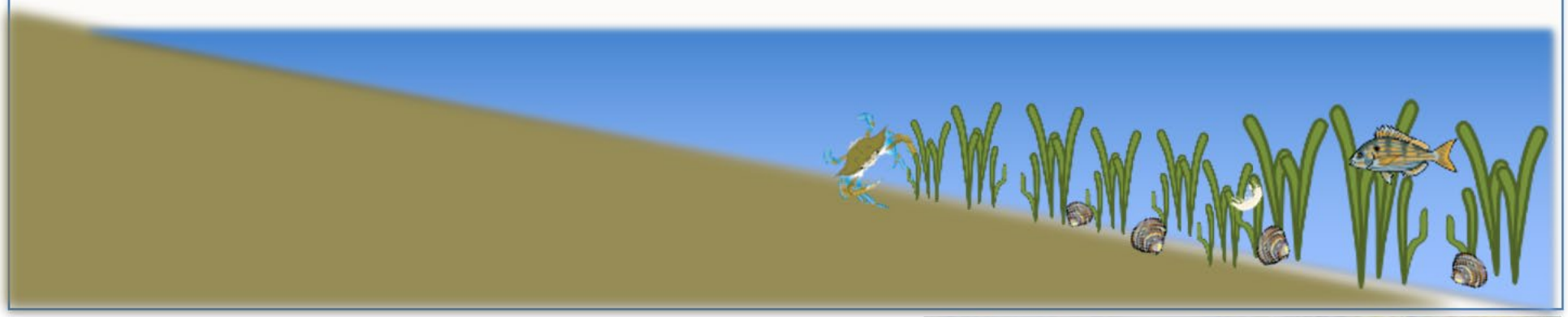
NOVEMBER
{2 MONTHS POST STORM}

What about habitat?

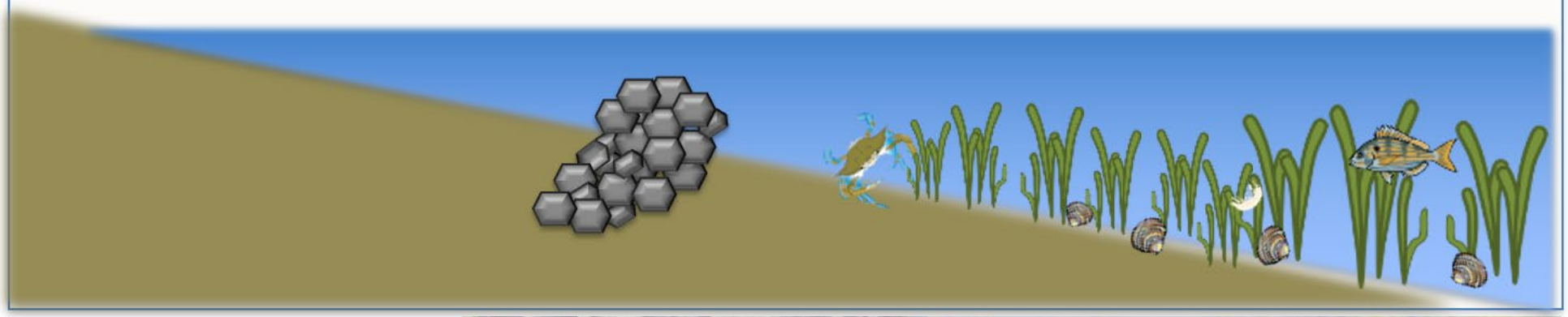
Bulkhead vs. Living Shoreline

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