Oyster Habitats

Eastern Oyster
Crassostrea virginica

- Oyster habitat in NC ranges from deep water reefs in Pamlico Sound to intertidal reefs fringing salt marshes

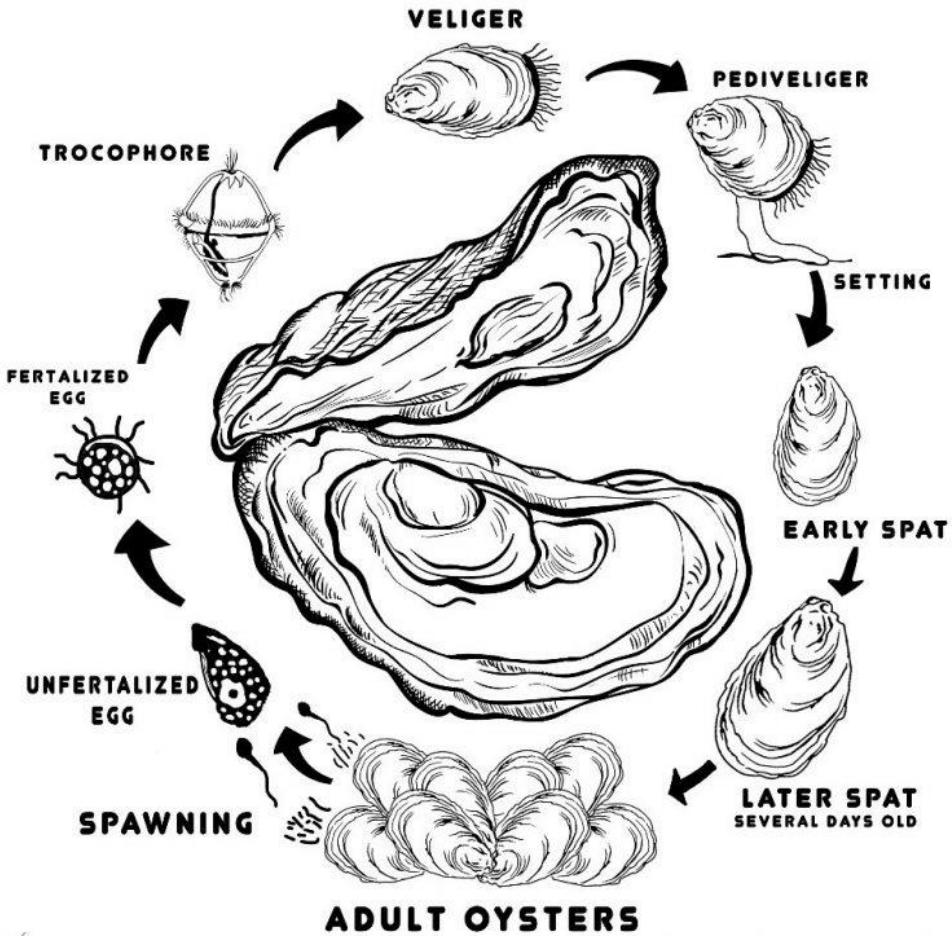
- Known as a keystone species in the estuary, their health reflects that of the overall coastal ecosystem

Oyster Habitats

- Vital to North Carolina's coastal ecology and economy
  - Food: $27 million impact
  - Filter the water: One adult oyster can filter up to 50 gallons of water per day
  - Fish Habitat: southern flounder, shrimp, clams, blue crabs

Building Oyster Reefs

- **Oysters are at historic lows because of:**
- Poor Water Quality
- Disease and Predation
- Habitat Loss
- Natural Disasters
- Low Recruitment
- Increased Harvest Pressure



Artistic rendering of the oyster life cycle ©Local as it Gets for the NC Coastal Federation. Most oyster restoration efforts focus on providing substrate for oyster larvae to “set” on, or by encouraging more oyster larvae in the first place.

Oyster Research and Mariculture

- Traditionally planted oyster shells on lease bottoms, creating a place for free-swimming oyster larvae to attach and become oyster “spat.”
- Increasing number of North Carolina oyster producers have been growing their oysters in the water column
- Increased availability of **Triploid** oyster seed for grow-out on shellfish leases

UNCW Center for Marine Science

Lab to Farm to Table

- **Triploid oysters** have three sets of chromosomes instead of two, rendering them sterile
- Diploid oyster is “watery” during the summer as they expend energy spawning and reproducing
- Can put all of their energy into growth, ready to harvest all year long
- Not considered genetically modified because they are the product of cross breeding

Ami Wilbur, pictured on the right with technician Amy Finelli, directs the UNCW Shellfish Research Hatchery, studying oysters and other North Carolina shellfish species. Photo by Jamie Moncrief/UNCW.

Seagrass Beds

- Vital to the health of coastal waters and communities
- Seagrass absorbs excess nutrients, producing oxygen and capturing carbon dioxide
- Slows wave energy that erodes shorelines, slowing the persistent creep of barrier islands toward the coast
- Serves as a nursery habitat, providing food and shelter for a range of organisms


Photo: APNEP

Eelgrass *Zostera marina*

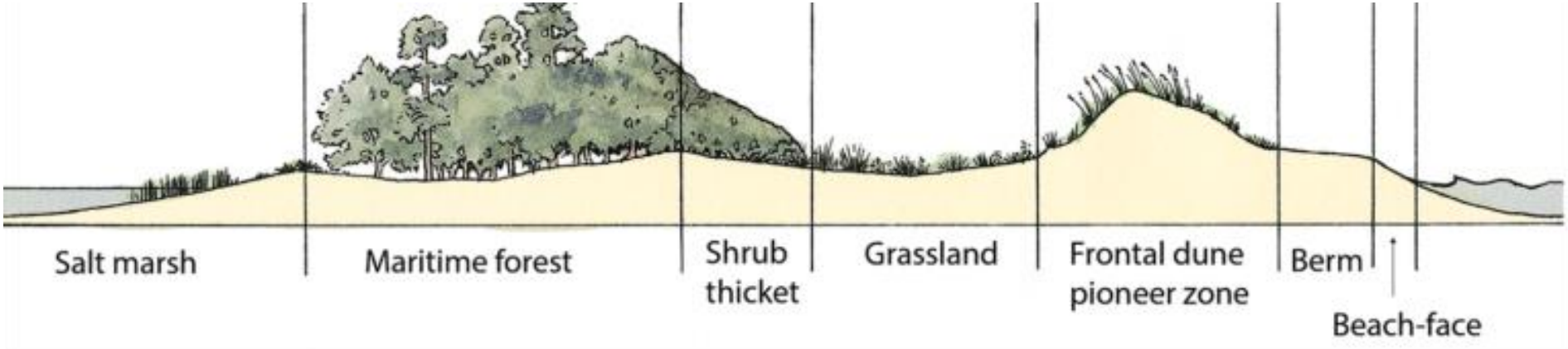
Gag Grouper

Blue Crabs

Flounder

Map: Tim Ellis, APNEP

Barrier Island Vegetation



Maritime Forest

- Occur in relatively protected areas on barrier and well drained on the inland shores of sounds and estuaries
- Salt spray, windstorm damage, dune migration, and soil drainage characteristics shape these habitats

Evergreen maritime forest at Fort Raleigh National Historic Site, Mateo, National Park Service

Maritime Forest

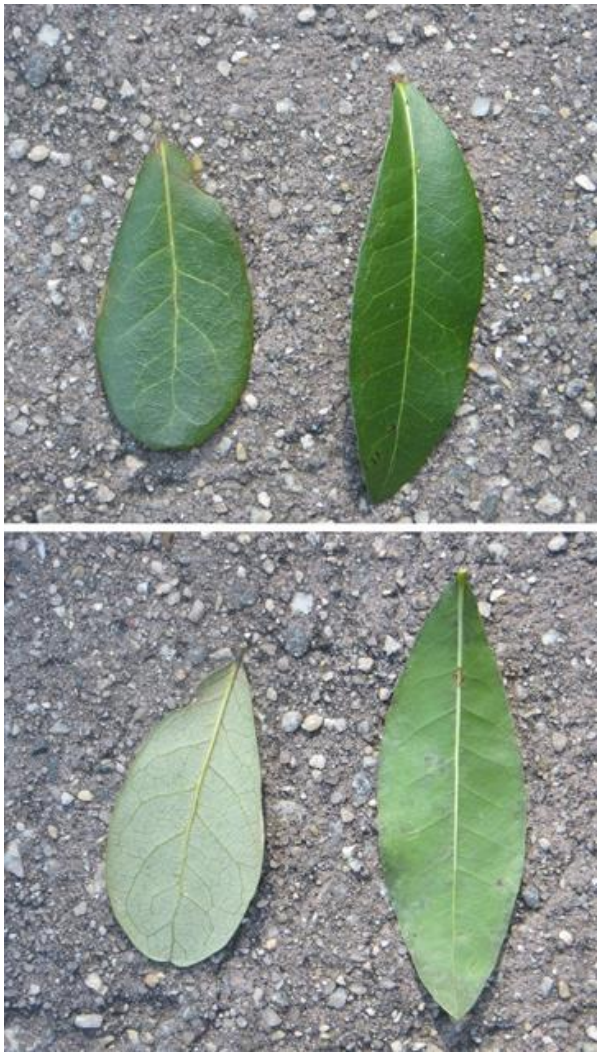
Loblolly Pine

Pinus taeda

- 80-100 feet with a broad crown
- Can live up to 150 years
- Long straight trunks, historically good for lumber
- “Loblolly” means mudpuddle


Photo by woodlot via Wikipedia

Live Oak *Quercus virginiana*
Laurel Oak *Quercus hemispherica*



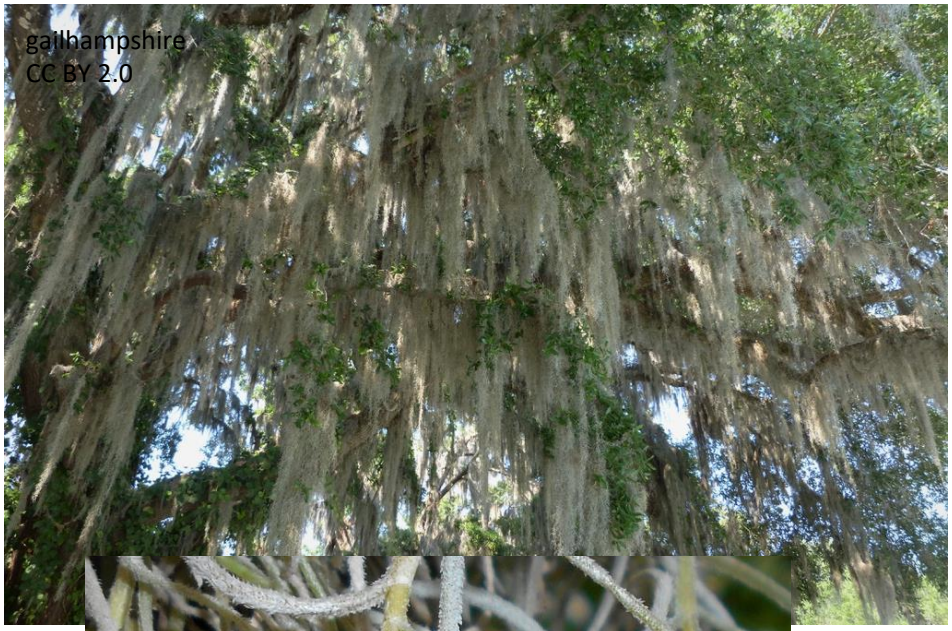
Live oak and Laurel oak leaves
National Park Service

Federalpointhistory.com

Spanish Moss

Tillandsia usneoides

- Air plant/Epiphyte in the Bromeliad Family
- Native to the Southeastern US from NC to Texas along the coastal plain in high humidity areas
- Plant has no roots and obtains moisture through its grey scales on the leaves
- It's a myth that they harbor chiggers!
- Roosting and nesting material for wildlife



Maritime Forest

Dogwood *Cornus florida*
Benthamidia florida

Red Bay *Persea borbonia*

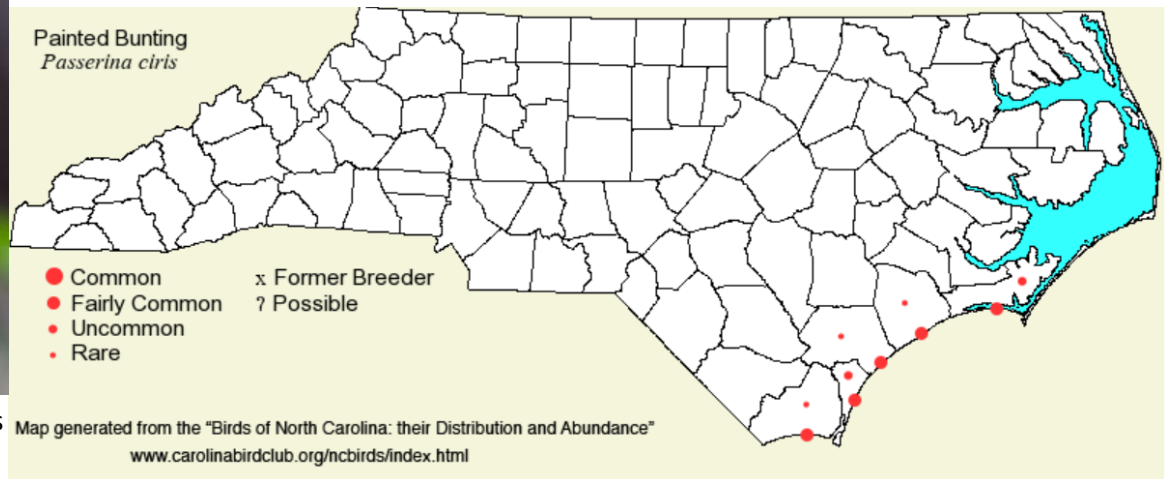
Maritime Forest Wildlife

Photo: Lorraine Minns/Audubon Photography Awards

Painted Bunting *Passerina ciris*

"The flying rainbow"

Breeding in maritime thickets April through October



Maritime Shrub Thicket

- A mix of vine, shrub and tree species grow in a thicket
- Habitat for white tailed deer, non-native red fox, opossum, racoon, marsh rabbit

Hiking Trail through Fort Fisher State Recreation Area

Maritime Shrub Thicket

Red Cedar
Juniperus virgniana

Wax Myrtle
Myrica cerifera

Yaupon Holly
Ilex vomitoria

Maritime Grassland

- Occur within dunefields and on overwash terraces behind the dunes
- Overwash will often bury these plants in sand

Fort Fisher State Recreation Area

Maritime Grassland

Salt Meadow Hay
Spartina patens

Sea Rocket
Cakile harperi

Prickly Pear
Opuntia drummondii

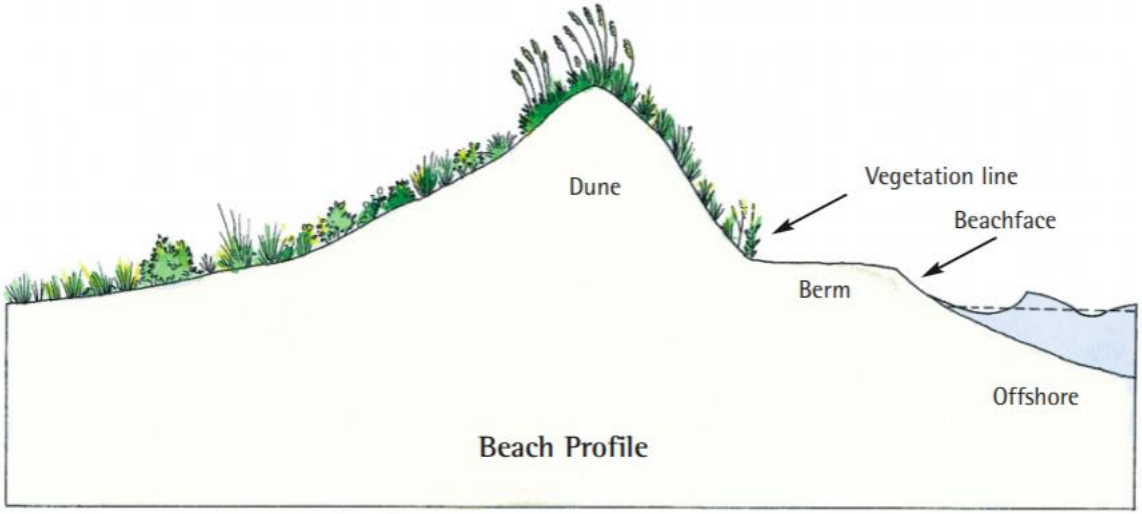
Sand Dunes

- Area landward of the active beach with dune grasses as the dominant plant
- Geologic features in a constant state of change
- Wind driven salt spray most important feature
- Dune plants have extensive root systems
- Roots and shoots slow, trap, and stabilize sand
- Provide protection from storms and waves

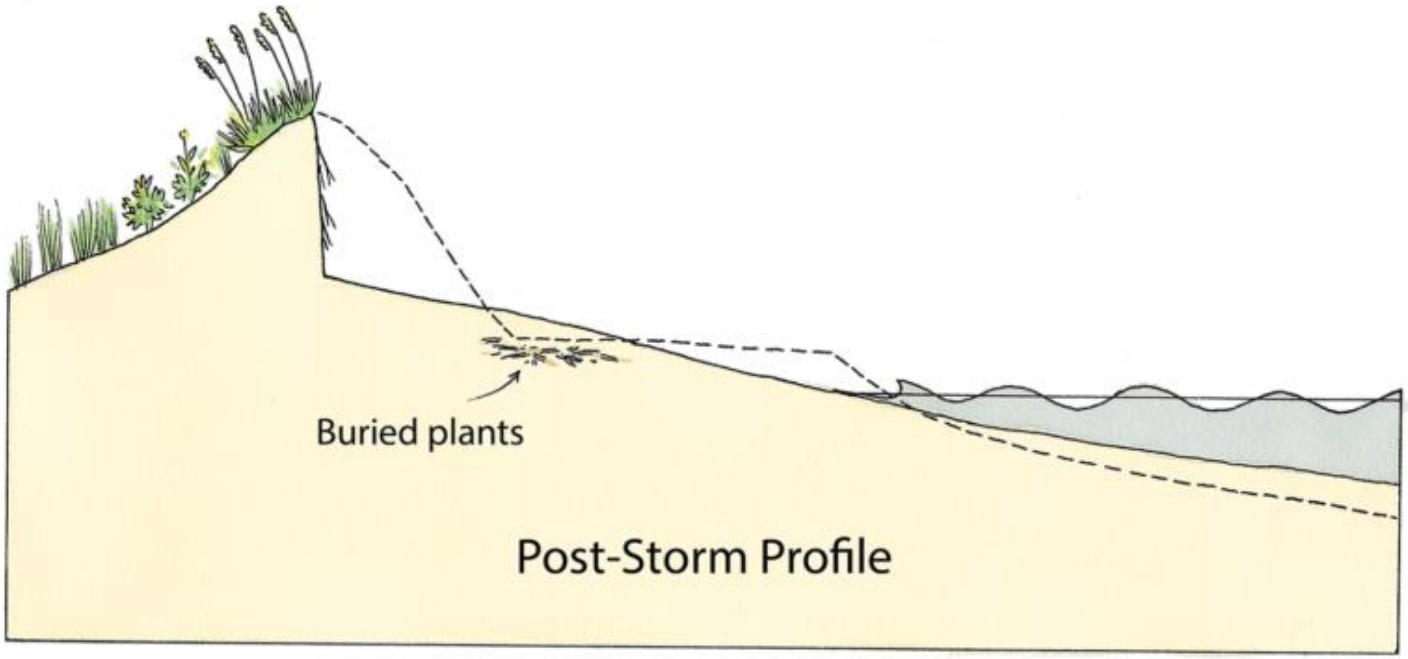

Photo by Eva Gonzales.

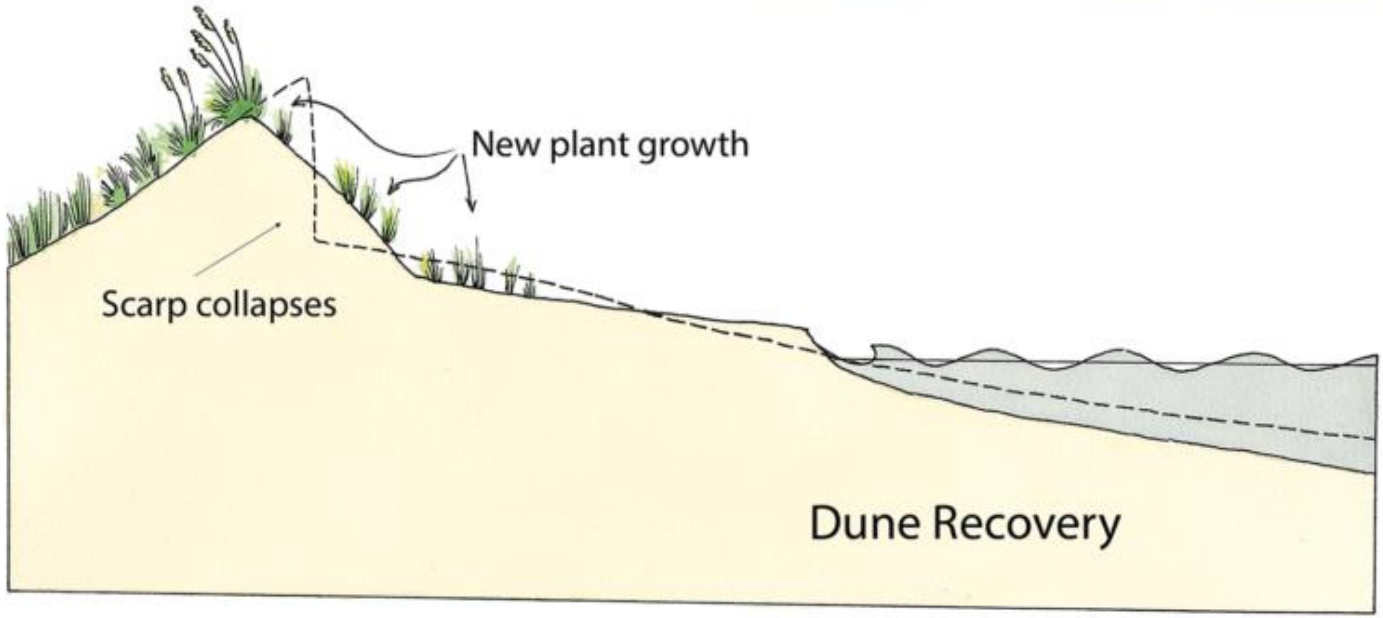
Dune and Beach Morphology

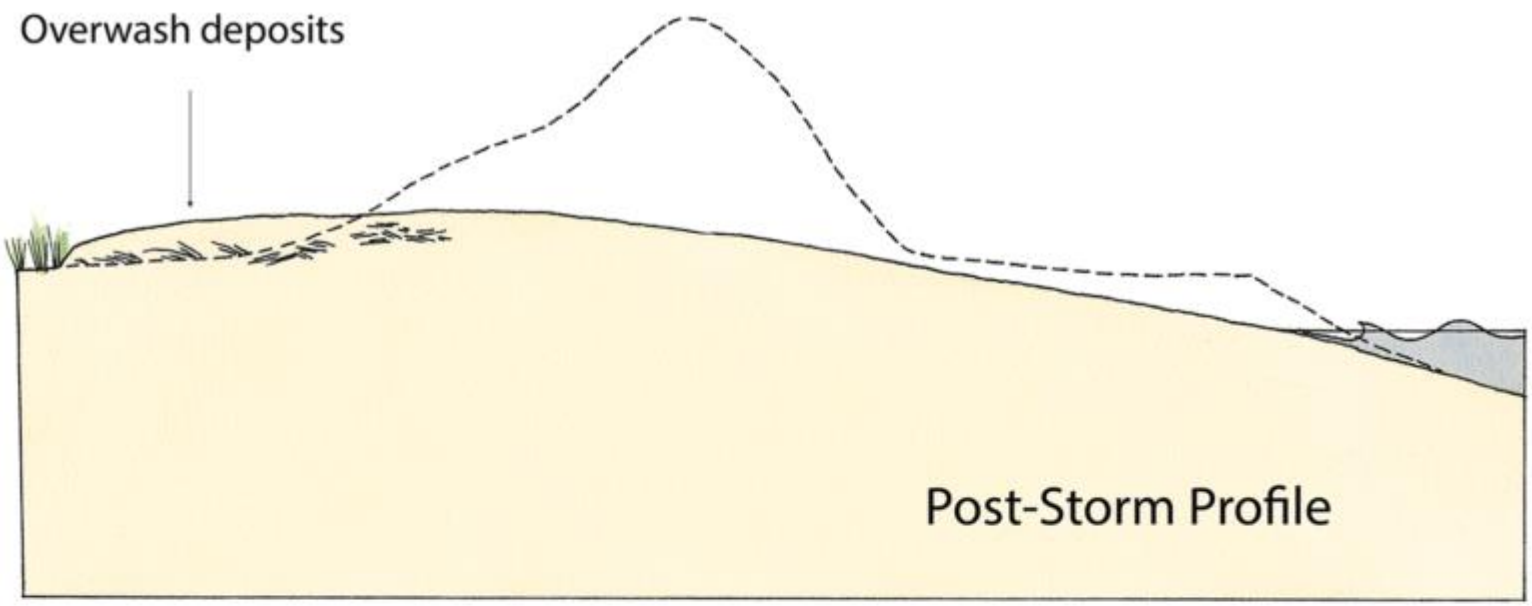
- The shape of the beach is rearranged constantly by changes in the waves
- Beaches are products of erosion, constantly eroding and recovering sand

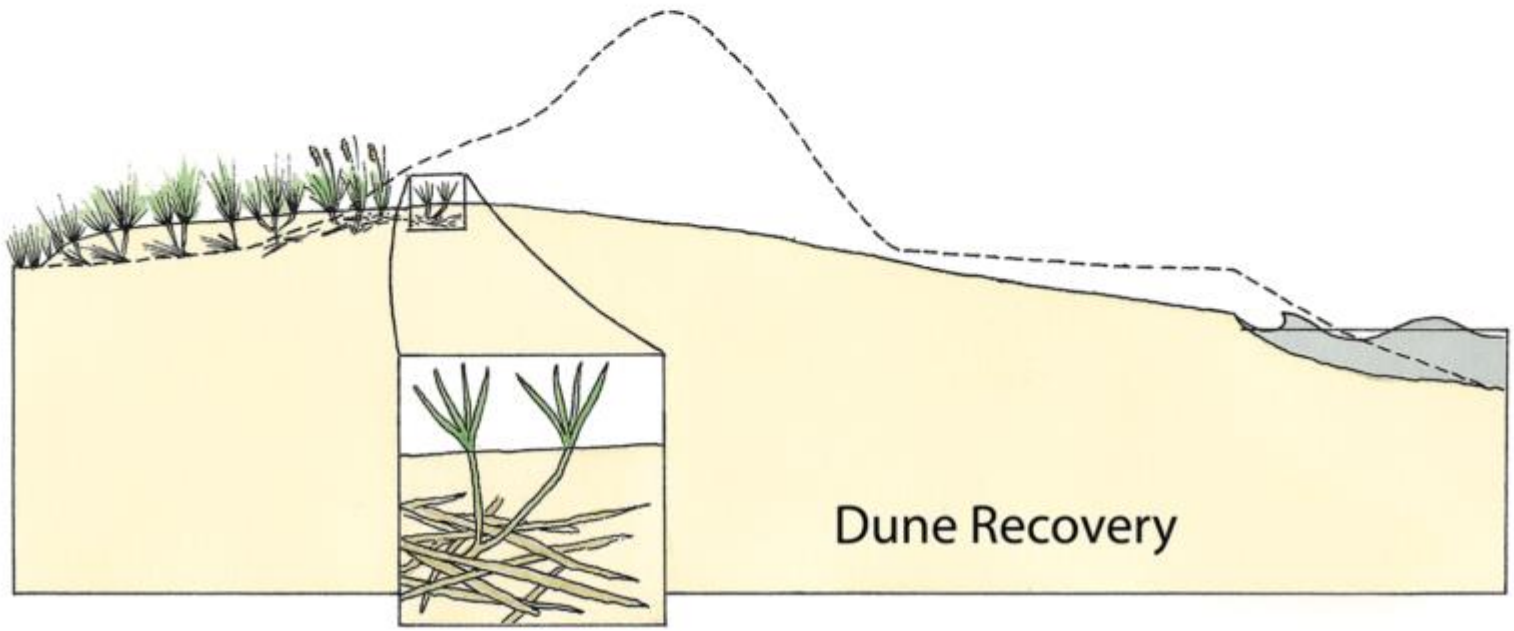


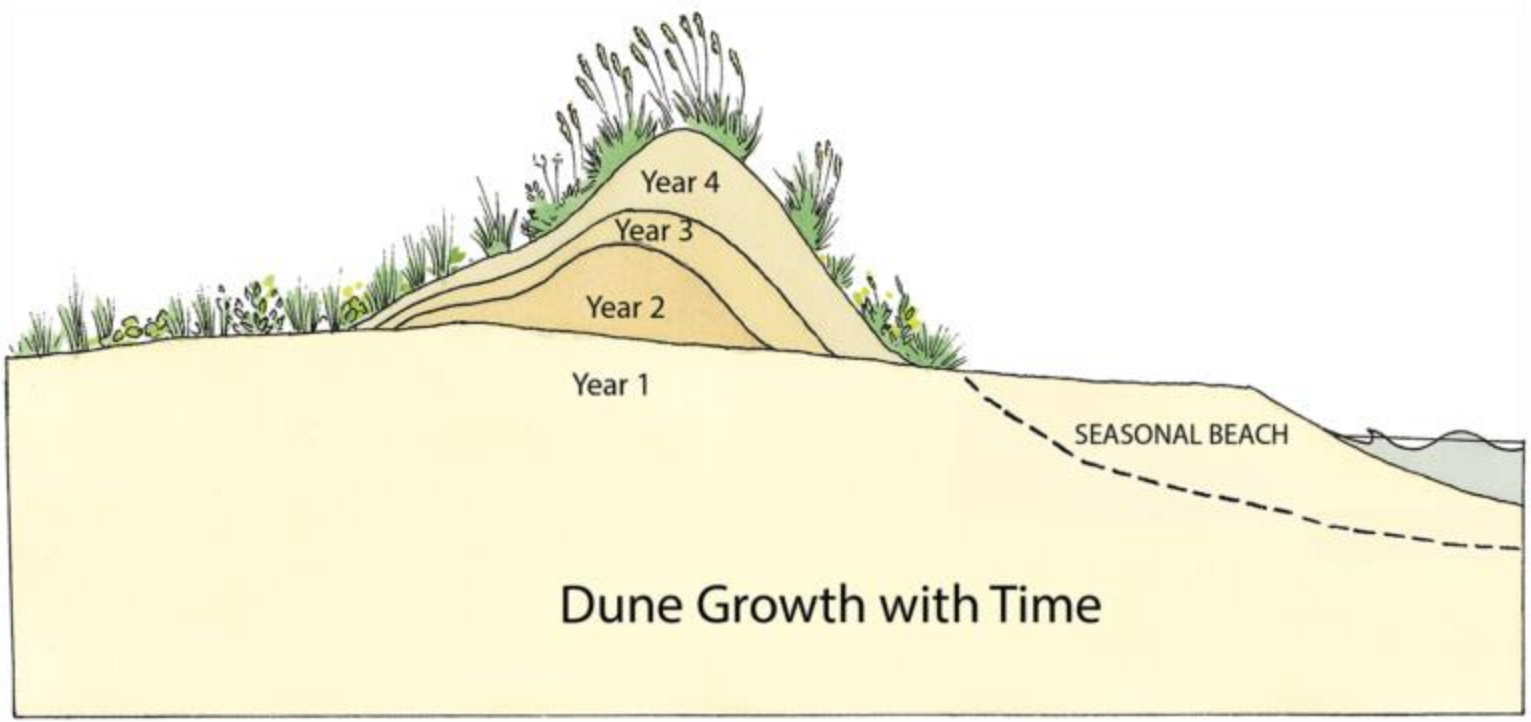
Source: The Dune Booklet, 2003


Buried plants
Post-Storm Profile


New plant growth
Scarp collapses
Dune Recovery


Overwash deposits
Post-Storm Profile


Dune Recovery


Year 4
Year 3
Year 2
Year 1
SEASONAL BEACH
Dune Growth with Time

Sea Oats

Uniola paniculata

"Signature Plant" on NC's coastal dunes

Important food source for wildlife in the dune ecosystem

Deep taproots and lateral rhizomes

American Beachgrass

Ammophila breviligulata

Native to the mid-Atlantic coast to Hatteras

Effective plant for dune building and stabilization

Establishes quickly and spreads by rhizome

Cool Season Grass

Bitter Panicum

Panicum amarum

Warm season perennial grass

"Running Beachgrass"

Effective at trapping and stabilizing sand

Spreads by underground rhizomes

Seashore Elder

Iva imbricata

Only non-grass species recommended for dune stabilization

Succulent leaves and woody stem

Seedlings germinate in the wrack line

Sea Turtles

Loggerhead Turtle
Caretta caretta

NC Coast
1496 total nest in 2021
1446 Loggerheads
42 Green Turtle
7 Kemp's Ridley

Beach Nesting Habitat

North Carolina's Beach-nesting Birds

- Black Skimmer
- Gull-billed Tern
- Common Tern
- Least Tern
- American Oystercatcher
- Wilson's Plover • Piping Plover


Lindsay Addison/Audubon


Photo: Sam Bland


Walker Golder, Audubon


Lindsay Addison/Audubon

Ghost Crabs

- Semi-terrestrial
- Inhabit deep burrows in the intertidal zone
- Blend very well with their surroundings
- Omnivores: will feed on insects, clams, vegetation and detritus
- Use the fine hairs on their legs to wick up water from the moist sand

Mole Crabs

- Live in the surf zone on the beach
- Stick antennae out to funnel plankton into mouth
- Dig quickly into sand using backward burrowing
- Uses temporary liquefaction of the sand to move in and out
- Moves up and down the beach face with the tide

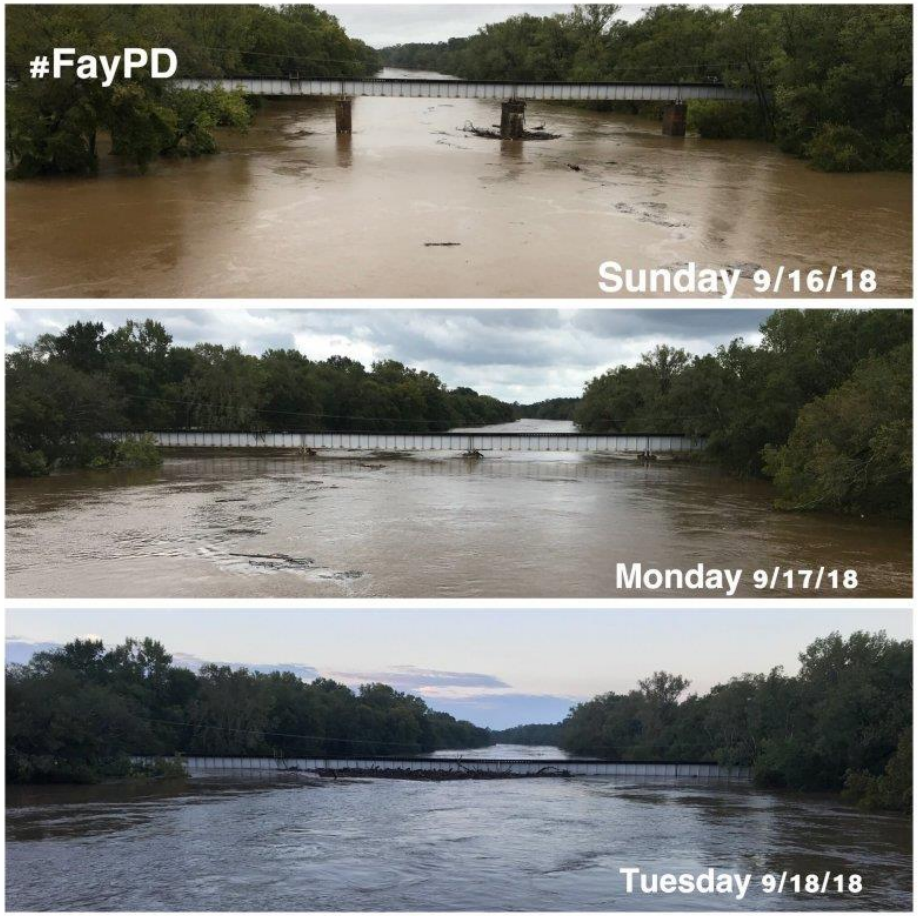
Coquina Clams

- *Donax variabilis*
- Found buried just under the surface of the sand in the surf zone
- Algae filter feeders
- Critical food source for fish, crabs and shorebirds
- Considered an indicator species for beach habitat

Photos: Sam Bland

Challenges

- Increasing frequency and intensity of storms
- Conversion of wetlands to other land use-losses functionality of that natural space
- Habitat loss
- Sea level rise



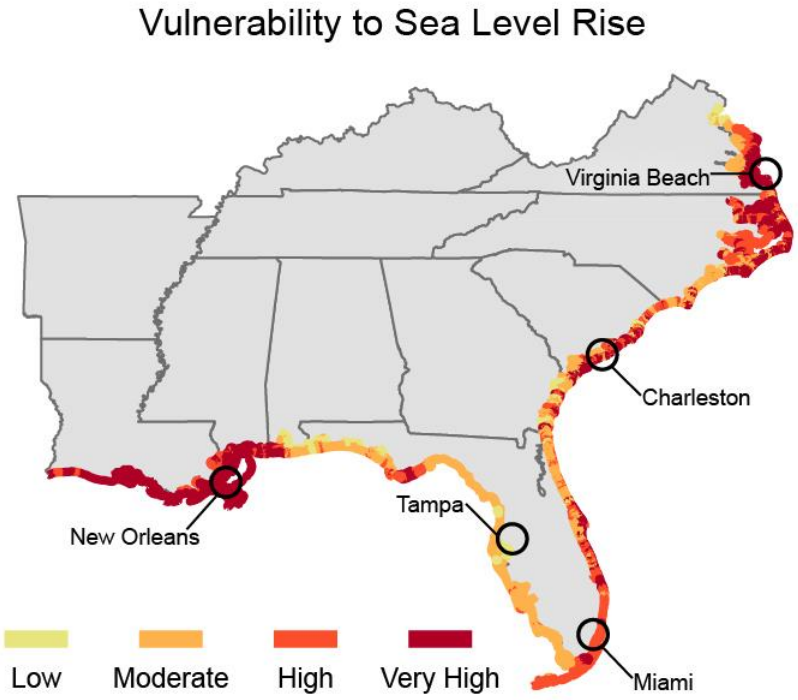
Cape Fear River in Fayetteville, N.C. Photo Fayetteville Police Department.

Sea Level Rise

What can we expect on the coast?

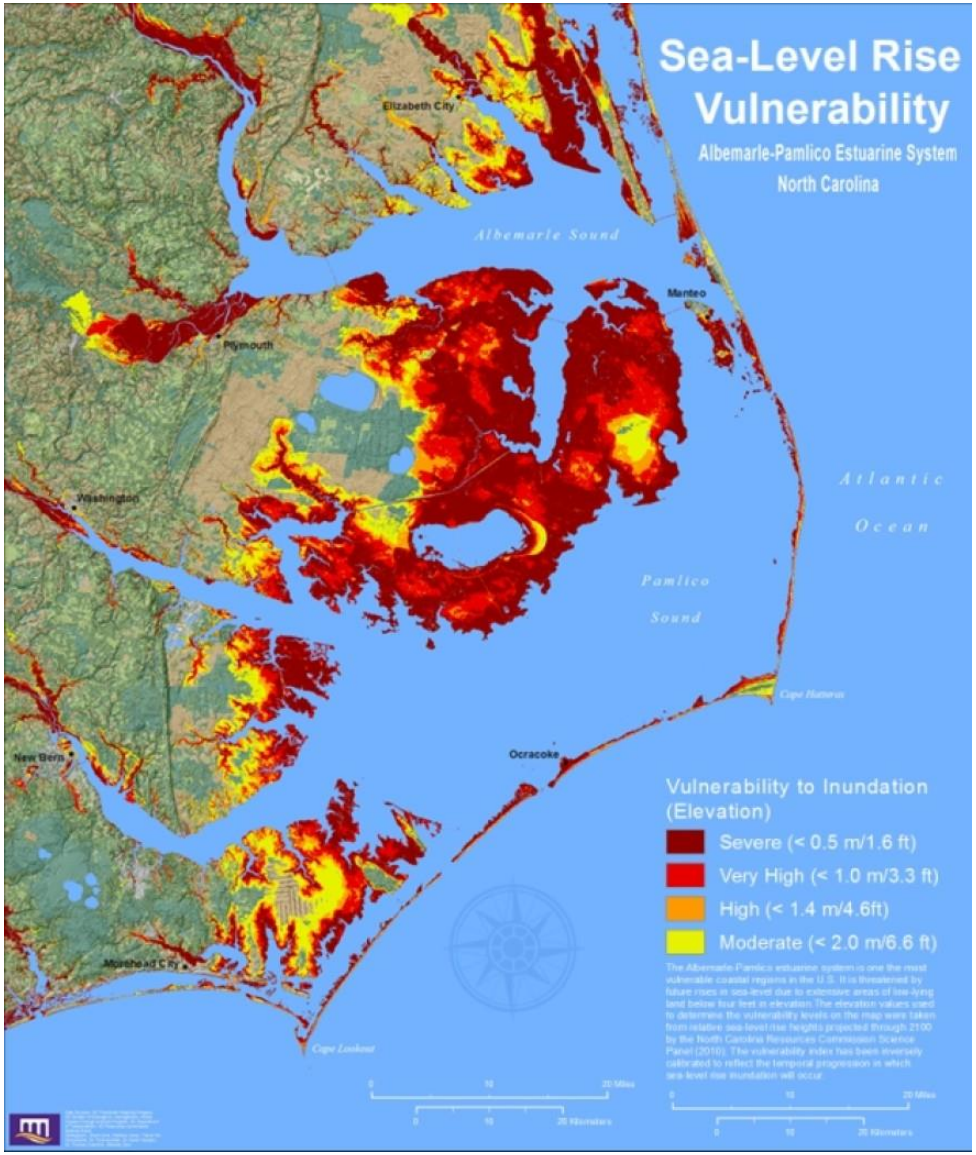
- Coastal flooding that is more frequent and severe
- Increased damage from storms, as higher sea levels lead to greater storm surge
- Greater stress on groundwater aquifers from saltwater intrusion
- Low-lying farming lands at risk of saltwater intrusion, decrease in available freshwater, flooding, permanent inundation
- Flooding and inundation can damage buildings, roads, and recreational areas, leading to greater costs to businesses and taxpayers

Global Sea Levels are rising by 3.3 mm per year and this rate is accelerating



Source: U.S. Global Change Research Program (2014)

Oregon Inlet: 4.5 mm/year
Southport: 2 mm/year



Renaissance Computing Institute (RENCI) At East Carolina University

Ghost Forests

Sunny Day Flooding

Battleship North Carolina, Cape Fear River

Kitty Hawk beach nourishment in September 2017. Photo: Dare County/Youtube

There is no guaranteed permanency for any ecosystem, landform, or built structure at the coast….

Stanley R. Riggs, et al. “The Battle for North Carolina’s Coast”