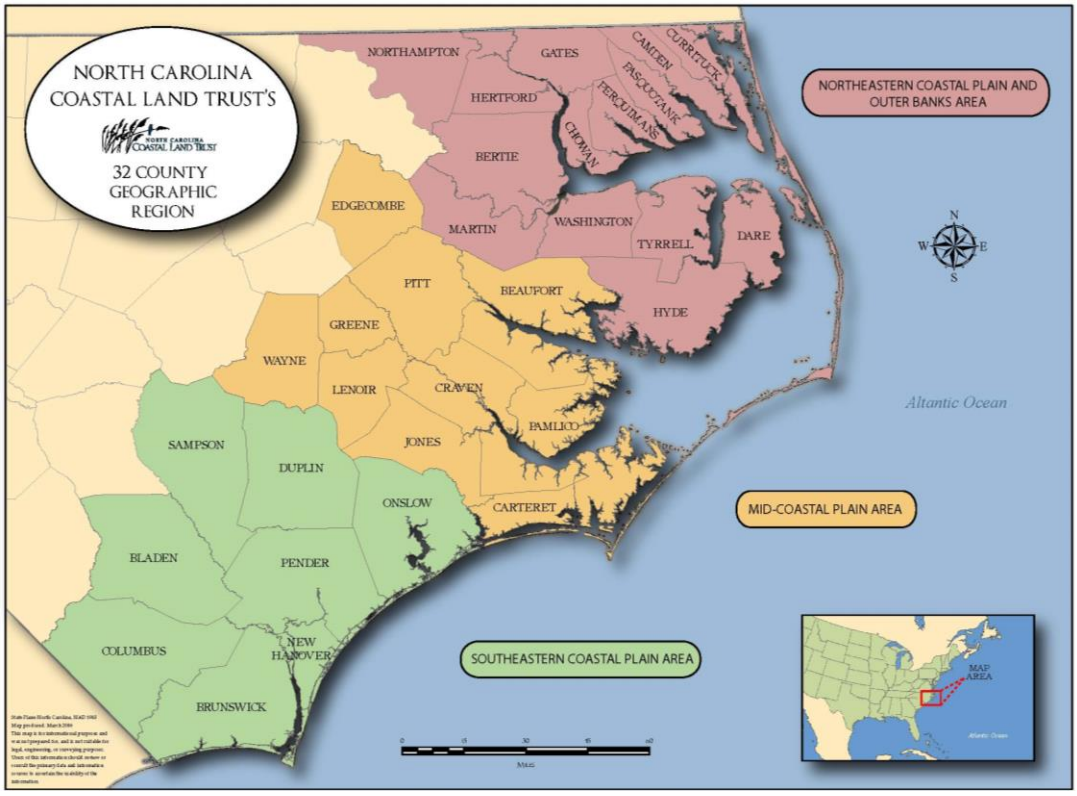
COASTAL REGION APPENDIX

The coastal region is defined by the area of North Carolina from the Sandhills to the continental shelf in the Atlantic Ocean. This 32-county geographic region is generally divided into 3 sub-regions: Northeastern Coastal Plain and Outer Banks; Mid-Coastal Plain; and Southeastern Coastal Plain. The Northeastern Coastal Plain is the area surrounding the Albemarle Sound and includes the Pasquotank, Chowan, and Roanoke watersheds. The Mid-Coastal Plain is the area around the Pamlico Sound and includes the Tar-Pamlico, Neuse, and White Oak watersheds. The Southeastern Coastal Plain is the area associated with the Cape Fear and Lumber River watersheds.



The coastal plain of North Carolina is distinguished by unusual geology and the greatest biological diversity along the Atlantic Coast north of Florida. A large variety of habitats have nurtured a multitude of plants and animals, many found nowhere else in the world. The coastal plain is a mosaic of barrier islands, estuarine marshes, tidal creeks, sandy pine ridges, pocosins, blackwater and brownwater river corridors.

The two biggest economic engines in this region are tourism and agriculture. Tourism is mainly focused along the coast, with barrier island beaches as the main attraction. Route 17, which runs along the entire North Carolina coast, provides transportation to the islands and coastal communities. On the west side of Route 17, the landscape is dominated by agriculture; everything from small family farms to large corporate operations. Coastal economies are severely impacted by

damage associated with severe storms. STAT about losses The protection of coastal habitats provides flood and storm surge protection, improved water quality, increased water storage, habitat for fisheries, corridors for species migration, and opportunities for recreation and tourism - ultimately making a significant contribution towards the coastal economy.

IMPORTANT HABITATS IN THE COASTAL REGION

The following habitats are some of the highest priorities for conservation in the coastal region.

Longleaf Pine and Pocosin Ecosystem

Longleaf pine, wet pine savanna, and pocosin habitats intermingle over much of the coastal landscape on interstream terraces.

- Longleaf pine communities have been reduced to just 3 percent of their previous range throughout the southeast, according to the NC Wildlife Action Plan. It is one of the most endangered habitats in the United States due to development and lack of fire. Two species that are dependent on longleaf include the fox squirrel (*Sciurus niger*)- state rare; and red-cockaded woodpecker (*Picoides borealis*)- federal and state endangered.
    - The restoration of fire in this natural community, through controlled burns, is a critical management strategy for protecting and restoring the longleaf pine ecosystem. Controlled burns, also called 'prescribed fire' also reduces the risk of wildfire by reducing the amount of fuel in the understory; the risk for wildfire is greater with more drought and flash drought events caused by climate change.
- Wet pine savannas are mineral wetlands characterized by an open canopy of pine and an understory of wiregrass, herbs, or shrubs. The Carolina gopher frog (*Rana capito capito*), a state-threatened species, and many other amphibians and reptiles use this habitat.
- Pocosins are shrub dominated wetland habitats occurring on peat-filled Carolina Bays and depressions. Under natural conditions, many species of wildlife use this habitat, including a variety of neo-tropical migratory birds. Pocosins, also when under natural conditions, are an important carbon sink, but when drained for other land uses, like agriculture and timberlands, they emit CO_2 and become a wildfire risk. The protection and restoration of pocosins reduces the risk of wildfire and the severity of flooding in coastal communities.
    - Estimated total carbon benefits from restoring pocosins are 3.08 MT CO2e/acre/year. Over time, the rate of carbon sequestration will increase, and at year 100, it is estimated that pocosins will sequester 1,080 MT CO2e/acre.[1]

Mesic and Dry Hardwood Forests

- Mesic forest occurs on moist upland habitat that is sheltered from fire by topography or moisture. Natural fires in mesic forests are infrequent and of low intensity. The canebrake rattlesnake (*Crotalus horridus*) is a species of concern that lives in mesic forests.

[1] North Carolina Natural and Working Lands Action Plan. June 2020. Department of Environmental Quality, Raleigh, NC.

- Oak forests are no longer common in the coastal plain except in small patches. The quality of these forests depends on the age of the trees, management history, and fragmentation. This habitat type also includes remnants of fire-deprived longleaf pine. Larger tracts of this habitat contain a variety of birds, bats, small mammals, reptiles, and amphibians.
- Early successional habitats are often found at the edge of agriculture fields and woodlands and are created by forest clearing. Naturally, these habitats are formed by intense fires, disease, or storms. High quality early successional habitat can include a variety of pasture, cropland, and open clearings. Grassland birds and small mammals thrive in this habitat.

Barrier Islands and Estuarine Ecosystems

This ecosystem is vulnerable from both natural and human causes. Several globally threatened species occur in these habitats.

- The beach/dune habitat found on barrier islands is particularly important to nesting sea turtles and shorebirds. These species rely on the dynamic nature of the beach and need storms to re-create wide beaches with bare sand. Loggerhead, Green, Leatherback, and Kemp's Ridley Sea turtles are federally- listed species that nest on North Carolina's barrier islands. The protection of beach and dune habitat is also critical for protecting infrastructure and development from flooding associated with rising sea levels, storm surge, and storms.
- Maritime forest is found on the upper dunes and flats protected by salt water and sea spray. It is one of North Carolina's most endangered habitats due to the development of barrier islands. Maritime forest is important breeding and migration habitat for migratory birds, and key breeding habitat for the eastern painted bunting (*Passerina ciris*)- rare in North Carolina.

Estuarine communities include a variety of habitats from mud flats and algal mats to marshes and small islands. Waterfowl, birds-of-prey, shorebirds, and furbearers all use estuarine habitat during some stage of their life cycles. Estuarine habitats are an important place for the growth of submerged aquatic vegetation (SAV). SAV is a critical nursery habitat for young fish and habitat for millions of invertebrates. In addition to being important wildlife habitat, SAV sequesters and stores CO2 in both the plant material and in the soil around the grass, scientists refer to this as 'blue carbon.' Currently, North Carolina's SAV stores 18 million MT CO2e. Similarly, saltmarsh has one of the highest per unit area carbon sequestration rates of any vegetated habitat, 1.1 MT CO2e/acre/yr. and North Carolina's salt marshes currently store about 61 million MT CO2e.[2]

- Salt marshes and SAV habitats are also very useful for stabilizing shorelines during storm events; 15 feet of salt marshes reduces incoming wave energy by half.
- Coastal fringe forest occurs along the mainland edge usually on sand bluffs overlooking estuaries. Small mammals, amphibians and reptiles seek refuge here, along with migrating birds. The Calcareous Coastal Fringe natural community, a variety of coastal fringe forest, is considered globally rare.

[2] North Carolina Natural and Working Lands Action Plan. June 2020. Department of Environmental Quality, Raleigh, NC.

Non-Alluvial Mineral Wetlands

Mineral wetlands that are not associated with rivers and streams are found in the coastal plain where high water tables are present. Historically, most of these wetlands were drained for farmland or forestry since they can support heavy machinery better than peatland, and mineral soils are especially fertile. Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) is a state-threatened species that roosts in large hollow trees found in these wetland habitats.

Small Wetland Communities

Small wetlands include vernal pools, cypress savanna, beaver ponds, Carolina bays, and lime sinks. These communities provide key habitat for crayfish, amphibians, reptiles, and wading birds. Many species that use these areas also need large buffers of upland habitat to complete their life cycle requirements.

Lakes and Reservoirs

Natural lakes and their shorelines are important foraging, breeding, and nesting habitat for birds. Many natural lakes are under public ownership; however, shoreline protection varies. Large birds such as the Bald Eagle (*Haliaeetus leucocephalus*), a federally protected species, and colonies of Wood Stork (*Mycteria americana*), a federal and state endangered species, forage and nest around open water.

Forested Floodplains and Riverine Aquatic Communities

These habitat types are associated with the blackwater and brownwater river systems in the coastal plain. The major coastal watersheds, from north to south, include Pasquotank, Chowan, Roanoke, Tar-Pamlico, Neuse, White Oak, Cape Fear and Lumber River watersheds.

- Coastal plain floodplain habitat includes levee forest, cypress gum swamps, bottomland hardwoods, and alluvial floodplains along the blackwater and brownwater rivers in the coastal plain. Wading bird rookeries of heron and egret species are reliant on these floodplain systems.
- Riverine aquatic habitat is important for aquatic animals, as well as species that use aquatic habitat during part of their life cycle (like amphibians). Semi-aquatic wildlife such as otters and beavers rely on this habitat for their food base.
- Protected forested floodplains play a critical role in lessening the impacts of severe flooding by storing and slowing down flood waters.

Tidal Swamp Forest and Wetlands

These habitats are found along rivers or sounds, where flooding is caused by lunar or wind tides. The level of flooding and salt content determine what type of vegetation is present. Tidal swamps are found mainly in northeastern North Carolina around Currituck and Albemarle sounds, and sporadically southward alongside estuaries.

COASTAL PLAIN CONSERVATION PARTNERSHIPS

Onslow Bight Conservation Forum

This forum of 14 different organizations includes state and federal natural resource agencies and the US military. The Onslow Bight landscape is in the mid-coastal plain of North Carolina from northern Brunswick County along the coast to the southern part of Beaufort County. The mission of the Onslow Bight Conservation Forum is to "provide for open discussion among the participants concerning the long-term conservation and enhancement of biological diversity and ecosystem sustainability throughout the Onslow Bight Landscape compatible with the land use, conservation, and management objectives of the participating organizations and agencies." The Onslow Bight Conservation Forum is named after the nautical term "Bight" that refers to a wide bay formed by a curve in the shoreline, as is the case in Onslow County. This area is home to spectacular longleaf pine savannahs containing large populations of red cockaded woodpeckers, a federally endangered species. Contact Hervey McIver for more information at hmciver@tnc.org.

Cape Fear Arch Conservation Collaboration

This Collaboration of 27 different organizations focuses on land management in the southeastern coastal plain of North Carolina and northeastern South Carolina. The mission of the collaboration is to "develop and implement a community conservation vision to build awareness, protection and stewardship of the region's important resources." The Cape Fear Arch Conservation Collaboration is named after the geological feature The Cape Fear Arch, an uplift of sand and limestone deposits formed 35-45 million years ago. The Cape Fear Arch has given rise to unique natural communities and a large diversity of plants and animals. Twenty-two plants and nineteen animals are endemic to the region, meaning they are found nowhere else in the world. This region has been identified in the NC Wildlife Action Plan, The Nature Conservancy's Mid-Atlantic Coastal Plain Ecoregional Plan and One North Carolina Naturally as one of the highest priority areas for conservation efforts. https://www.capefeararch.org/

Visit https://ncwrc.maps.arcgis.com/apps/webappviewer/index.html?id=f4d510e0b5724c03892d85b1601e4cee for an online map of focal conservation areas in the Cape Fear Arch.

Coastal Resilience Community of Practice

This group is a peer-learning group available to local government staff and natural resources professionals that are interested in nature-based solutions for climate resilience. The group meets quarterly to discuss current tools, research, and resources to support the protection of coastal communities and natural areas. Contact Whitney Jenkins for more information at whitney.jenkins@ncdenr.gov

COASTAL REGION GIS DATA

Section 2 of the Green Growth Toolbox Handbook presents conservation GIS data layers that apply statewide. Page 37 of the handbook lists the original sources of the statewide data, how frequently they are updated, and who created the data. All of the data layers can be downloaded from the map on the NC Natural Heritage Program Data Explorer[3] and the Green Growth Toolbox website.[4] Additional GIS data that is useful for conservation planning on the coastal plain have been included in this appendix. Copies of these layers are available on the Green Growth website under "Ecological Region Data" (www.ncwildlife.org/greengrowth/Conservation_Data.htm).

Ambient Water Quality Monitoring Sites - 'awqms.shp' - These points represent routine water quality sampling sites monitored by the NC Department of Environmental Quality, Division of Water Resources. For the associated water quality data for these sites, you can download the 2012 Overall Integrated Water Quality Ratings produced and managed by DWR at http://data.nconemap.gov/downloads/vector/waterq_ratings.zip.

Beach Access Areas – 'Beach_Acess.shp' - This layer represents public water access points developed by the NC Division of Coastal Management. Sites vary in amenities such as restrooms, parking, showers, and picnic tables. Details on the amenities offered can be found in the attribute table for this layer.

Benthic Monitoring Sites – 'benthic.shp' - The benthic monitoring sites layer represents aquatic sampling for macroinvertebrates. The "Bioclass" column in the attribute table for this layer notes whether the site is considered excellent to poor. Definitions for these values are below. Questions on specific monitoring data can be directed to NC Department of Environmental Quality, Division of Water Resources, Biological Assessment Branch at http://portal.ncdenr.org/ web/wq/ess/bau.

Value	Definition
Excellent	Waters with very diverse benthic macroinvertebrate populations, including many pollutant-intolerant species.
Good	Waters with healthy but less diverse benthic macroinvertebrate populations and fewer pollutant intolerant species.
Good-Fair	Waters with average benthic macroinvertebrate populations, numbers & diversity.
Fair	Waters with below average diversity or abundance of benthic macroinvertebrate populations. Tolerate species begin to dominate community.
Poor	Waters with very limited benthic macroinvertebrate populations, low diversity and/or abundance. Tolerant species are generally dominant.
Not Rated	Locations that have been sampled, but not assigned a water quality rating

[3] https://ncnhde.natureserve.org/
[4] www.ncwildlife.org/greengrowth /Conservation_Data.htm

Fish Sampling Sites- This layer shows sites where fish communities are assessed to help inform water quality conditions. For specific fish data at a sampling site, please contact the USGS NC Water Science Center at (919) 571-4000.

The NC Division of Marine Fisheries produces the following datasets. The presence of a Shellfish Growing Areas and Submerged Aquatic Vegetation in a waterway or marsh may affect adjacent upland areas in terms of recommended shoreline stabilization methods, setbacks, and stormwater treatment requirements to protect this important resource. You can read more about these habitats and maps at https://fisheries-ncdenr.opendata.arcgis.com/

- *Shellfish Growing Areas – 'sga.shp'* - This layer represents marshlands and waterways critical for a healthy oyster fishery and other valued species.
- *Submerged Aquatic Vegetation (SAV)* – SAV is a designated critical habitat in the NC general statutes. SAV is essential fish nursery habitat and is a primary producing habitat that forms the base of the estuary food chain. Without it many of our fisheries and marine mammals will die out.
- *Strategic Habitat Areas* – SHAs represent the best of the best coastal aquatic and wetland habitats. They are essential for natural ecosystem function.

Sea Level Rise and Coastal Flooding Impacts Viewer*:* This data viewer provides coastal managers and scientists with a visualization of modeled sea level rise and coastal flooding impact scenarios, including the migration of marsh habitat inland. http://coast.noaa.gov/slr/

Coastal Flood Exposure Mapper*:* This mapping application provides a visualization of exposure to common types of coastal flooding. And it allows users to make maps.
http://www.coast.noaa.gov/floodexposure/#/splash

Coastal Resilience Evaluation and Siting Tool (CREST) identifies where open space projects may have the greatest potential to benefit both human community resilience and fish and wildlife.
(https://www.resilientcoasts.org)

The Nature Conservancy Coastal Resilience Decision Support Tool *provides* visualization of potential inundation during coastal storms and sea-level rise predictions. The tool also site-specific guidance on where to restore marshes and oyster reefs, or to do different types of living shoreline projects. The site also incorporates resiliency planning data from local governments.
https://maps.coastalresilience.org/northcarolina/

REGIONAL PLANS & RESOURCES

These plans and resources are specific to a coastal region or to a particular species and/or natural community.

- **America's Longleaf Initiative**, *Conservation plan.* www.americaslongleaf.org/resources/conservation-plan/
- **Cape Fear Arch Conservation Collaboration**. 2009. *Cape Fear Arch Conservation Plan, Working Draft.* http://capefeararch.org/resources/
- **Onslow Bight Conservation Forum**. 2004. *Onslow Bight Conservation Design Plan.* Contact Hervey McIver, The Nature Conservancy, hmciver@tnc.org.
- **The Albemarle-Pamlico National Estuary Program** (APNEP) provides mapping and modeling tools, outreach materials, research, and can facilitate partnerships and resource-sharing to support community nature-based resiliency planning efforts. https://apnep.nc.gov/our-work/protection/climate-resilience-and-adaptation-initiatives
- **NC Division of Coastal Management Coastal Resiliency** is a portal to coastal resiliency resources, including:
    - **Funding resources** – links local governments to funding resources, including the **N.C. Resilient Coastal Communities Program,** which provides funding to local governments to help overcome barriers in coastal resilience and adaptation planning.
    - **North Carolina Coastal Communities Resilience Guide** – Story map that walks communities through a planning process for resiliency
    - **Data Resources** to support coastal resiliency
    - Additionally, DCM offers guidance on **living shorelines** for homeowners, local governments, and developers https://deq.nc.gov/about/divisions/coastal-management/coastal-management-estuarine-shorelines/stabilization
- **Basinwide Water Quality Plans:** The Department of Environmental Quality Division of Water Quality developed these watershed plans to identify water quality problems, restore impaired waters, protect high value resource waters and unimpaired waters while allowing for economic growth. All the river basins of the coastal plain have water quality plans that are a good source of natural resource existing conditions information. Plans can be accessed at: https://deq.nc.gov/about/divisions/water-resources/planning/basin-planning.
- **Natural Area Inventories:** The North Carolina Natural Heritage Program has developed county-wide Natural Heritage Inventories for all counties on the coastal plain. These reports document the most significant natural areas in the counties, describes their features, and documents all known natural communities and rare species of plants and animals associated with them. You can access your county's Natural Heritage Inventory online by searching the terms 'Natural Heritage Inventory' and your county's name.

REGIONAL GREEN GROWTH CONTACTS

ORGANIZATION	CONTACT	PHONE	EMAIL
Albemarle – Pamlico National Estuary Partnership	Stacey Feken	(919) 707-8657	stacey.feken@apnep.org
Audubon North Carolina	Lindsay Addison, Coastal Biologist	910.408.2288	laddison@audubon.org
Bald Head Island Conservancy	G. Christopher Shank, Executive Director	(910) 457-0089	shank@bhic.org
Brunswick County	Kirstie Dixon, Planning Director	910-253-2025	kdixon@brunsco.net
Cape Fear Council of Governments	Allen Serkin, Executive Director	910-274-0341	aserkin@capefearcog.org
Cape Fear Resource Conservation & Development		910-763-6611	info@capefearrcd.org
Cape Fear River Watch	Dana Sargent, Executive Director	910-772-3005	dana@cfrw.us
Natural Resource Conservation Service	North Carolina | Natural Resources Conservation Service (usda.gov)		
North Carolina Coastal Federation	Lauren Kolodij, Deputy Director		laurenk@nccoast.org
North Carolina Coastal Land Trust	Harrison Marks, Interim Executive Director	(910) 790-4524 x2060	harrison@coastallandtrust.org
North Carolina Cooperative Extension	Contact Us | NC State Extension (ncsu.edu)		
North Carolina Natural Heritage Program	Rodney Butler	919-707-9392	rodney.butler@ncdcr.gov
North Carolina Wildlife Resources Commission	Maria Dunn, Habitat Conservation Program	252-948-3916	maria.dunn@ncwildlife.org
The Nature Conservancy	Dan Ryan, Southeast Coastal Plain Director	910-395-5000	drayn@tnc.org
Sound Rivers	Heather Deck, Executive Director	252 946-7211	heather@soundrivers.org
US Fish & Wildlife Service	Sara Ward, Ecologist	252-473-1132	sara_ward@fws.gov
Winyah Rivers Foundation	Debra Buffkin, Executive Director	843-349-4007	ExecutiveDirector@winyahrivers.org