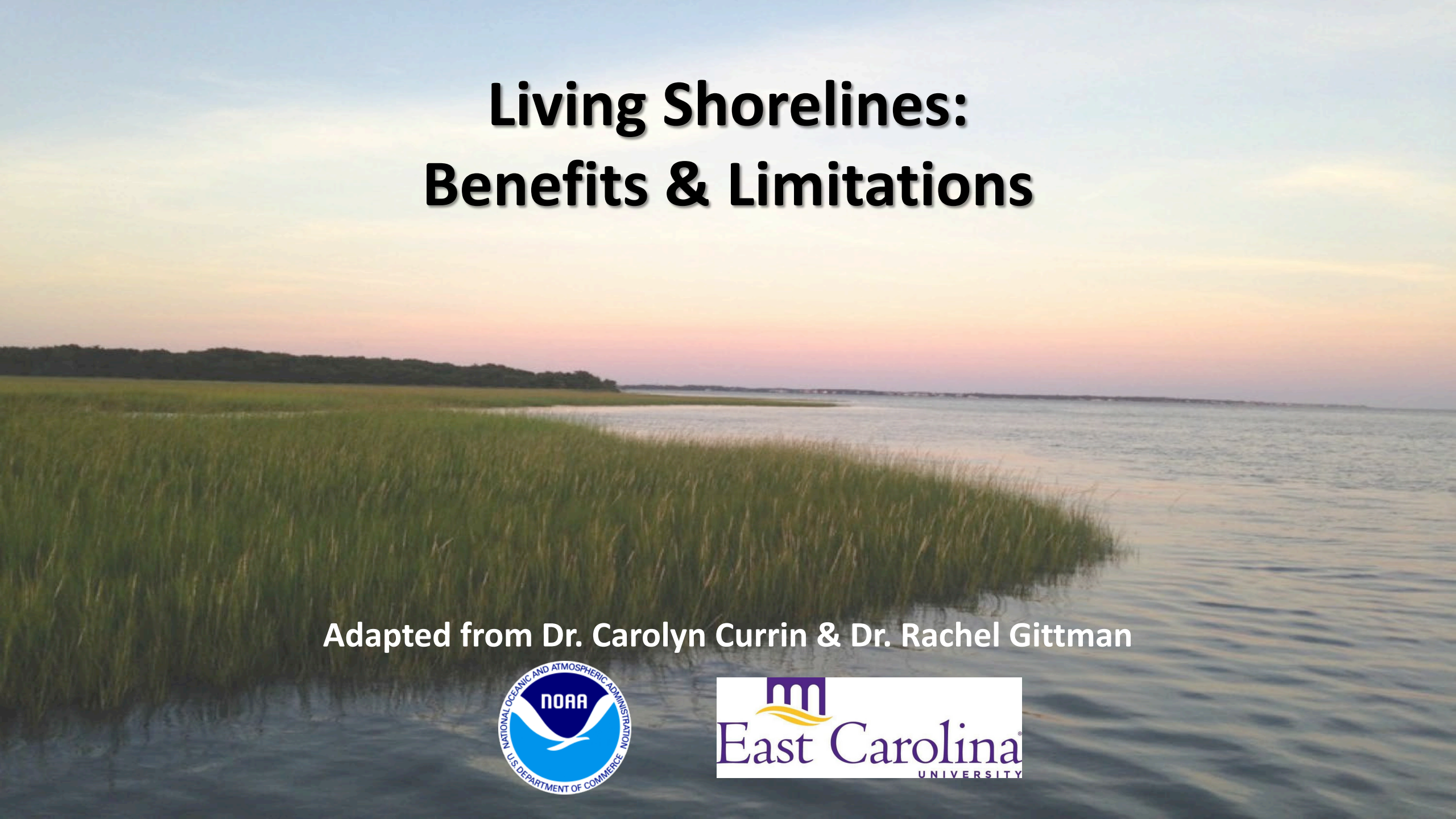
# Living Shorelines: Benefits & Limitations



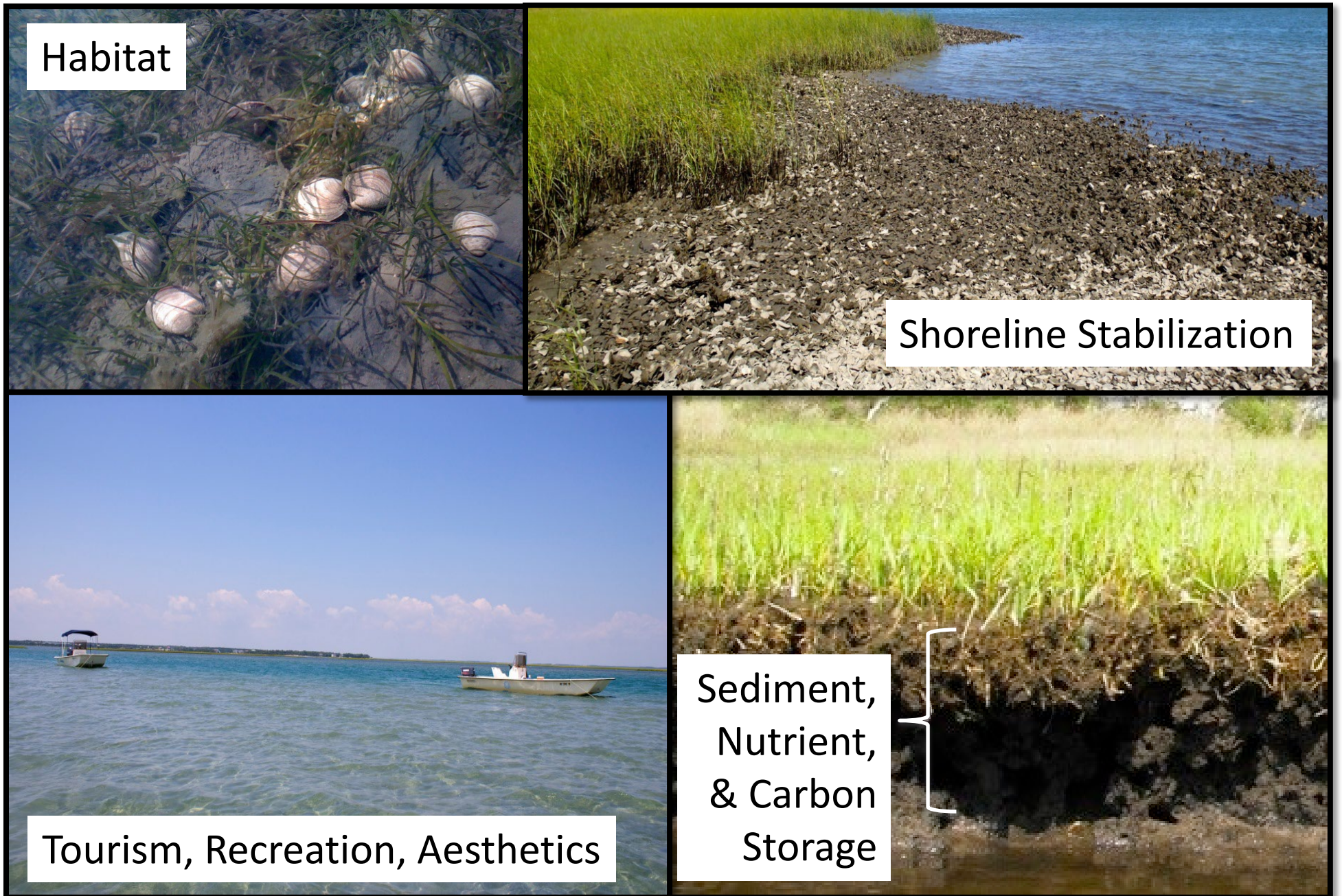
Adapted from Dr. Carolyn Currin & Dr. Rachel Gittman

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

East Carolina University

# North Carolina Coastal Habitats

# Coastal Habitat Benefits



# North Carolina Coastal Habitats

# 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

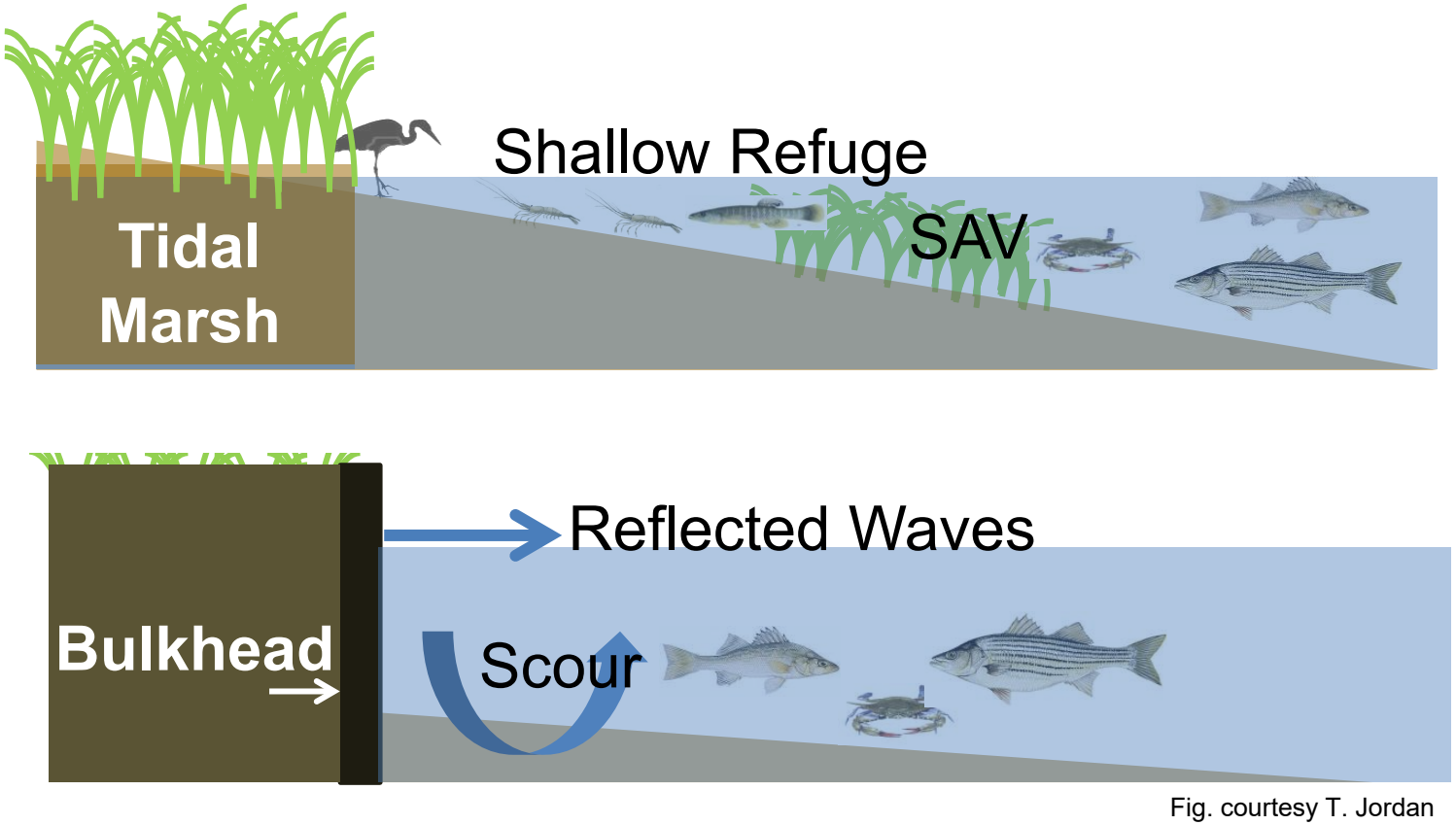



Fig. courtesy T. Jordan

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

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

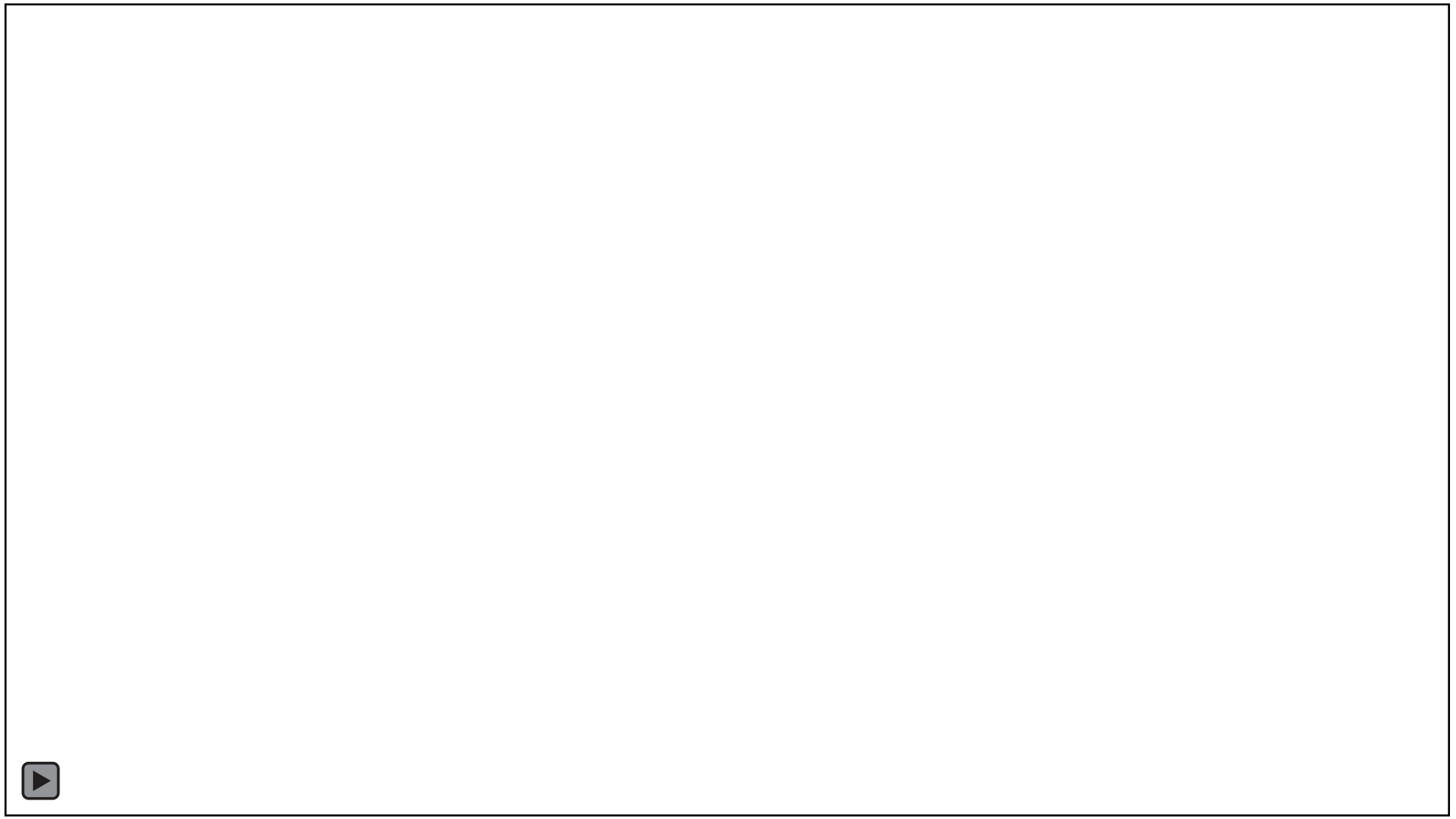
# Pivers Island Living Shoreline

May 2014

# Pivers Island Living Shoreline

September 2014

# Marshes Dampen Wave Energy



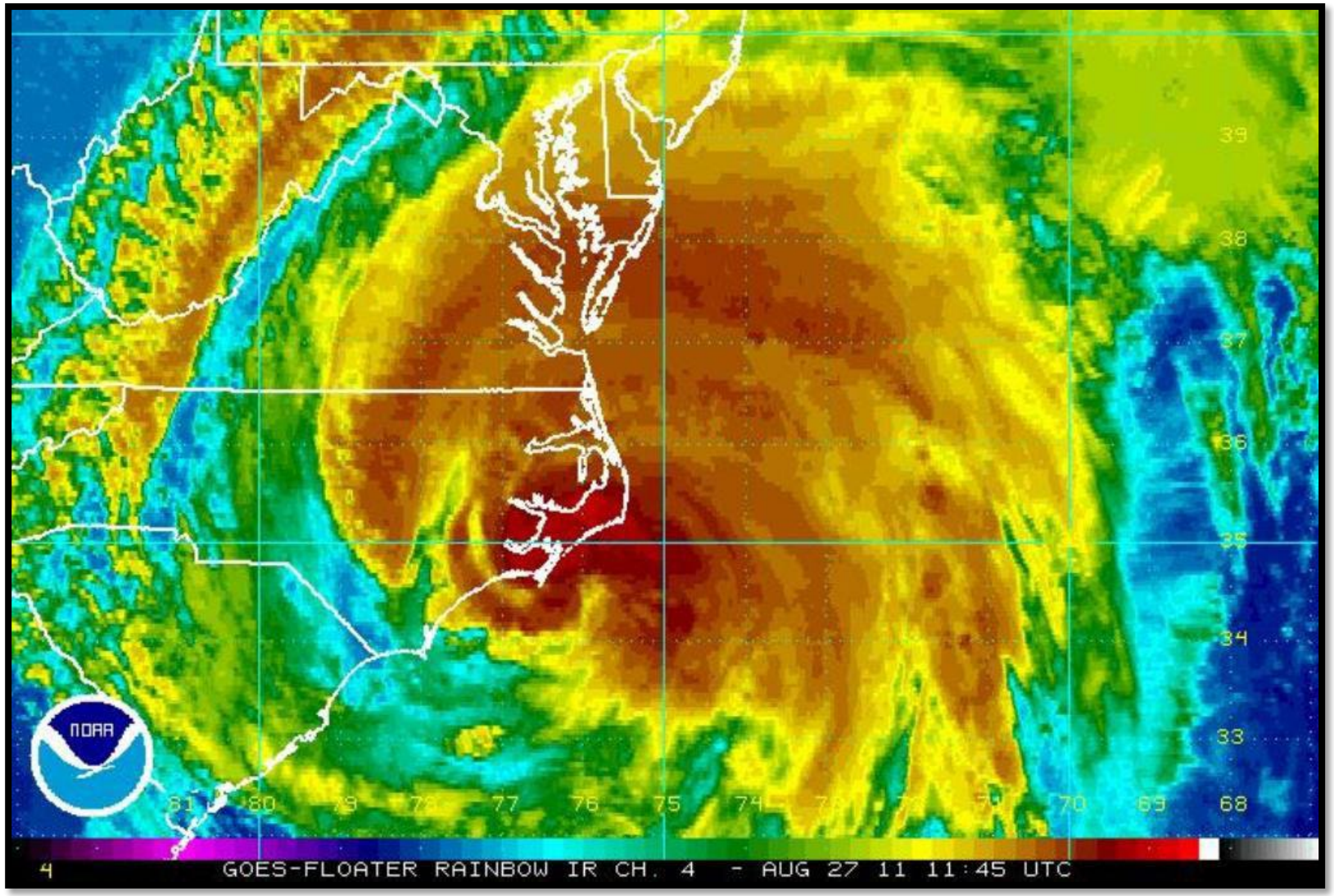

# Pivers Island Living Shoreline

After Hurricane Irene – 2011

Shoreline Accreted Sediment

# What about hurricanes?

Hurricane Irene 2011




NOAA 2011

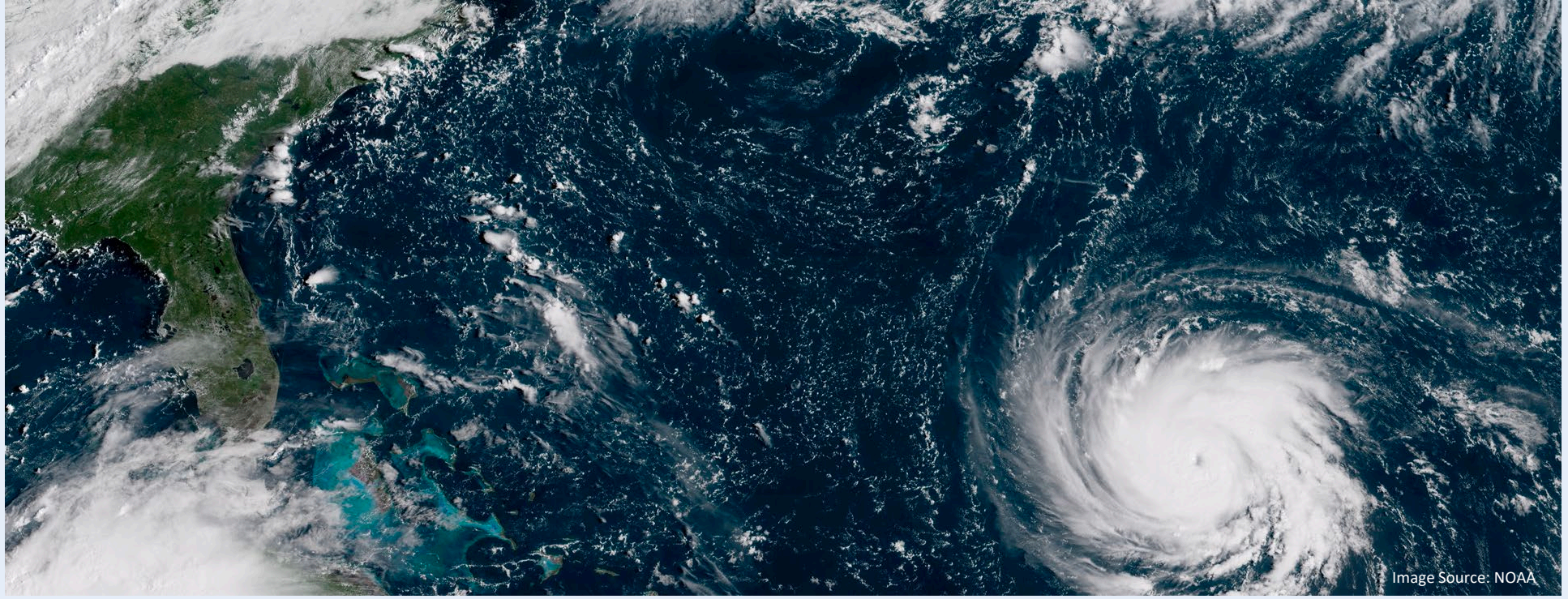
# Bulkhead vs. Living Shoreline



Photos: Rachel Gittman

# Hurricane Matthew, 2016

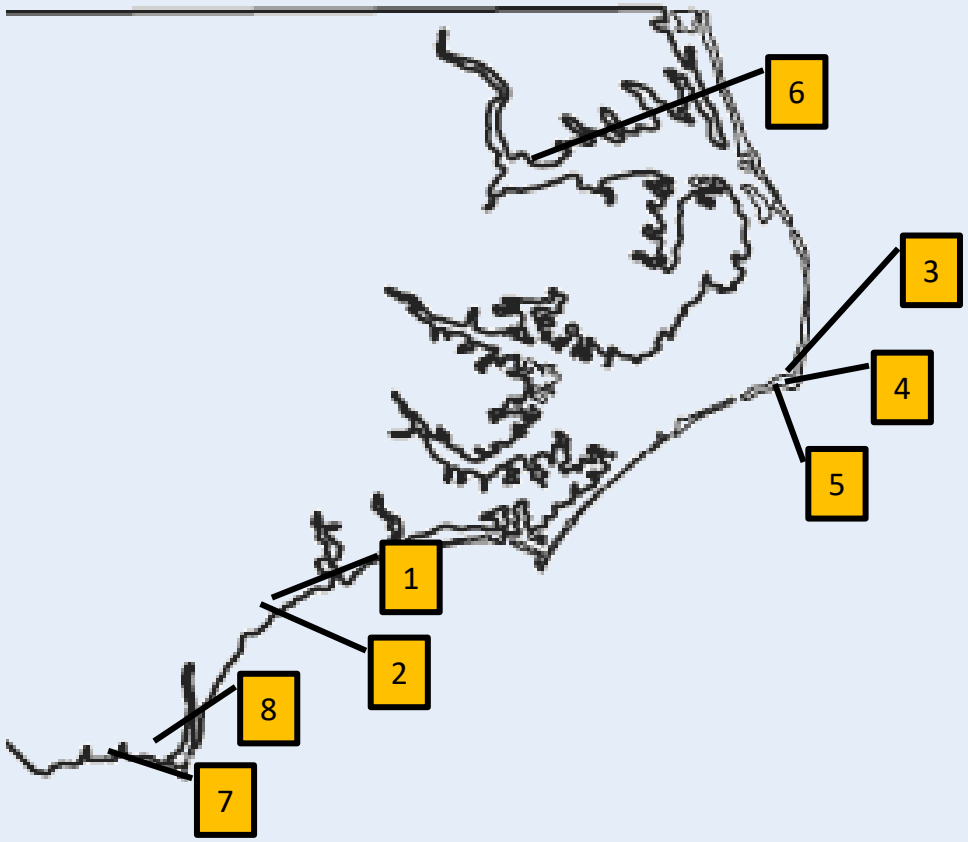
Scour landward of the wall




# 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

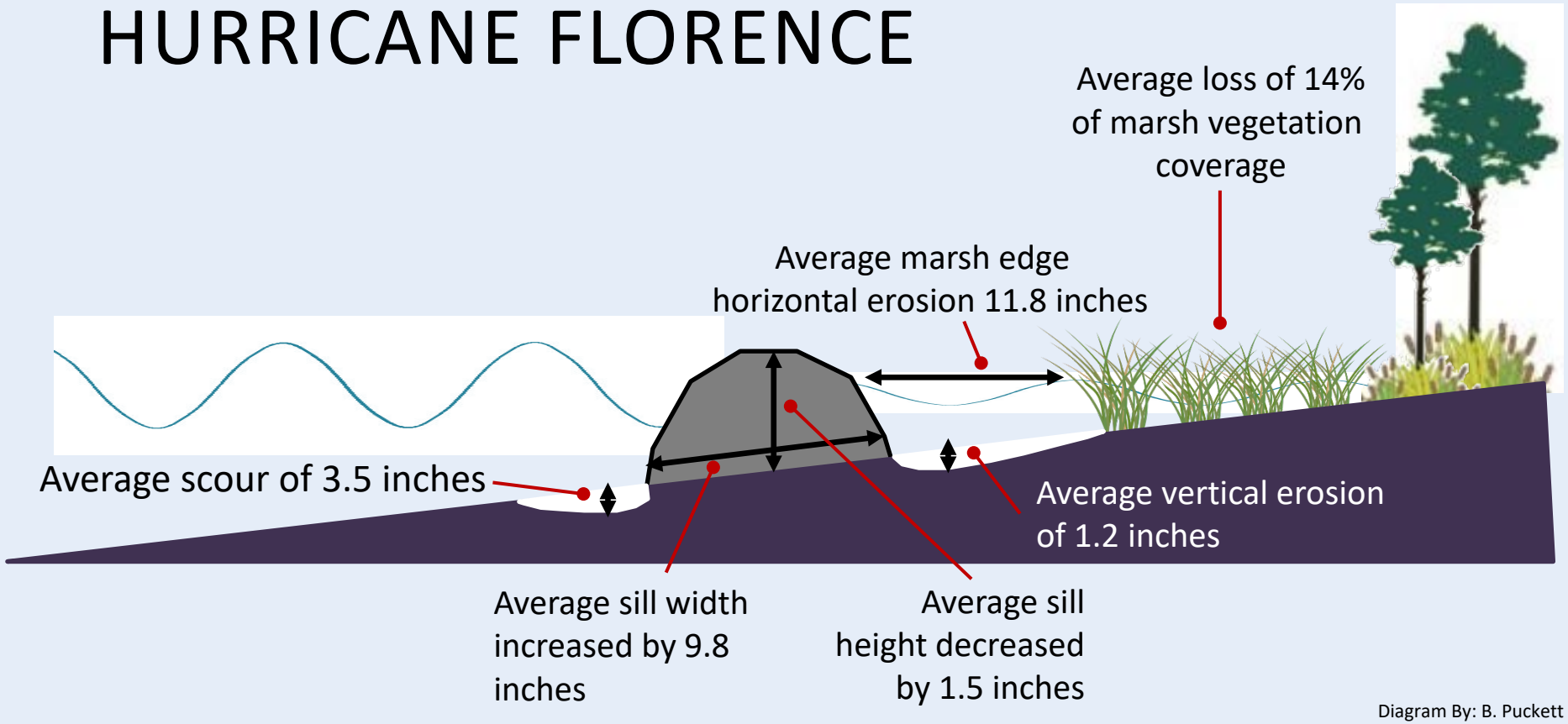



Diagram By: B. Puckett

# 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}

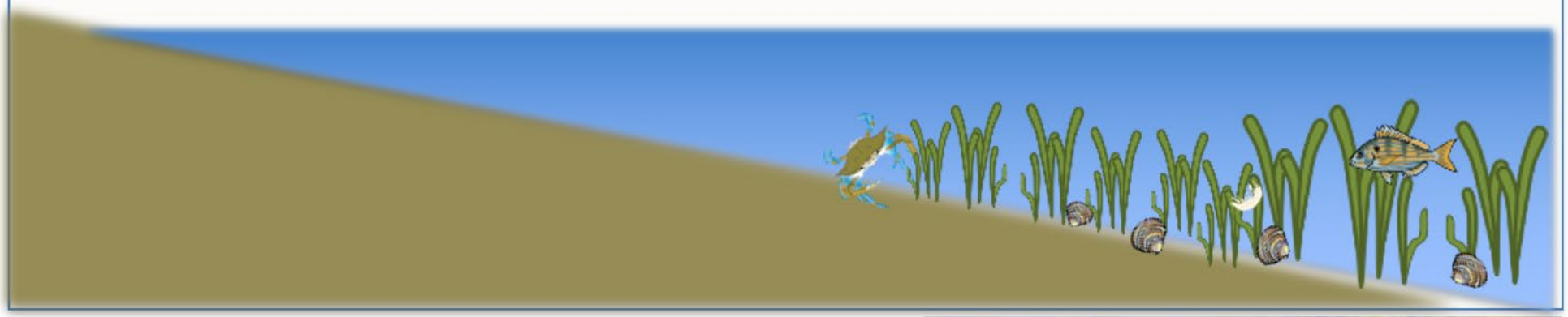
NOVEMBER
{2 MONTHS POST STORM}

# What about habitat?

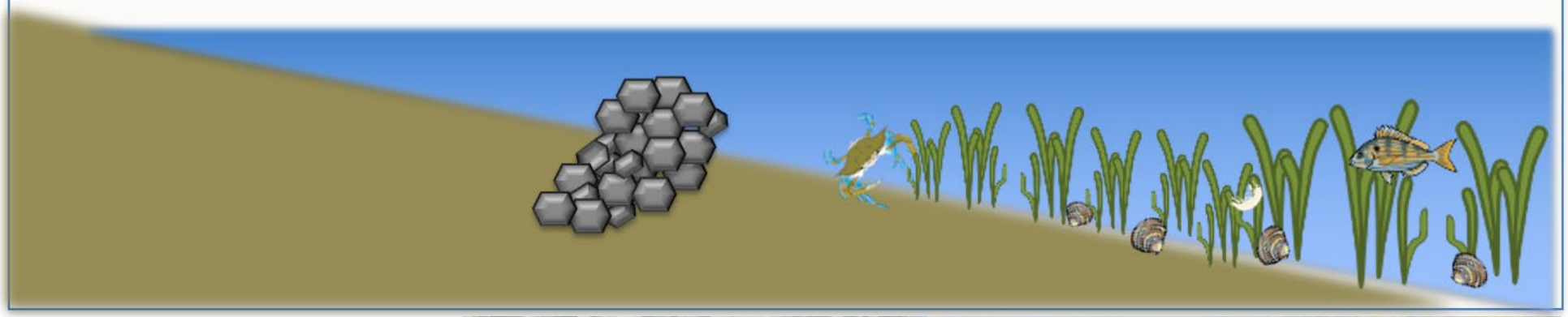
Bulkhead vs. Living Shoreline

# Habitat Comparison

# Habitat Comparison



# Habitat Comparison



# Habitat Comparison

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# 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

# 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