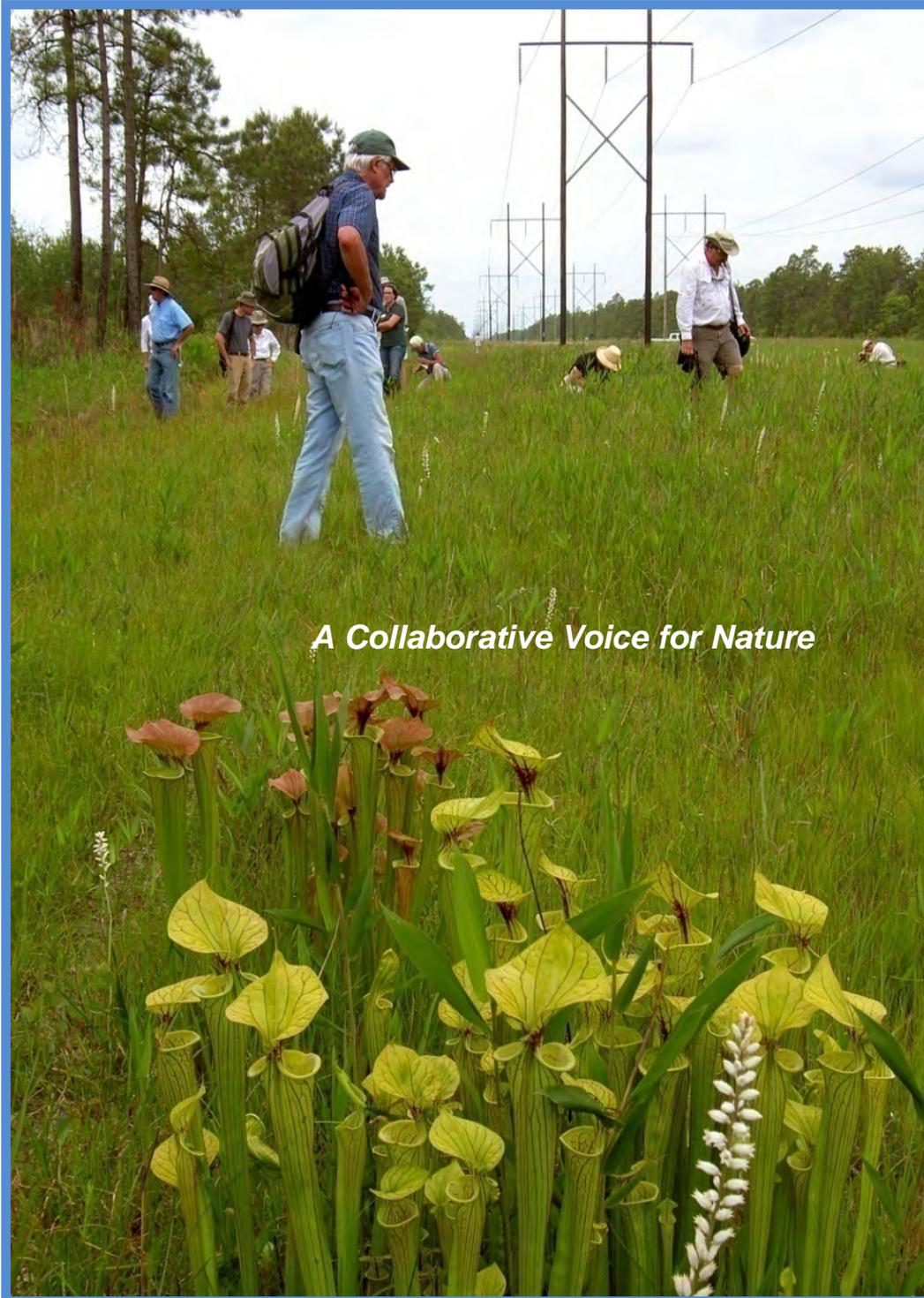




# CONSERVATION PLAN

Prepared by the Cape Fear Arch Conservation Collaboration  
Working Plan Version April 2015



*A Collaborative Voice for Nature*



Photos by NC CLT & Dale Suiter

# Cape Fear Arch Conservation Plan

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# CAPE FEAR ARCH CONSERVATION PLAN

## I. Definition and Significance of the Cape Fear Arch Region

Southeastern North Carolina and northeastern South Carolina stretch across the lower Coastal Plain and are strongly influenced by the geologic region known as the “Cape Fear Arch”. The Cape Fear Arch is a region distinguished by unusual geology and the greatest biological diversity along the Atlantic Coast north of Florida. It is located between Cape Lookout in North Carolina and Cape Romain in South Carolina, and extends inland beyond Fayetteville to the Sandhills Region of the Carolinas. See Map1- Counties within the Cape Fear Arch Region.



The Cape Fear Arch is a little higher in elevation than areas near the coast to the north and south, and has been above sea level for a longer period of time, even standing as a peninsula at certain times when the rest of the coastal plain was submerged. These factors have helped to produce an array of wet and dry habitats. In turn, these habitats have nurtured a multitude of plants and animals, many found naturally nowhere else in the world. Among these are the Venus flytrap and the Waccamaw silverside.

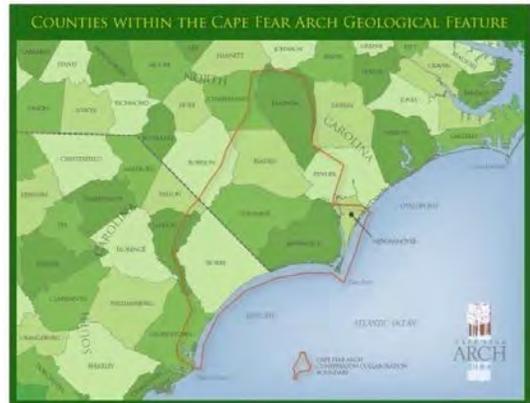
Typical of areas with great biological diversity, there are a number of rare plants and animals associated with the Cape Fear Arch. Brunswick County, for example, has more rare species than any other county in North Carolina. New Hanover County, though only 99th in size among the state’s 100 counties, ranks second in number of rare animal species. There is also evidence that the Cape Fear Arch has served as a plant and animal migration corridor between the outer Coastal Plain and Sandhills Region during climate changes in the past. The Cape Fear Arch appears to have served as a refuge for Coastal Plain plants and animals during the last Ice Age, and its isolated and specialized habitats may also have seen the development of new species during the same period. With proper care and maintenance of Cape Fear Arch habitats, these major bio-geographical functions would be available for the future needs of the region’s plants and animals.

## II. Cape Fear Arch Conservation Collaboration (CFACC):

The rural character of the area, coupled with the flora and fauna and supporting geophysical landform have created a natural environment with abundant opportunities to enjoy fishing, hunting, camping, hiking, canoeing, and other natural resource-based outdoor recreational opportunities. Many residents - permanent and seasonal - have chosen the area because of the many amenities afforded by the natural environment.

The Cape Fear Arch region is experiencing intense growth pressure with substantial projected population increase in the near term that will consume many acres of natural land, urbanize much of the presently rural landscape, and threaten many of the natural resources that make the area so attractive. However, there is still a window of opportunity to plan properly for the anticipated population growth in a way that will allow for economic development while protecting the resources that make this area so special.

Many organizations and individuals are interested in realizing a vision for this region where growth and nature's needs are properly balanced. These entities have recognized the importance of coordinating efforts in the region to avoid duplication of effort and missed opportunities, leading to the formation of the Cape Fear Arch Conservation Collaboration (CFACC). The CFACC selected a subset of the Cape Fear Arch Region to focus its efforts, i.e., all or portions of 12 counties in North and South Carolina that did not overlap other existing partnership efforts such as the Onslow Bight Conservation Forum and the Sandhills Conservation Partnership in North Carolina and provided an extension of conservation efforts across state lines along the Lumber/Pee Dee and Waccamaw Rivers. The overall CFACC focus area is outlined on Map 2.



The participating organizations represent a broad spectrum of land managers and land conservation advocates with differing missions. Some are custodians of large areas of public land held primarily for resource conservation and utilization. Some modify the resource base by their own activities, and some are conservation advocates with little or no land base of their own. All are dedicated to sustainable natural resource management, providing for human needs while retaining the natural heritage of the region. Towards this end, the participating organizations are committed to foresee potential conservation opportunities and resource issues and, within their authority and consonant with their missions, work to maintain and protect ecologically viable and significant areas.

The CFACC was formed for the purpose of enhancing cooperation and communication regarding regional conservation issues within the Cape Fear Arch landscape.

The mission of the CFACC is: *Develop and implement a community conservation vision to build awareness, protection and stewardship of the region's important natural resources.*

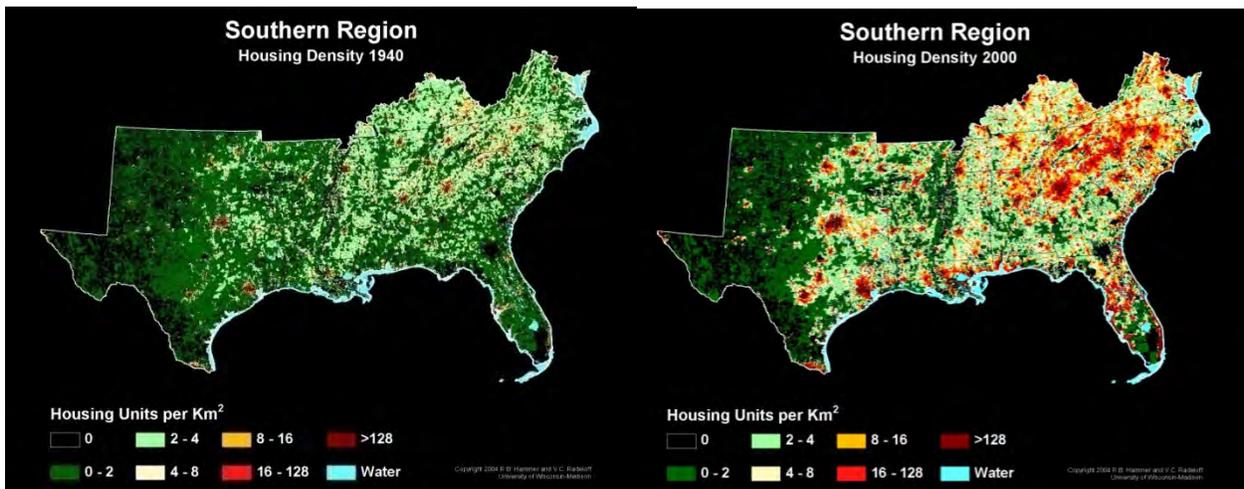
The participating organizations and agencies recognize the following goals of the CFACC:

1. Identify and map the highest priority habitats and species in need of conservation attention in the region;
2. Promote the conservation, restoration, health and sustainable use of the landscape and the native terrestrial and aquatic communities that depend, in whole or in part, on the lands and waters of the Cape Fear Arch focus area;
3. Encourage public/private partnerships among participating governmental agencies, community and non-governmental organizations, academic institutions, corporations, and private landowners to enhance resources and achieve land conservation results on a landscape scale;
4. Enhance coordination among participants concerning current and future initiatives such that participants will be able to take better advantage of the work already being done by others, as well as identify opportunities for working together to undertake more ambitious projects than any single participant's resources would otherwise permit;
5. Encourage an on-going regional dialogue among participants about sustainable land management, working landscapes and native biodiversity;
6. Establish a network of conservation lands and waterways, and to promote the establishment of landscape corridors and buffers, between and adjacent to existing conservation lands to protect and enhance long-term wildlife population viability and genetic exchange and to ensure land management flexibility;
7. Promote the education of interested private individual and corporate landowners and local government agencies on conservation land management through demonstrations, workshops and field trips;
8. Provide local, county and state government entities with the information and tools necessary to help conserve the natural resources of the region; and
9. Create popular recognition of the beauty, significance and value of the region's special conservation resources.

To achieve these goals, the CFACC provides a communicative forum to identify opportunities for collaborative action among the participants. Although it is not the intent to provide the CFACC with the authority to carry out any specific project in furtherance of its stated objective and goals, participants are engaged to further the mission of the CFACC to the extent authorized under their regulatory and statutory authority, applicable regulations, and in consonance with their primary mission. This Conservation Plan is a critical tool in carrying out these objectives.

The CFACC recognizes that growth itself is not the problem – it is the *pattern* of growth and failure to address issues of conflict with habitat that is the issue. The conservation plan is an effort to define habitat priorities and strategies for defining, reducing, and mitigating conflicts to reduce impacts on the critical networks of natural areas. A key to conservation planning is that it is cheaper to protect high quality, high functioning systems now than to restore damaged natural systems later.

The following images were developed by R.B. Hammer and V.C Radeloff of The University of Wisconsin-Madison, 2004. They highlight the projected housing density for states within the Southern Region with highest densities shown in red.



The conservation planning process identifies, evaluates, and prioritizes an interconnected network of essential core ecosystems in the Cape Fear Arch region and identifies gaps in the existing network for protection and restoration priorities. This strategic and inclusive approach to long-term planning can inform conservation funding decisions. The plan will be provided as a tool to inform planning at regional and local levels. By integrating the goals of multiple programs, strategic planning produces more effective and efficient conservation outcomes. A coordinated, collaborative method maximizes resources and reduces duplication of efforts.

This region has been identified in North Carolina's Wildlife Action Plan, the Nature Conservancy's Mid-Atlantic Coastal Plain Ecoregional Plan, and the One North Carolina Naturally Conservation Planning Tool as one of the highest priority areas for conservation efforts in the Mid-Atlantic Coastal Plain. The North Carolina Coastal Habitat Protection Plan also highlights the ecological and economic significance of the region's estuarine and marine resources, and provides strategies for the long-term enhancement of coastal fisheries associated with coastal habitats.

### **III. Conservation Values of Cape Fear Arch Region- North Carolina**

#### **A. Water Quality Values/Issues**

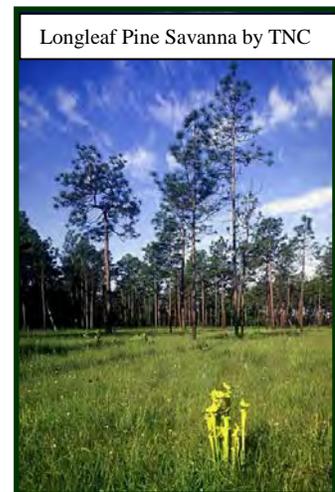
Protecting, enhancing and restoring water quality is a major focus of the Cape Fear Arch Conservation Collaboration. In North Carolina, the Cape Fear Arch Region lies within two major river basins, the Cape Fear River and the Lumber River Basins. (Map 3- Surface Water Quality & Resources)

***From the 2005 Cape Fear River Basinwide Water Quality Management Plan*** - The Cape Fear River is the largest river basin in North Carolina and its watershed is entirely contained within the State. The Cape Fear is formed at the confluence of the Haw and Deep Rivers on the border of Chatham and Lee Counties just below the B. Everett Jordan Reservoir Dam. The Cape Fear River includes 6,049 stream miles and drains 9,322 square miles. It flows through the heavily populated regions of the Triad (Greensboro-Burlington-Highpoint), the Durham-Chapel Hill area, Fayetteville and Wilmington. The Cape Fear River is the most heavily industrialized watershed in North Carolina with 641 National Pollution Discharge System dischargers and approximately 27% of the state of North Carolina's population. Approximately 24% of the land use in the watershed is devoted to agriculture and livestock production, particularly swine and poultry with the highest confined animal production facilities located in the Coastal Plain (the Cape Fear River Basin hosts over half of the state's swine population). The Cape Fear Arch Region includes 9 of the 24 sub basins of the Cape Fear River. There are over 450 miles of streams or rivers in the Cape Fear River Basin within the Cape Fear Arch Region listed as impaired for the aquatic life, and/or recreation use support categories (a majority of the waters in the basin are impaired for fish consumption) by the state Division of Water Quality due to nonpoint or point source pollution. There are approximately 6,500 acres of estuarine waters within the Cape Fear Basin (and Cape Fear Arch Region) that are considered to be impaired for shellfish harvesting. Within the Cape Fear Arch region, only the Black and the South Rivers along with several tidal creeks (e.g., Foy/Futch Creek) and sounds (e.g., Middle Sound) in New Hanover and Pender Counties are listed as either High Quality Waters or Outstanding Resource Waters. A portion of the Cape Fear River mainstem north of Wilmington is listed as a Water Supply Watershed (WS IV). Most of the tidal creeks and sounds in New Hanover and Pender Counties are also listed as important shellfish waters. A detailed description of the Cape Fear River and water quality rankings and threats is in the 2000 and 2005 versions of the Cape Fear River Basinwide Water Quality Management Plan (N.C. Department of Environment and Natural Resources 2000 and 2005).

***From the 2003 Lumber River Basinwide Water Quality Management Plan*** - The Lumber River is situated along the North Carolina/South Carolina border at the southeast corner of the state. The river flows from the Sandhills Region in southern Moore and Montgomery Counties in North Carolina into South Carolina where it joins the Pee Dee River. The Pee Dee River empties into the Atlantic Ocean at Winyah Bay near Georgetown and Myrtle Beach, South Carolina. The Lumber River Basin contains all or portions of nine counties in North Carolina including: Bladen, Brunswick, Columbus, Hoke, Montgomery, Moore, Richmond, Robeson and Scotland. Eight of those counties fall within the Cape Fear Arch Region. The Lumber River Basin hosts Lake Waccamaw, a unique Carolina Bay. The mainstem of the Lumber River is the only North Carolina blackwater river to earn federal designation as a National Wild and Scenic River. Additionally, a majority of the Lumber River mainstem is also designated as a state Natural and Scenic River, one of just four in North Carolina. Approximately 66% of the land in the Lumber River Basin is forested and about 32% is in agriculture with the remaining land in urban use (or as water). The Cape Fear Arch Region includes 8 of the 10 subbasins of the Lumber River Basin. There are 52 permitted wastewater discharges in the Lumber River Basin and approximately 171 registered animal operations. The N.C. Division of Water Quality considers all 2,232.5 miles of waterway within the Lumber River Basin to be impaired for fish consumption, i.e., all waterways contain elevated methylmercury levels that exceed state recommended criteria. However, none of the streams in the basin were designated as impaired for the aquatic life or recreation use support category. Approximately 3,600 acres of estuarine waters are considered impaired for shellfish harvesting due to a variety of non-point source and point source pollution. Within the Cape Fear Arch Region, Lake Waccamaw is designated as Outstanding Resource Waters, the Lumber River mainstem in Robeson County and many of the tributaries of the Shallotte and Lockwood Folly Rivers in Brunswick County are designated as High Quality Waters. Many of the tidal creeks and sounds along the Brunswick County coast are considered important shellfish harvesting waters. A detailed description of the Lumber River and the water quality rankings and threats is in the December 2003 Lumber River Basinwide Water Quality Management Plan (N.C. Department of Environment and Natural Resources 2003).

## **B. Significant Natural Communities**

According to the 2003 Lumber River Basinwide Water Quality Management Plan, the “Lumber River basin encompasses three distinct ecological regions in North Carolina: the Sandhills, the Carolina bay region and the Southeastern Coastal Plain. This assemblage of ecological regions gives the Lumber River basin a great diversity of natural communities. From the vast pocosins of the Green Swamp to the large Carolina bay that became Lake Waccamaw to the dry sandy hills cloaked with magnificent longleaf pines, the Lumber River is a showcase of biological diversity.” Similarly, the Cape Fear River Basin is also high in



natural diversity, especially within the Cape Fear Arch Region.

According to the 1999 Conservation Assessment of the Southeast Coastal Plain of North Carolina, Using Site-oriented and Landscape-Oriented Analyses (Hall and Schafale, 1999), there are “50 community types out of a total of 126 found within the state overall. As with the species, some of these communities have been identified as among the most threatened in North America.” A general list of the natural communities in the Cape Fear Arch Region include maritime forests and other barrier island habitats; longleaf pine dominated savannas, flatwoods and sandhills; Carolina bays, and southern forested wetlands including the wet marl forest and stands of Atlantic white cedar. More specific examples of important terrestrial communities within the Cape Fear Arch Region include the variants of longleaf pine forests (e.g., Pleea Flat, Very Wet Clay and the *Leiophyllum* variant), Coastal Fringe Sandhills, Coastal Fringe Evergreen Forest, high and low pocosin, pond pine woodland, bay forest, cypress-gum swamp, Coastal Plain bottomland hardwoods, and upland oak-hickory forest. The Cape Fear Arch region hosts rare limesink depressions and clay-based Carolina bays and the region hosts the only known global occurrence of the wet marl forest.

A complete list of natural communities in North Carolina can be found in *The Classification of the Natural Communities of North Carolina, Fourth Approximation* (Schafale 2012). The Natural Heritage Program has conducted natural areas inventories for a majority of counties within the Cape Fear Arch Region. These county natural areas inventories identify specific sites that are deemed of high ecological importance and are thus designated as significant natural heritage sites. These county inventory reports can be found at [www.ncnhp.org](http://www.ncnhp.org).

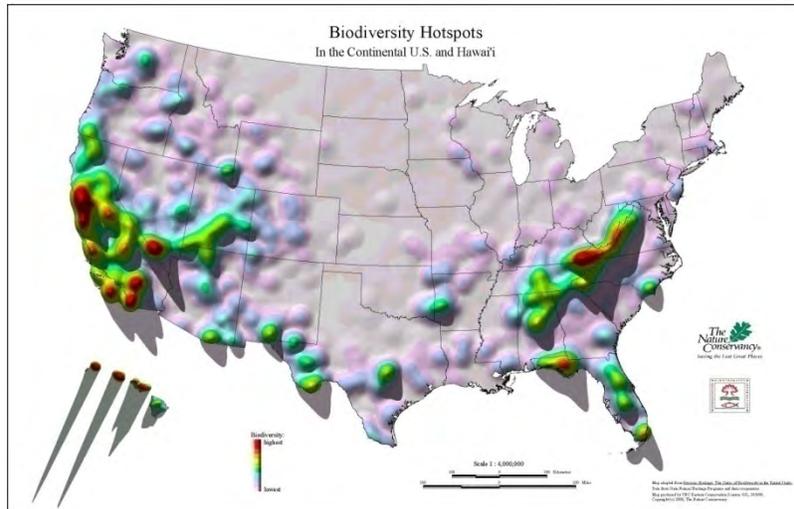
### **C. Biodiversity/Species Endemism**

Biodiversity is a term used to describe the variety of life forms within an area. A species is endemic to a site or a region if it occurs nowhere else but at that site or region.

An uplift of sand and limestone deposits called the Cape Fear Arch occurs from Cape Lookout, North Carolina to Cape Romain, South Carolina and westward towards Fayetteville. This uplift is considered the Cape Fear Arch region, and it has given rise to an evolution of plants and animals found nowhere else in the world. 22 plants and 19 animals are considered endemic to the Cape Fear Arch region, which means they are found at sites within the counties of the Cape Fear Arch Region (see Map 1, Counties of the Cape Fear Arch Region). Because of the unique species and natural communities, the southeastern coastal plain of North and South Carolina is considered the most biologically diverse area on the east coast, aside from Florida. According to Hall and Schafale (1999), “the Southeast Coastal Plain of North Carolina is an area of particularly high biodiversity. Of the 17,601 occurrence records of Natural Heritage Program element species and communities, more than 3,757 (21%) are from this area. These element occurrence records represent 298 different species, including 19 species listed as Endangered or Threatened by the federal government and 63 that are

included on the corresponding state lists of protected animals and plants.”

According to the N.C. Wildlife Action Plan, the coastal plain ecoregion ranks among the top 10 in the continent in number of reptile, bird and tree species. Bird species are especially diverse because North Carolina lies at the northern end of the range for southeastern breeding species, and at the southern end of the range for many northern breeding species. See the 2005 N.C. Wildlife Action Plan for summaries of important habitat types in the North Carolina Coastal Plain and a list of priority species within those habitat types ([www.ncwildlife.org](http://www.ncwildlife.org)).



According to The Nature Conservancy, the southeastern coastal plain of North Carolina is a “biodiversity hotspot.” See The Nature Conservancy’s map above.

#### D. Existing Conservation Lands

Within the Cape Fear Arch Region in North Carolina, there are a number of sites that are already under some form of conservation. Conservation lands include:

**State game lands** such as Suggs Mill Pond, Cape Fear River Wetlands, Columbus County, and the Sampson County Game Lands, and,

**State Parks** such as Lake Waccamaw State Park, Carolina Beach State Park, and the Lumber River State Park, and,

**State Forests** such as Bladen Lakes State Forest, and,

**State Natural Areas** such as Lea Island, and,

**State Division of Coastal Management’s National Estuarine Research Reserve units** such as Masonboro Island, and,

**Land Trust Preserves** such as The Nature Conservancy’s Green Swamp Preserve and

the North Carolina Coastal Land Trust's B.W. Wells Savanna Preserve, and,

***Land Trust Conservation Easements*** on privately-owned lands.

***N.C. Ecosystem Enhancement Program Conservation Easements and Land Acquisitions*** on public and privately-owned lands.

## **E. Importance of Working Lands to Region**

Farm and forest land protection in North Carolina not only saves the state's rural, historic, ecological and economic resources, but also saves counties and municipalities money as they struggle to deal with the increasing financial burdens of urbanization.

The importance of privately-owned working farm and/or forest lands as integral to the conservation of the ecological diversity of the Cape Fear Arch planning area cannot be overstated. Conservation practices and management systems on private lands that will enhance the targeted ecosystems or the connectivity within the Cape Fear Arch landscape can fulfill some of the stated plan objectives. The Cape Fear Arch Conservation Collaboration will encourage the use of state and federal cost-share programs for more effective conservation techniques in woodland management, restoring hydrology, improving water quality and restoring and improving habitat.

- Target areas are predominantly privately-owned.
- Farm and privately-owned woodlands can make up the important corridors needed for the connectivity of the target areas.
- Some farms and/or heavily managed forests have important restoration value that will be lost if the land is converted to other uses.

## **IV. Conservation Targets**

Biodiversity is composed of species, the genes they contain, the communities and ecosystems they form, and the processes that connect them. One aspect of a systematic (and successful) landscape-scale conservation approach is to be explicit about what features of biodiversity we are trying to conserve and where we are trying to conserve them. For the Cape Fear Arch landscape these specific features of biodiversity are referred to as conservation targets, and contain elements at the species, community and ecosystem level. Not all targets are rare; some may be vulnerable species (i.e. presently frequent but of concern due to declines or other factors). In order to capture genetic diversity, it may appropriate in a few occasions to give more attention to individual populations, particularly those that are significantly disjunct or that contain a high proportion of distinctive ecotypes or genotypes. Such features may actually be easier to conserve at a regional rather than a state or national level. Other targets may in fact be relatively common, but may be indicators of ecosystem integrity, or key elements in ecosystem processes, such as wiregrass in the Longleaf Pine ecosystem.

The Cape Fear Arch Conservation Collaboration identified priority areas and priority species within the region. It is anticipated that additional conservation targets, particularly natural communities, may be identified within each of the priority areas at a later date as described further below. Also worth noting are a number of historically known species that have not been observed in at least 25 years. If these species are discovered again, they will immediately be added to the list of conservation targets (see Appendix C).

#### **A. Priority Areas in the Cape Fear Arch Region**

The Cape Fear Arch landscape provides a unique and important conservation opportunity, and a primary component of the conservation strategy for the Cape Fear Arch Conservation Collaborative is to identify particular areas within the landscape for conservation attention. Cape Fear Arch Conservation Collaboration partners will focus efforts to protect and maintain highly intact and viable ecosystems within these identified areas for the conservation targets, which include wildlife, rare habitats, and rare species. The areas identified offer the best opportunities for ecological conservation, and we are developing strategies that can address the threats to, and conservation of, habitats and ecosystems. This approach is appropriate for a number of additional reasons. First, the types of resources that help in land conservation (e.g. funding & personnel) can be scarce, and we have to make the best use of them through planning and coordination. Second, not every partner will be comfortable making land use recommendations or advocating for policy changes. However we can be clear about which areas are important for conservation, and the intent of partners to work with landowners on a voluntary basis to protect and maintain the conservation values of their property.

Priority Areas are defined as subset areas within the overall Cape Fear Arch Conservation boundary where the Cape Fear Arch Conservation Collaborative is choosing to focus its conservation efforts. The Cape Fear Arch Conservation Collaborative developed a list of 21 priority areas by (1) examining North Carolina Natural Heritage Program County Inventory data and identifying clusters of significant natural heritage areas; (2) utilizing the Landscape Habitat Indicator Guild analysis, one of the layers in the Biodiversity and Wildlife Habitat Assessment as a surrogate map for the North Carolina Wildlife Resource Commission's Wildlife Action Plan; and (3) by tapping its membership to identify places that, based on the group's expertise, were ecologically important, as well as those under the most threat. Such on-the-ground sources have proven valuable in other conservation efforts (Beier 2007).

The following is a list of the priority areas along with a brief summary of key ecological features, i.e., a sampling of significant natural heritage areas and existing conservation lands. Additionally, a sampling of key wildlife species and habitat types per the N.C. Wildlife Action Plan are also noted for each priority area. The Focal Area Appendix to this plan outlines in more depth the locations, conservation values, threats and strategies to the integrity of these sites.

1. *Smith Creek Greenway* - Smith Creek is the key feature in this priority

area. Smith Creek drains into the Northeast Cape Fear River just north of the Isabelle Holmes Bridge in Wilmington. Due to increased development in the area, the water quality of Smith Creek has declined and it has been listed on the 303(d) list for impaired biological integrity. This creek was selected as a priority area due to considerable conservation and restoration interest in this urban watershed. The N.C. Ecosystem Enhancement Program has developed a local watershed plan for several watersheds in New Hanover County including Smith Creek. New Hanover County has also been working on a Smith Creek watershed planning initiative. For more information see [www.nhcgov.com](http://www.nhcgov.com). New Hanover County acquired 45 acres of land and the Department of Transportation owns a 47-acre mitigation tract along Smith Creek, forming keystones of a growing greenway along Smith Creek.

2. *Town Creek Headwaters* - The upper reaches of Town Creek west of U.S. Highway 17 are the key features in this priority area. The headwaters of Town Creek begin at the eastern edge of the Green Swamp and empty into the Lower Cape Fear River. The headwaters area is a mosaic of longleaf pine savannas, loblolly pine plantations, limesink ponds, and floodplain forest. Wetlands in these headwater areas are extremely valuable for maintaining downstream water quality as they can retain sediments and transform nutrients before they are carried into larger bodies of water. They are also important in retaining floodwaters and moderating water flows. The landscape that includes the Town Creek headwaters is also valuable as it connects the lower Town Creek region to the Green Swamp. Priority wildlife species include worm-eating warbler (*Helmitheros eyrthrocephalus*), common nighthawk (*Chordeiles minor*) and Seminole bat (*Lasiurus seminolus*). Black bear (*Ursus americanus*) are an important game species in this relatively undeveloped region. While much of the land used to be held by large timber corporations, much of it is now owned by development and investment companies.

3. *Lake Waccamaw/Waccamaw River Corridor* - Lake Waccamaw, the Waccamaw River and associated floodplains are the key features in this priority area. Lake Waccamaw is an 8,900-acre Carolina bay. This priority area contains habitat supporting the greatest concentration of endemic animals in the state. Eight species are found only in the lake or associated waters including the Waccamaw Silverside (*Menidia extensia*), Carolina pygmy sunfish (*Elassoma boehlkei*), and the Waccamaw fatmucket (*Lampsilis fullerkerati*), a freshwater mollusk. The Upper Waccamaw River Swamp consists of the most extensive cypress-gum swamp in the state and contains habitat for the endemic Cape Fear Threetooth (*Triodopsis*



*soelneri*). In addition, the Waccamaw River provides high quality aquatic habitat for the Carolina pygmy sunfish (*Elassoma boehlkei*), the Waccamaw crayfish (*Procambarus braswelli*) and numerous freshwater mussels. Lay's Lake is a manmade lake near the Waccamaw River with islands of cypress trees near the South Carolina border. A large heronry including nesting great blue herons, anhingas, cattle egrets, little blue herons, and wood storks occurs here. The State Division of Parks and Recreation owns and manages Lake Waccamaw State Park. The State Wildlife Resources Commission owns and manages a series of sites along the river and on the northeast side of the lake known as the Columbus County Game Lands. Both The Nature Conservancy and the N.C. Coastal Land Trust have protected some land along the Waccamaw River through fee title preserves or conservation easements.

4. *Black River and South River Corridors* - The Black River is the main feature of this priority area. The Black River, a well-known coastal paddling destination, flows 66 miles from Sampson County to the Cape Fear River. The Black River is designated as an Outstanding Resource Waters with excellent water quality, rare fish and mussel species, and relatively undisturbed and extensive floodplain wetlands. The oldest known trees east of the Rocky Mountains are 1,700-year-old bald cypress found along the Black River. The land along the Black River also includes high bluffs of hardwoods and pine along with stands of mature longleaf. Priority wildlife including yellow-billed cuckoo (*Coccyzus americanus*), wood thrush (*Hylocichla mustelina*), marbled salamander (*Ambystoma opacum*) and spotted turtle (*Clemmys guttata*). The Nature Conservancy owns 2,500 acres in fee title and 300 acres of conservation easements along the Black River. The N.C. Wildlife Resources Commission owns Roan Island, a 2,757-acre island at the confluence of the Black and Cape Fear Rivers which is managed as public game lands.

The South River and its associated floodplain are also key features in this priority area. The South River swamp forest is an extensive and relatively intact example of the coastal plain bottomland hardwoods natural community which provides habitat for the state threatened Rafinesque's big-eared bat (*Corynorhinus rafinesquii macrotis*). The floodplain consists of small levee features, meanders, oxbows, and narrow to broad floodplain flats. The South River itself supports two rare fish species including the Broadtail madtom (*Noturus sp. 1*) and thinlip chub (*Cyprinella sp. 1*). A portion of the South River has been designated as Outstanding Resource Waters. The Nature Conservancy and the North Carolina Coastal Land Trust have protected some lands along the South River through fee title or conservation easement acquisition.

5. *Great Coharie Creek Corridor* - The Great Coharie Creek and its associated floodplain are key features in this priority area. The floodplain

contains extensive areas of cypress-gum swamp. The 16-mile corridor is considered one of the largest and most important landscape corridors in Sampson County supporting a variety of neotropical songbirds, waterbirds, fishes and reptiles. The N.C. Ecosystem Enhancement Program, acquired over 4,800 acres of wetlands and 29 miles of stream along Great Coharie Swamp. The Great Coharie Swamp is an extensive cypress-gum swamp and Great Coharie Creek is part of a high-quality blackwater stream system feeding into the Black River. The Great Coharie Creek along with a tributary, Six Runs Creek, contains aquatic habitat supporting populations of five rare animals including the state threatened eastern lampmussel (*Lampsilis radiata*). Six Runs Creek is designated as Outstanding Resource Waters by the State of North Carolina Division of Water Quality. The U.S. Fish and Wildlife Service manages a few permanent conservation easements along Great Coharie Creek. The N.C. Ecosystem Enhancement Program is starting a local watershed plan to focus stream restoration efforts in the headwaters of Great Coharie Creek.

Little Coharie Creek is also a key feature in this priority area. It, along with Great Coharie and Six Runs Creeks, drain to the Black River and provide important aquatic habitat for five rare animals including two rare fishes: the broadtail madtom (*Noturus sp. 1*) and thinlip chub (*Cyprinella sp. 1*), and three rare mussels: Eastern lampmussel (*Lampsilis radiata*), pod lance (*Elliptio folliculata*), and Eastern creekshell (*Villosa delumbis*). The North Carolina Ecosystem Enhancement Program acquired a conservation easement and completed a stream restoration project along an unnamed tributary of Little Coharie Creek.

6. *Lumber/Little Pee Dee Corridor* - The Little Pee Dee River and its tributary, the Lumber River, are the key features in this priority area. Portions of the Lumber River are designated as a National Wild and Scenic River by the State of North Carolina. The Lumber River floodplain contains extensive cypress-gum swamp and bottomland hardwood wetlands. Along the edges of the floodplain, ridges of sand support upland pine forests including xeric sandhill scrub and wet pine flatwoods. The State of North Carolina owns 7,000 acres along the Lumber River managed by the N.C. Division of Parks and Recreation as a state park. The Little Pee Dee River is designated as a South Carolina Scenic River. Priority wildlife species include Northern bobwhite quail (*Colinus virginianus*) and yellow-crowned night heron (*Nycticorax violaceus*).

7. *Brunswick River/Cape Fear River Marshes* - The Brunswick River and Cape Fear River marshes are the key features in this priority area. The marshes comprise an extensive area of regularly flooded tidal flats. The flats support tidal freshwater marsh upstream of the normal reach of salt water. Large portions of the marshes have been altered by ditching and construction of roadbeds and dikes. Eagle Island lies within this priority

area and consists of a large expanse of brackish marsh and swamp forest located between the Brunswick and Cape Fear Rivers near Wilmington. The southern half of the island is a series of diked dredged-material disposal impoundments. These impoundments attract large numbers of shorebirds during migration including the black-necked stilt (*Himantopus mexicanus*). Waterfowl and colonial waterbirds also use these impoundments. Several organizations including the National Audubon Society and Cape Fear RC&D are working to conserve portions of Eagle Island.

8. *Cape Fear River Corridor* - The Cape Fear River and associated lowlands, terraces and sloughs are the key features in this priority area. The Cape Fear River is one of four rivers in the state that support American shad (*Alosa sapidissima*) and other anadromous fish. The floodplain of the Cape Fear River consists of examples of cypress-gum swamp and levee forest associated with a large brownwater river. Above the floodplain, there are oak-hickory, mesic mixed hardwood forests and longleaf pine forests. According to the N.C. Wildlife Action Plan, oak forests have the potential to support Cooper's hawk (*Accipiter cooperii*), Eastern fox squirrel (*Sciurus niger*), four-toed salamander (*Hemidactylium scutatum*), and timber rattlesnake (*Crotalus horridus*). According to the N.C. Wildlife Action Plan, mesic forests have the potential to support Swainson's warbler (*Limnothlypis swainsonii*), ornate chorus frog (*Pseudacris ornate*), and Carolina gopher frog (*Rana capito*). Overall, the Cape Fear River within the Cape Fear Arch region hosts a suite of natural wetland and upland habitats that support a variety of game and nongame wildlife species.



9. *Boiling Spring Lakes/Orton Plantation/Sunny Point* - This region is located in and around the City of Boiling Spring Lakes. This region hosts a diverse wetland complex containing a mosaic of ridges and swales remnant of an ancient dune system with a large concentration of Carolina bays and small depression ponds or limesink ponds. Indeed, this region contains the largest concentration of limesink ponds in North Carolina. There are a host of rare plant species in this region with over 20 species documented including Venus fly trap (*Dionaea muscipula*), rough-leaved loosestrife (*Lysimachia asperulifolia*), loose watermilfoil (*Myriophyllum laxum*), and Carolina goldenrod (*Solidago pulchra*). Longleaf pine forest is also prevalent in the region with priority wildlife species including the red-cockaded woodpecker (*Picoides borealis*) and Carolina gopher frog (*Rana*

*capito capito*). The State of North Carolina owns and manages a 7,000+ acre preserve in Boiling Spring Lakes with significant support from The Nature Conservancy. The North Carolina Ecosystem Enhancement Program along with the North Carolina Department of Agriculture Plant Conservation Program has acquired 517 acres of former pine plantation in Boiling Spring Lakes. North Carolina Ecosystem Enhancement Program is implementing a large-scale restoration project on this tract to include a combination of headwater stream and wetland restoration, wetland enhancement and preservation, and establishment of a longleaf pine savanna. The goals of this project are to restore ecological function of the system, improve water quality, and enhance native wildlife habitat.

10. *Juniper Creek/Green Swamp Corridor* - Juniper Creek and its headwaters including Green Swamp and Honey Island Swamp are the key features in this priority area. The Green Swamp contains large areas of pocosin intermingled with some of the country's finest examples of longleaf pine savannas. Indeed, the pine savannas contain one of the highest per acre plant species richness of any area in temperate North America. The Green Swamp is perched relative to the surrounding landscape, thus it serves as headwaters for multiple streams flowing to the Waccamaw River, Cape Fear River and Lockwoods Folly River. The Green Swamp contains at least 14 different species of carnivorous plants, 26 rare plants and 16 rare animals. Priority wildlife species include red-cockaded woodpecker (*Picoides borealis*), pine barrens tree frog (*Hyla andersonii*) and ornate chorus frog (*Pseudacris ornata*). Rough-leaved loosestrife (*Lysimachia asperulifolia*), hooded pitcher plant (*Sarracenia minor*) and wiregrass (*Aristida stricta*) are some of the rare, unusual and/or key plant species. The Nature Conservancy owns 15,907 acres known as the Green Swamp Preserve. The original extent of the Green Swamp is believed to be 200,000 acres, but most has been ditched and converted to pine plantations over time. Juniper Creek with its extensive, mostly uninterrupted floodplain, connects the Green Swamp to the Waccamaw River. The threatened Carolina pygmy sunfish (*Elassoma boehlkei*) along with several other rare fish and mussels are found in Juniper Creek. The N.C. Wildlife Resources Commission owns over 18,000 acres along Juniper Creek managed as public game lands.

11. *White Marsh System* – The key feature of this priority area is White Marsh, a freshwater wetland system that runs along the southeastern side of the City of Whiteville in Columbus County to the western edge of Lake Waccamaw. The wetlands consist of open marsh along with cypress-gum swamp. These wetlands provide excellent wintering habitat for such waterfowl as wood duck, mallard, black duck, pintail and hooded merganser.

12. *Bladen Lakes Complex*- Key features include Tussock Bay, Smith Mill Pond, Camp Bay, Suggs Mill Pond, Jones Lake and other Bladen Lakes

Forest Bays. Area is characterized by numerous Carolina bays and a variety of pine communities from wet pine flatwoods to the drier xeric sandhill scrub community. Priority wildlife species for this region include southern hognose snake (*Heterodon simus*) and northern bobwhite quail (*Colinus virginianus*). Important game species include wood duck (*Aix sponsa*) and black bear (*Ursus americanus*). Managed lands include state parks, state forest and state game lands.

13. *Council Connector* – This priority area is located near the Town of Council in Bladen County. Part of what is thought of as a core area/connector for the landscape that contains Bladen Lake State Forest, Bladen State Parks, 421 Sand Ridge, and the Green Swamp/Waccamaw River Basin. It is a good example of a potential future corridor that will need protection effort simply to maintain function, and additional effort to improve or restore habitat. This region may also serve as a connector between the major river basins of the Lumber and Cape Fear.

14. *Lea and Hutaff Islands/South Topsail Island* - Lea and Hutaff Islands and the southern end of Topsail Island are the key features in this priority area. Located between Figure 8 Island and Topsail Island, Lea and Hutaff are ribbons of sand that support loggerhead sea turtles (*Caretta caretta*), least terns (*Sterna antillarum*), black skimmers (*Rynchops niger*), American oystercatchers (*Haematopus palliatus*) and piping Plovers (*Charadrius melodus*). The islands were joined following closure of Old Topsail Island Inlet and the area is designated as a state-significant Important Bird Area by the National Audubon Society. Lea Island is owned by the State of North Carolina and managed under a lease by the National Audubon Society. The southern end of Topsail Island, over 100 acres of barrier beach, is currently undeveloped and is accreting sand each year. It is privately-owned, but serves as a refuge for nesting sea turtles, shorebirds, and recreationists.

15. *Lockwood Folly River* - The Lockwood Folly River and associated floodplain and uplands are the key features of this priority area. Lockwood Folly is believed to be unique because it contains all of the North Carolina tidal vegetation communities as they transition from the Intracoastal Waterway upstream basically changing as the salt water influence changes. Starting with salt marsh closest to the Intracoastal Waterway, you then find brackish marsh and then tidal freshwater marsh as you go upstream. These extensive tidal marshes are considered important Shellfish Growing Areas for the American oyster (*Crassostrea virginica*). The N.C. Coastal Federation is actively working with state and local governments and private entities to conserve land and enhance water quality in this watershed. The North Carolina Ecosystem Enhancement Program has completed a local watershed plan on the Lockwood Folly watershed and targets this area for restoration.

16. *Northeast Cape Fear River Floodplain and Marshes* - The Northeast Cape Fear River and its respective floodplain are the key features in this priority area. The 4,876-acre Cape Fear River Wetlands Game Lands owned and managed by the N.C. Wildlife Resources Commission lay within this priority area. The Northeast Cape Fear floodplain hosts high quality examples of tidal cypress-gum swamp, bottomland hardwoods and other wetland communities. The extensive floodplain forests along the Northeast Cape Fear River provide excellent breeding habitat for wood ducks (*Aix sponsa*) and a variety of neotropical songbird species such as hooded warbler (*Wilsonia citrina*), Swainson's warbler (*Limnothlypis swainsonii*) and prothonotary warbler (*Protonotaria citrea*). Other priority wildlife species found in this area include the Southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), and southern dusky salamander (*Desmognathus auriculatus*). The Northeast Cape Fear River is also extremely important for a number of game and nongame fish species including striped bass (*Morone saxatilis*) and American shad (*Alosa sapidissima*).

17. *Bald Head Island/Smith Island Complex* - Bald Head and Smith Islands along with interconnecting coastal marsh are the key features of this priority area. Located at the mouth of the Cape Fear River, this island complex most likely developed from Cape Fear River sediment deposition and sand spit formation. The complex contains excellent examples of maritime and beach habitats including the maritime evergreen forest which hosts live oak, loblolly pine and sand laurel oak and is most often found in sheltered areas of barrier islands. Bald Head Island contains one of the largest concentrations of loggerhead sea turtle nests in North Carolina, and is one of the very few recurring green turtle (*Chelonia mydas*) nesting sites in the state. Other priority wildlife species include the piping plover (*Charadrius melodus*) and Eastern painted bunting (*Passerina cirius*). Seabeach amaranth (*Amaranthus pumilus*), a federally threatened plant species is also known from the shoreline of Bald Head Island. The Bald Head Island Conservancy and Smith Island Land Trust have protected significant lands on the islands. The State of North Carolina owns and manages a 10,000 acre natural area in the Smith Island complex.

18. *Town Creek/Lower Cape Fear River* - The lower Cape Fear River south and east of Highway 17 in Brunswick County along with Town Creek and its tributaries are the key features in this priority area. This region of the lower Cape Fear is renowned for its cultural history and hosts some spectacular properties that were once antebellum rice plantations. There were almost 30 former plantations along the Cape Fear and Town Creek including Orton, Clarendon and Pleasant Oaks where "Carolina Gold" rice was once cultivated (R. Foushee, 2001). While rice is no longer cultivated in the lower Cape Fear region, the remnants of the old ditch/dike networks remain and some of these old rice fields have been improved for use as

waterfowl impoundments (managed duck ponds). In addition, vast longleaf pine forests once blanketed the lower Cape Fear River region and served as another important component of the region's economy during the 18<sup>th</sup> and 19<sup>th</sup> centuries providing naval stores (turpentine, rosin, tar, pitch) and lumber. Longleaf pine forest remnants along with numerous other natural communities including limesink ponds contribute to this region's biological richness. Priority wildlife species in this region include Eastern fox squirrel (*Sciurus niger*), Northern bobwhite quail (*Colinus virginianus*), and Eastern tiger salamander (*Ambystoma tigrinum*). Town Creek, a major tributary of the lower Cape Fear, is believed to be one of the most pristine and unusual of all the lower Cape Fear River tributaries. Unlike our usually acidic coastal plain blackwater streams, Town Creek has a near neutral pH and high water hardness (high mineral content) which supports a diversity of freshwater snail and mollusk species, including the Greenfield ramshorn snail (*Helisoma eucosmium*) found nowhere else in the world. The N.C. Coastal Land Trust has protected over 10,000 acres in this area through fee title preserves and conservation easements.

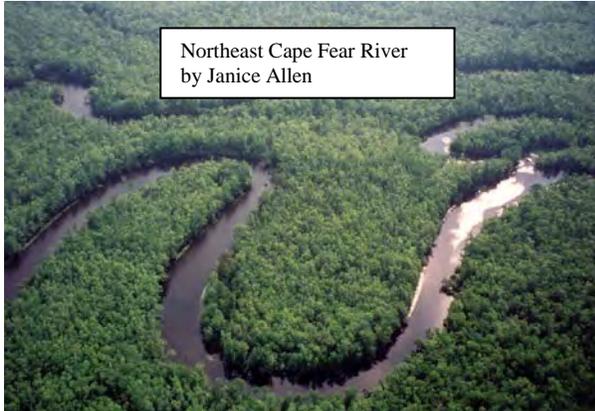
19. *Masonboro Island* - Masonboro Island and associated marshes are the key features of this priority area. Masonboro Island, the largest pristine barrier island remaining on the southern North Carolina coast, is an 8-mile-long island accessible only by boat. It contains 4,300 acres of tidal salt marsh and mud flats, and 600 acres of beach. The habitat supports nine rare animals including federally and state threatened loggerhead sea turtle (*Caretta caretta*), piping plover (*Charadrius melodus*), and the green turtle (*Chelonia mydas*). The population of nesting Wilson's plover (*Charadrius wilsonia*) is one of the largest in the state. The extensive marshes are considered a significant Shellfish Growing Area for the American oyster (*Crassostrea virginica*). The island is part of the North Carolina Coastal Reserve and the National Estuarine Research Reserve. Masonboro Island is an important nesting site for loggerhead sea turtles.

20. *Winyah Bay* -

Winyah Bay in South Carolina represents the southernmost focal area in the Cape Fear Arch region. It is the third largest estuary on the east coast with a watershed that encompasses approximately 18,000 acres, most of which is located in the coastal regions of North and South Carolina.

21. *New Hanover County Tidal Creeks* - Bradley Creek, Futch Creek, Foy Creek, Hewletts Creek, Pages Creek, Howe Creek, and Whiskey Creek are the key features in this priority area. These creeks drain directly into the Intracoastal Waterway along the New Hanover County coast. Dominant natural communities include salt marsh and brackish marsh. Priority wildlife species associated with these tidal creeks and/or their adjacent uplands include the rare diamondback terrapin (*Malaclemys*

*terrapin centrata*) and the Eastern painted bunting (*Passerina ciris ciris*). The American oyster (*Crassostrea virginica*) is an important aquatic species represented in this area. Several agencies and organizations including New Hanover County, N.C. Coastal Federation and the N.C. Coastal Land Trust are interested in enhancing water quality and/or conserving land within this region.



The overall goal of the conservation plan is to conserve habitat for identified conservation targets. The above-listed priority areas are the critical first step of such an effort. However, additional effort will be needed to identify specific sites, priority biological sites, for conservation within these priority areas. Additionally, the identified conservation targets, animals as well as plants, will also need some level of connectivity to allow for genetic exchange and other ecosystem functions. Thus,

within each priority area, corridors and buffers will need to be identified to maintain the ecological function and connectivity of the priority biological sites they surround, or are adjacent to. Some of these corridors and buffers contain important habitats in their own right (e.g. the Waccamaw River corridor), but in many cases they do not have as high a level of integrity as the priority sites. It is important to note that protecting the buffer is not as important as conservation of the priority biological sites, which includes appropriate management for natural habitats and wildlife.

#### **B. Priority Species in the Cape Fear Arch Region**

One of the plans helping guide this effort to locate important habitats is the North Carolina Wildlife Action Plan, and we have selected appropriate Wildlife Action Plan priority species (those that are known to have some of their range within the Cape Fear Arch focus area). Some of these species (indicator or focal species) may be helpful in monitoring or measuring our success over time.

The One N.C. Naturally Conservation Planning Tool also has incorporated priority species from the N.C. Wildlife Action Plan, including the use of groups of animals that share an affinity for particular habitats. The presence of members of these groups, (or “guilds”), are looked at as indicators of ecosystem integrity. Through the use of the indicators, we can continue to map the habitats that priority animal species are utilizing, and focus conservation on those existing high-quality habitats. Additional biological survey and data collection will also be important for conservation, providing the best information for not only protection, but also management and monitoring, as noted in the previous paragraph. Because one of the themes of the Wildlife Action Plan is to “keep common species common,” there might be a lack of information about distribution of some animal populations. One task will be to coordinate inventory information.

#### **V. Threats to Priority Areas and Species**

The land and biological conservation targets of the Cape Fear Arch region are under threat from numerous sources. Below is a broad list of stresses on natural communities, wildlife and rare species populations, each with an annotated list of some of the dominant components and sources of the stresses behind them.

### **A. Conversion of high quality natural habitats.**

- Development: New homes, planned residential developments, commercial and industrial land uses as well as new land uses that support growth such as quarries, landfills and highways. Creation of new working lands: farmland (i.e. blueberry farms on Leon soils) and new intensively managed pine plantations in sensitive habitats.
- Increasing recreational pressure: On barrier and estuarine islands which may threaten critical breeding habitat for animals such as sea turtles, terns and plovers and colonial nesting birds.

### **B. Conversion of traditional working lands (agriculture and forestry).**

- Loss of privately-owned working lands (farmland and forest): most of the targeted conservation sites in the Cape Fear Arch are on private lands. Privately-owned working lands make up the largest non-federally owned land base in North Carolina.
- Encroaching suburbanization and accompanying rise in land value: This represents the biggest threats to farm and forestland, since landowners can make a lot of money selling to developers versus continuing to work the land.

### **C. Fragmentation of and loss of habitat connectivity**

- Development: especially new homes in low (human) density, rural areas.
- New roads or the upgrading of existing roads.
- Increased vehicular travel on roads: making wildlife crossing more difficult.
- Changes in land management: discontinued application of controlled burning.
- Clear-cutting forests within linear swamps (e.g. shovel-logging) and along river corridors.

### **D. Lack of fire on the natural landscape** (See a detailed discussion in *Appendix C, Prescribed Fire as an Ecosystem Management Tool*).

- Diminished use of controlled burning as a land management practice.
- Rapid suppression of wildfires (from all ignition sources) instead of potentially allowing low-risk fires to burn to firebreaks (streams, roads, etc.).
- More stringent smoke management guidelines due to regulatory changes.
- More difficult smoke management due to expansion of smoke sensitive areas (homes and roads in rural areas, etc.).
- Negative public perceptions of fire.



### **E. Changes in timberland management practices**

- Declining use of prescribed burning.
- Even-aged timber management instead of selective harvesting.

- Ground bedding (plowing) as a site preparation practice which can destroy the natural groundcover.
- Use of herbicides for competition control, primarily used on hardwoods in lieu of burning.
- Intensive pine straw raking which alters the natural groundcover.
- Shovel-logging swamplands which can result in second-growth forests dominated by poor mast-producing red maples and sweet gums.

**F. Decline in the water quality and water table levels**

- Widespread historical and recent drainage of wetlands (estimated at 1 million miles of ditches) resulting in lowering of the aquifer, higher flooding risk, and changes in wetland communities.
- Localized groundwater pumping from wells and quarry operations.
- Increased nutrient levels from multiple sources including runoff from upstream agricultural spray fields, fertilizer runoff from cropland, runoff from developed areas, and discharges from upstream wastewater treatment facilities.
- Increased sedimentation from multiple sources including upstream cropland, developed areas, new roads and forest harvesting operations.
- Increased chemical pollutant levels from multiple sources including upstream developed areas, roads and cropland, and industrial land uses.
- Increased pollutant levels due to aerosol deposition such as ammonia from animal operations and mercury from the burning of fossil fuels.

**G. Alteration of natural stream flow and natural aquatic habitat**

- Decline of groundwater recharge due to increased impervious surfaces created by roads and development.
- Decline of groundwater recharge due to greater soil compaction from heavy vehicle traffic and loss of natural groundcover.
- Widespread use of drainage ditches across the landscape which exacerbates stream flashiness.
- Upstream water withdrawals from streams for human water supply and agricultural irrigation.
- Clearcutting swamps and bottomland forests which directly alters vegetation as well as increases the temperature of waters.
- Removal of snags for flood control purposes.
- Clearing and straightening stream channels.
- Installation of culverts.
- Dredging stream and river channels.

**H. Invasive species.**

- Increase in non-native or invasive plant and animal species
- Introductions from the nursery trade.
- Introductions from aquarium releases.
- Accidental introductions from vehicles and boats.

- I. Intentional destruction or poaching of target species** (e.g. snakes, turtles & carnivorous plants).
  - Market demand from the exotic pet and plant trade.
  
- J. Impacts from global climate change and sea level rise.**
  - Increase in greenhouse gas emissions from numerous sources.
  - Loss or movement of coastal natural communities and species.
  - Salt water intrusion into non-tolerant natural communities.
  - Increased erosion and flooding.
  - Impacts to municipal infrastructure.
  - Reduction in carbon sequestration opportunities

## **VI. Conservation Strategies**

### **A. Land Conservation Strategy for Priority Biological Sites, in order of importance:**

1. Conservation of unprotected priority biological sites by acquiring fee interest in critical lands or acquiring conservation easements on those lands where fee acquisition is impossible or where easements are suitable.
2. Appropriate management of protected priority biological sites, including strategies for off-site impacts.
3. Protection of buffers to, and corridors connecting, protected priority biological sites
4. Protection of buffers to, and corridors connecting, unprotected priority biological sites (mostly where there is some likelihood of unprotected PBS being protected)
5. Restoration of land to site appropriate natural communities including ecological restoration where necessary; hydrological restoration involving filling of ditches or management of drainage and application of controlled burning.
6. Support Low Impact Development guidelines.
7. Support wildlife-related education, hunting, fishing, and bird-watching on conserved lands.

Targeted land protection and/or restoration will be based on the following criteria:

- Significant natural heritage areas
- Existing large managed lands
- Buffer areas around the above sites
- Ecologically functional corridors connecting large blocks of conserved lands
- Targeted open space

The vision is not that every site needs to be publicly-owned, but that as many owners as

possible of the Priority Biological Sites are maintaining these areas in such a manner as to promote the viability of the natural habitats and species they contain, and the buffers and corridors are maintained in such a way that ecological functions are protected. A variety of conservation tools are available for partners to work with landowners to achieve this, as well as a number of incentives.

Key funding sources include N.C. Clean Water Management Trust Fund, Land & Water Conservation Fund, N.C. Parks & Recreation Trust Fund, and the N.C. Agricultural Development and Farmland Preservation Trust.

Possible land acquisition partners include N.C. Wildlife Resources Commission, local land trusts, N.C. Ecosystem Enhancement Program and The Nature Conservancy.

**Examples of Action Items for Land Conservation:**

- a. Acquire lands with significant natural heritage areas and/or lands that help buffer or connect existing conservation lands within priority areas through conservation easement or fee title acquisition.
- b. Protect working forest/farmland through conservation easement or fee title acquisition within priority areas.
- c. Develop partnership grant proposals for land acquisition and/or habitat restoration (e.g., NAWCA grant, AG EEG grant).
- d. Create a Land Protection Committee that proactively focuses on the conservation of priority sites.

Other important potential strategies are listed in the section below.

**B. Work with and educate local governments to achieve multiple conservation goals:**

1. Support planning efforts that incorporate open space and a “green infrastructure.”
2. Implement zoning and rules that reflect land use plans.
3. Encourage developments that provide ecologically functional corridors for wildlife and buffers for streams and wetlands.
4. Require and enforce effective stormwater management on all new developments.
5. Develop new stormwater management infrastructure in targeted existing developed areas to achieve much higher water quality.
6. Support “lights-out” program on barrier islands during turtle nesting season.

**Examples of Action Items for Working with Local Governments:**

- a. Host meetings with local government representatives (e.g. county planners) to educate them about the conservation significance of the Region, to discuss conservation opportunities, and to encourage them to incorporate some of the Cape Fear Arch goals into their CAMA plan revisions or updates, if appropriate. Encourage local governments to hold conservation easements and/or fee title conservation lands. Educate local governments on the details of holding easements.
- b. Participate in New Hanover County and Brunswick County's greenway development process and encourage conservation of priority areas and species.

**C. Educate and work with private and public landowners to encourage best management practices.**

- 1. Develop good and varied models for private conservation management that can be used to show other interested landowners.
- 2. Provide information on various cost-share programs.
- 3. Encourage landowners to, at minimum use best management practices (BMP's) and to exceed them if possible.
- 4. Promote effective stormwater controls.
- 5. Promote controlled burning as an effective management tool where appropriate.

**Examples of Action Items for Working with Private Forestland Owners:**

- a. Identify specific forest management or general conservation practices or goals that the Arch group supports and that will not result in a significant loss of financial resources for landowners.
- b. Establish a private individual and/or corporate landowner recognition program to recognize landowners within the Cape Fear Arch that are supporting these management goals.
- c. Identify state forests or other state lands that could be used for red-cockaded woodpecker or other rare species mitigation. Pursue agreements with the appropriate state management agencies.
- d. Host landowner workshops within priority areas (e.g. Waccamaw River, Bald Head Island, Voluntary Agricultural District-Brunswick County or Bladen County) to educate about the significance of the Cape Fear Arch and to encourage support of the plan's goals and to outline options for land conservation (easements, donations, tax benefits, etc).

**D. Work with public farmland agencies and farmland owners to encourage farmland conservation in priority areas.**

1. Promote the use of water quality BMP's to control sediment, nutrient and chemical runoff including the use of permanent vegetated buffers along streams and ditches. During presentations of the Arch plan to local organizations and private landowners provide information about programs that will assist landowners install conservation systems and BMPs that will help achieve the plan's stated strategies.
2. Promote ecologically sound alternatives to animal waste lagoons and sprayfields.
3. Provide information and encourage cost-share programs to support conservation efforts.
4. Promote effective stormwater controls.
5. Identify areas of open and working lands that will connect Arch targeted areas. Identify working lands that contain soils of importance for restoration of targeted natural communities.
6. Present the Cape Fear Arch plan to all organizations that are participating in Farmland Preservation within the Arch. Ask Arch partners to use the plan in their funding and planning strategies and where relevant for *special program emphasis* designation for the identified areas.
7. Encourage the inclusion of Cape Fear Arch information in the development of County Farmland Protection Plans. Most of the counties within the Arch do not currently have Farmland Protection Plans but may be developing them in the near future or can be encouraged to develop them because having one provides some economic incentives.
8. Seek Cape Fear Arch endorsement or membership from organizations that are working in the farmland preservation field. (Soil and Water Conservation Districts, Natural Resource Conservation Service, Voluntary Agricultural Districts, American Farmland Trust, Land for Tomorrow, One NC Naturally, Clean Water Management Trust, Conservation Trust for North Carolina, N.C. Agricultural Development and Farmland Preservation Trust Fund, N.C. Farm Transition Project, N.C. Tobacco Trust Fund Commission, and land trusts)
9. Present the concepts in this plan to grassroots organizations and land owners.
10. Establish agreements with conservation partners that will provide special emphasis programs for the Cape Fear Arch area.

**Examples of Action Items for Working with the Agricultural Community:**

- b. Work with the NRCS District Conservationists to focus the Environmental Quality Incentives Program (EQIP) funding on priority sites and species in the Cape Fear Arch region.
- c. Work with the Conservation Reserve Enhanced Program (CREP) to increase enrollment of land in the permanent and 30-year easement option in the Waccamaw River watershed or other high priority watersheds in the region.
- d. Work with counties that do not have a Voluntary Agricultural District (VAD) to establish a VAD ordinance in all NC Arch counties (Brunswick, Bladen, Columbus, Sampson have VAD ordinances).
- e. Encourage all NC Arch counties to develop Farmland Protection Plans. Provide current information to the Soil and Water Conservation Districts (SWCD) and the counties as to the fiscal and community benefits of having a county Farmland Protection Plan.
- f. Encourage counties and/or SWCD to hold working farm easements.

**E. Monitor Regional Groundwater Levels.**

- 1. Educate the public, private and political sectors about water resources.
- 2. Develop a basinwide study to determine and define the relationship of the ground and surface water systems to each other and to the river systems within the region.
- 3. Develop a water use plan, with the goal of maximizing water retention in wetlands while maintaining uses.
- 4. Develop a maintenance plan for temporary reestablishment of sheet flow conditions by managing the closing and opening of drainage ditches and road dams.
- 5. Improve land use practices adjacent to streams, drainage ditches, road beds, and steep-sloped banks.

**F. Minimize impacts to water quality and aquatic habitat.**

- 1. Work with local governments and contractors to limit de-snagging efforts through education.
- 2. Identify and prioritize impaired waters in priority areas for potential Section 319/TMDL projects: Lockwood Folly and Shallotte River. Implement Lockwood Folly Section 319 project to serve as a model for the Shallotte River.
- 3. Work with National Pollutant Discharge Elimination System Phase II communities and counties (Brunswick, New Hanover, Wilmington, Wrightsville Beach, Onslow) on implementation of Phase II requirements.
- 4. Support new stormwater rules and definitions of low density, land disturbance triggers, buffers, stormwater control and treatment.

5. Support efforts that restrict the amount of pollution that washes into out tidal creeks, rivers and estuaries.
6. Utilize existing programs to implement stormwater BMPs in priority watersheds.
7. Encourage oyster shell recycling.
8. Discourage selling oyster shells out-of-state.
9. Support annual meetings of oyster habitat restoration stakeholders to identify potential project areas, priority areas, distribution of oyster shell and oyster larvae.
10. Implement recommended restoration and protection efforts from the Oyster Plan Priority Shellfish Growing Areas (SGA) Summaries for areas in the Cape Fear Arch Region.
11. Prioritize stream restoration efforts in areas with sensitive species or significant aquatic resources.
12. Promote wildlife-friendly retention ponds and constructed wetlands on development projects.
13. Support stream-monitoring and cleanup efforts.

**Examples of Action Items for Water Quality and Aquatic Habitat:**

- a. Protect land and waterfront along priority waterways through fee title or conservation easement acquisition.
- b. Complete wetland and/or stream restoration projects in Cape Fear Arch Region.
- c. Encourage Counties to limit removal of woody debris in priority aquatic sites during de-snagging efforts to protect in-stream habitat for priority aquatic species.
- d. Develop fact sheets on priority aquatic species and highlight need to protect in-stream habitat.

**G. Combat invasive species.**

1. Develop partnerships and promote cross-boundary cooperation.
2. Determine effective strategies to combat the most noxious invasives.
3. Develop rapid response teams to combat new outbreaks effectively.
4. Educate local leaders and the general public of the ecological and economic threats posed by invasive species.
5. Develop water invasive eradication plan for Waccamaw River.
6. Work with port authority to include invasive species prevention strategies in the National Environmental Policy Act/Environmental Impact Statement process for the new port.
7. Support invasive species council for NC.

### **Examples of Action Items for Combating Invasive Species**

- a. Work with U.S. Geological Survey to develop a training workshop for interested Cape Fear Arch partners to aid in the early detection of invasive species within the region.
- b. Encourage Cape Fear Arch partners to participate in an invasive species task force or council.
- c. Help recruit citizen volunteers for the Carolina Beach Vitex Task Force.
- d. Work with County Governments to modify existing landscaping lists for developers so that they do not recommend invasive species.
- e. Bring in knowledgeable invasive species experts to speak about local invasive species issues and management strategies.
- f. Develop cost estimate and purpose/need for invasive species signs at boat launches.

### **H. Control poaching of rare species.**

1. Promote effective enforcement of existing laws and punishment of offenders.
2. Research the trafficking and marketing of important species and determine where the pipeline can be attacked.
3. Educate the public about the impacts of acquiring these species.
4. Find, if possible, alternatives to wild-collecting of Venus fly-traps, pitcher plants, orchids, and reptiles.
5. Educate local store owners about the availability of locally cultivated Venus fly-traps.

### **Examples of Action Items for Combating Poaching**

- a. Continue to work with Southeastern Community College in Whiteville to increase the sales of nursery grown fly traps.
- b. Bring in a State or Federal Law Enforcement agent to talk to Cape Fear Arch group about problems of addressing poaching of rare species.

### **I. Environmental Education**

1. As a conservation partnership, be proactive in getting out a conservation vision for the region.
2. Develop education materials to be shared among partners and targeted to different audiences – local governments, local leaders, important landowners, neighbors to managed lands, the general public.
3. Research the costs and benefits of conservation versus unmanaged growth.
4. Include bottom mapping data and shellfish sanitation surveys on the Cape Fear Arch website file exchange.
5. Work with NC Division of Agriculture Consumer Services and Aquaculture Division, UNCW, Cape Fear Community College, and

Brunswick Community College to support oyster mariculture training in order to move towards a sustainable fishery.

7. Promote outdoor recreational activities to improve the understanding of our natural resources.

**Example of Action Items for Education:**

- a. Create & Implement an Outreach and Education Plan.

**J. Develop strategies to address climate change.**

Scientific consensus indicates that the future will include a significant level of climate destabilization, and overall global warming. In the Cape Fear Arch, this will certainly be an impact, perhaps foremost in sea level rise. One strategy to address climate change in the Cape Fear Arch region will be to identify and conserve sites of high integrity (and resilience), and protect redundancy as well. Also, it will be important to maintain connectivity and provide some migration corridors.

1. Support legislation which requires full disclosure and hazard notification to persons acquiring property on barrier islands
2. Support legislation restricting future state subsidies and support of development in designated high hazard areas.
3. Support establishment of a state hazard area acquisition program.
4. Develop model for introducing new barrier island landowners to responsible vegetation choices.
5. Research areas where the planting of salt-tolerant species may be possible in advance of rising sea waters.
6. Identify areas where ditch plugging would be most beneficial in reducing salt-water intrusion.
7. Research potential retreat strategies and re-zoning that have been developed by other states.
8. Begin basic research to aid understanding migration and evolution of unique habitats and to support choices of priorities regarding what to give up and what to focus on. For example conservation focus may need to shift to upland buffers to allow room to migrate rather than a core resource that may revert to open water.

**Examples of Action Items for Global Climate Change:**

- a. Advocate for development of local scale models based on best available LIDAR data for the Arch region and incorporate into conservation mapping. In the interim, incorporate best available data.
- b. Advocate for ease of permitting of living shorelines following the Maryland model.