Conservation Assessment for the Lower Deep and Upper Cape Fear River

from House in the Horseshoe to Raven Rock State Park

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The Triangle Land Conservancy
is a non-profit land trust founded in 1983
to create a regional network of open space and natural areas
in the six-country Triangle J Region.

TLC remains committed to protection efforts
in the lower Deep – upper Cape Fear River Watershed.

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Table of Contents

Appendices

Large Maps

Map 1: Base Map
Map 2: Geology
Map 3: Natural Heritage Sites
Map 4: Mining Past and Present
Map 5: Historic Bridges, Locks, Dams, and Fish Traps
Map 6: State Parks, Game Lands, Protected Properties
Map 7: Zoning and Watershed Ordinances
Map 8: Scenic Route

List of Figures (excluding appendices)

I. Executive Summary

Along the shores of the Deep – Cape Fear River, natural and cultural treasures lie in hiding. The river has rarely attracted much attention, or kept it long, which is precisely why these treasures still exist today. In a canoe, you can feel the water's unexpected power and see the landscape's beauty.

Below the river's surface swims the Cape Fear shiner, an endangered, small golden minnow. A red-backed salamander climbs the river's banks. A Septima's clubtail dragonfly, another endangered species, hovers over the water. White pine trees, remnants from the last Ice Age, grace the slopes at the confluence of the Rocky and Deep Rivers, and Catawba rhododendron overlook the steep, north-facing bluffs. From House in the Horseshoe to Raven Rock State Park, the Deep – Cape Fear River travels through some of the most fragile and precious natural areas remaining in the southern Triangle.

The river tells a history of human habitation, as well. Along its shores, dreams were born and fortunes lost. Folks tell stories here, of Philip Alston, the "unprincipled scoundrel" who lived at House in the Horseshoe, and of his brother, the colorful "Chatham Jack", so called due to his vast land holdings in Chatham County.

The remains of locks, dams, and canals all along the river tell of a complex river navigation system, which was used to carry iron for the Confederate Army from Buckhorn to the Endor Furnace, until a major storm flooded everything out. The remains of the massive Endor Iron Furance still stand in Lee County. Old mines provided coal and copper to the nation and brownstone to build elegant homes in New York and Philadelphia. At White Pines a lone steel cable reveals how children crossed the river on a swinging bridge to get to school. At Gulf, a huge stone foundation was the site of a mill on the old plank road to Fayetteville. Stone fish traps show how Native Americans and the early Scottish settlers used to catch their fish.

But the Deep – Cape Fear River is beginning to be affected by the region's burgeoning population. Sedimentation and run-off is degrading the river's water quality. Wastewater

treatment plants dump more phosphorus into the water than the river can assimilate, and numerous small dams slow water velocity and reduce oxygen levels. At the same time, the river is an important water supply for the growing population.

As property values rise, farm and forest landowners are sometimes forced to give up their land in order to pay estate and property taxes. Now is the time to protect the river -- its water and its surrounding watershed -- so that its natural and human history will not be lost to us or to future generations.

This document is an investigation of the Deep – Cape Fear River Corridor from House in the Horseshoe to Raven Rock State Park. This stretch of the river is significant for seven major reasons:

1. It is a water supply resource.
2. It is an aquatic habitat for rare fish and mussel species.
3. It has a vivid historical legacy.
4. It possesses great timber and agricultural lands.
5. It is terrestrial habitat for wildlife and rare plant species.
6. It is a recreational resource.
7. It is a beautiful, scenic place.

Our goal is to protect and enhance these resources for highest economic and social benefit for the community.

This document is both educational and strategic. By describing the river and its values and by recommending specific strategies to protect and enhance them, this document will provide necessary information to aid protection, restoration, and water- and land-use decision-making. We hope that this plan creates a vision for the river over the next several decades and guidance for how to achieve that vision.

II. Corridor Description

A. Location

Both the Deep and the Cape Fear Rivers are part of the greater Cape Fear River Basin, which is the largest river basin contained entirely within the state (Figure 1). Beginning near High Point, NC, the Deep River flows through Forsyth, Randolph, and Moore Counties, past the State Historic Landmark of House in the Horseshoe, before becoming the borderline between Lee and Chatham Counties. Along the border just south of the Jordan Lake dam, the Deep is met by the Haw River, which flows south from Alamance County through Chatham; at their confluence the two rivers together become the Cape Fear River. The Cape Fear River continues along the border of Lee and Chatham Counties and enters into Harnett County, past Raven Rock State

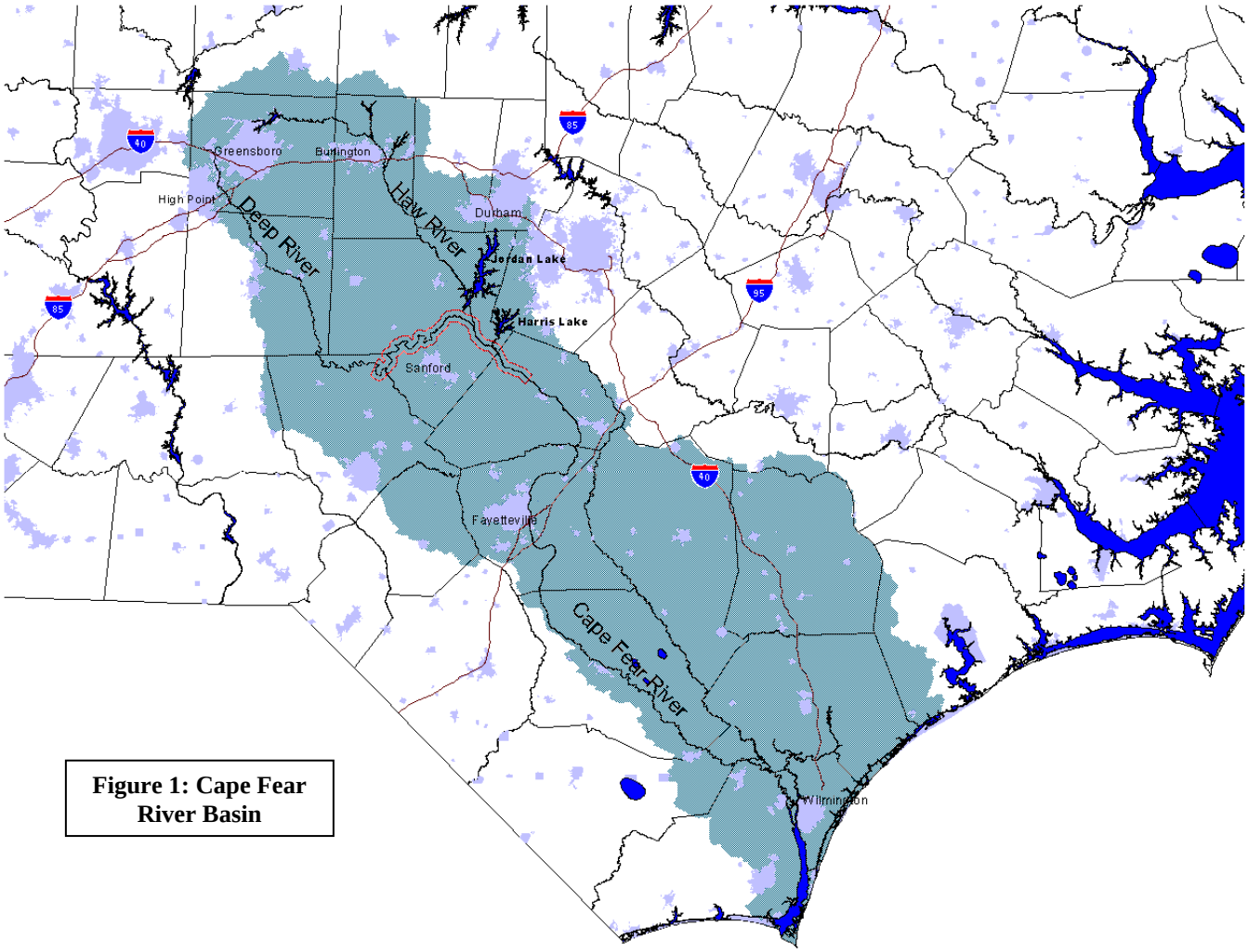
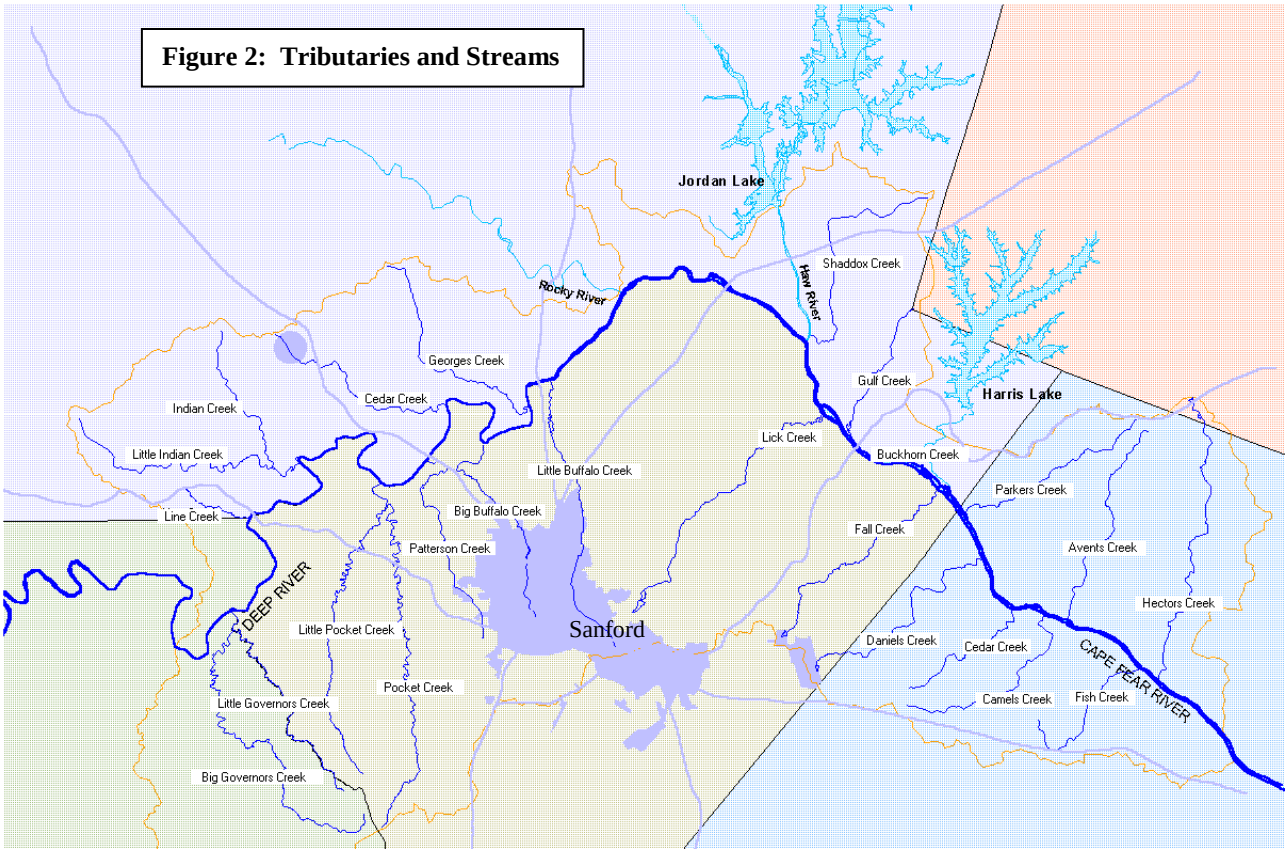


Figure 1: Cape Fear River Basin

Park, continuing southeast to flow through Fayetteville and Wilmington, until it eventually reaches the Cape Fear and the Atlantic Ocean.

Our study area is this mainstem of the river from House in the Horseshoe in Moore County, past Lee and Chatham Counties, to Raven Rock State Park in Harnett County, and the two-mile wide corridor around it, measured one mile from each side of the riverbank. The study area is approximately 53 miles long (See Map 1: Base Map).

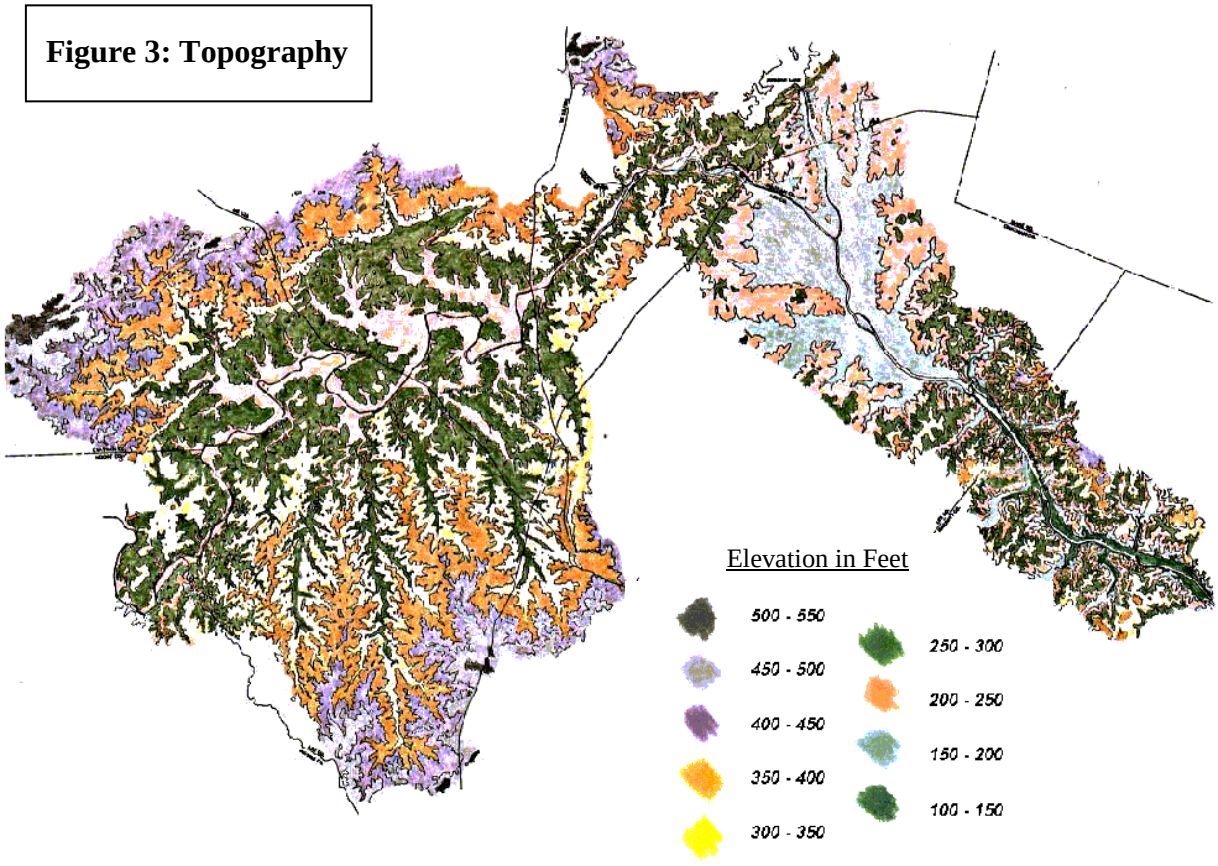
Many streams feed into the Deep – Cape Fear River inside the study area (Figure 2). Major tributaries of the Deep include McLendons Creek (not shown), Governors Creek (Big and Little), Line Creek, Indian Creek, Pocket Creek, Patterson Creek, Cedar Creek, Big Buffalo Creek, Georges Creek, Little Buffalo Creek, and the Rocky River. Major tributaries of the Cape Fear River include Lick, Gulf, Buckhorn, Fall, Parkers, Daniels, Cedar, Camel, Avents, Fish, and Hectors Creeks.



B. Physiography, Geology, Topography, and Hydrology

In the study area the river traverses two physiographic regions of North Carolina: the Piedmont, distinguished by gentle, rolling hills and sharply-defined stream valleys; and the Coastal Plain, a flatter region containing swamps and slow-moving rivers. The Fall Line, which separates the Piedmont from the Coastal Plain, lies in close proximity to the river corridor; the area's diversity in natural features, which reflects characteristics of both physiographic regions, is a result of its location within this transition zone.

Figure 3: Topography



A section of the Deep – Cape Fear River Corridor, approximately from the 15-501 crossing to the US-1 crossing, is underlain by the Carolina Slate Belt, a strip of mostly metamorphic and some igneous rocks – primarily crystalline, typically acidic, and relatively poor in nutrients, as are the soils that weather from them. The Carolina Slate Belt holds little groundwater; therefore, the streams that originate from it have low flows

during dry seasons. Because this area is so similar in geology to many of the rock formations further west, the vegetation here is typical for most of the Piedmont. The Carolina Slate Belt, more so than sedimentary areas, also features steeper topography in the river corridor (Figure 3).

From House in the Horseshoe to 15-501, and after the Slate Belt from US-1 to approximately the Buckhorn Dam (see Map 5), the Deep – Cape Fear River Corridor is underlain by the softer rocks of the Triassic Basin. This was formed by the sedimentary infill of the vertical faults that were created by the pulling apart of the North American and African crustal plates many years ago. The low-lying Triassic Basin, like the greater Coastal Plain, is typified by swamps and broad, flat terrain. The widest floodplains in the corridor lie within the Triassic Basin (Figure 4). Yet like the Slate Belt, the Triassic Basin is also incapable of holding much ground water, resulting in low-flow streams. The Triassic rocks are also more easily eroded than the harder rocks of the Slate Belt. The Deep River Coal Field, consisting of sandstone and shale and located in the corners of Lee, Chatham, and Moore Counties, is part of the Triassic Basin and historically has been a significant mineral resource for the area. The lucrative clay, shale, and brownstone deposits close to the river are also associated with the sediments of the Basin.

Approximately three miles upstream of the Harnett County line, the geology changes significantly again. Here the underlying rock is the Raleigh Belt, a sedimentary and

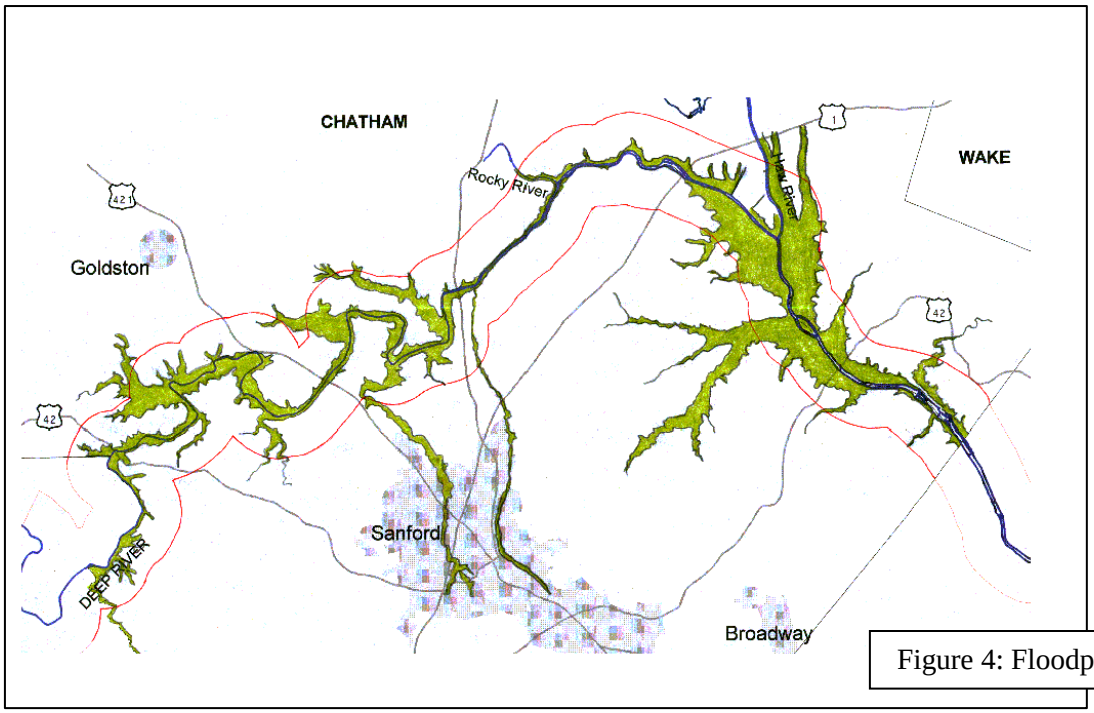


Figure 4: Floodplains

metamorphic formation containing gneiss, schist, and granite. The Raleigh Belt rocks also tend to weather into acidic soil, and again the topography is steeper here along the river because of the harder rock.

This underlying geology is what creates the river's interesting hydrology. This stretch of the river is known for its falls, twists, turns, rapids, and shallow waters, which have made it mostly unnavigable for commerce and travel, despite several historical attempts to make it otherwise. The rapids at Buckhorn Falls, for example, have developed at the approximate place of geological change from the Triassic Basin to the Raleigh Belt. Pullen's Falls (present-day Lockville), on the other hand, can be explained by the fault line that crosses the river at the same location. The many falls at Raven Rock, however, are attributed to the change in geology from the Raleigh Belt to the sedimentary Middendorf Formation, which begins just east of the edge of this study area.

Another interesting geological feature in the Deep – Cape Fear River Corridor are the diabase sills, of which there are several near Carbonton and McLendons Creek. Diabase is a rock similar to basalt, rich in iron and magnesium but poor in silica, giving it a dark, rusted appearance. The soils that weather from it are rich in calcium and circumneutral to basic (in contrast to the other soils in the area, which are mostly acidic). The sills that have formed here are the result of liquid magma flowing laterally through subterranean, horizontal faults, created by the separation of the North American and African plates.

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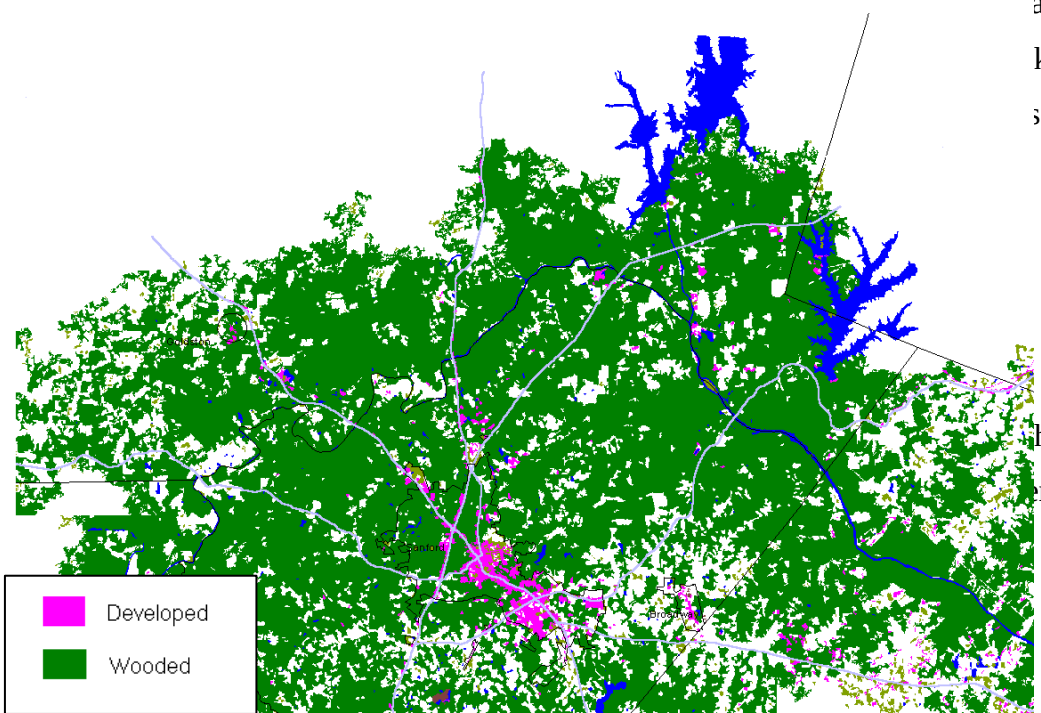

home to a
erons; red-

shouldered, red-tail, and broad-winged hawks; prothonotary and other types of warblers; barred owls; hairy and pileated woodpeckers; kingfishers; ospreys; and various types of tanagers. Bald eagles are more unusual but still indigenous to the river, and a reintroduction program of wild turkeys has been very successful, to the point where they are now commonly spotted from the river. Common animal species include beavers, whitetail deer, muskrats, otters, opossums, raccoons, terrapins, snapping turtles, copperheads, and banded water snakes. Even the occasional coyote, bobcat, and black bear has been rumored, if not tracked or seen. Common fish species include smallmouth and largemouth bass, catfish, bluegill, sunfish, gar, and carp.

The plant communities in the river corridor are typically floodplain and alluvial forests, although this varies with soil type, drainage, slope grade, etc. In places that have been recently cut, early successional communities are dominant, especially loblolly pine

forests. Because of steep slopes and flooding, however, the areas immediately alongside the river tend to contain older hardwoods. Typical tree species include beech, birch, sycamore, oak, black willow, holly, hornbeam, and elm. Understory species include buckeye, pawpaw, violets, jewelweed, pickrelweed, and bamboo.

The species listed above are the most typical flora and fauna in the Deep – Cape Fear River Corridor. In addition, there are many rare, disjunct, or exceptional species in the river corridor. For example, the diabase sills near Carbonton and McLendons Creek are capable of supporting rare plant species, such as piedmont horsebalm, because of the unusual soils that weather from the diabase rock. The site of the LaGrange Diabase Bog supports one of the rarest natural communities in the Piedmont, the hillside seepage bog. Here, the underlying diabase sill allows little penetration by water, and consequently the slopes are almost continually wet. The rich diabase soil, in combination with the wet conditions, supports unusual plant species, such as sweet bay, blaspheme vine, Virginia chain fern, and spikerush, all of which are typically found in the Coastal Plain.

In addition, some disjunct mountain species can be found within the Deep – Cape Fear River Corridor – either marginals from their normal range or relicts from the Ice Age. Usually these species are found only further west in the higher elevations, but in the Piedmont they can also be found on north-facing slopes and rocky promontories. They include white pine trees, featherbell, trout lily, galax, Catawba rhododendron, and dutchman's britches. Similarly disjunct montane animal species include the red-backed salamander and the *Mesomphix* sp. (a landsnail).

The White Pines Promontary, a nationally-significant natural area as identified by the NC Natural Heritage Program, is home to many of these typically montane species, yet its location near the Fall Line creates a diverse habitat that supports typically coastal species as well. Thus in White Pines there is the juxtaposition of Carolina anoles and red-backed salamanders, white pines and longleaf pines. Witch alder and mountain laurel, both representative of mountain species, can be found in the same area as small duckweed, three awn grass, and legget's pinweed, which are more representative of coastal species.

The river itself is home to several rare aquatic species, including the Cape Fear shiner, a small minnow that is federally-listed as endangered, and the Carolina redhorse, a federally-listed species of concern. The shiner has probably never existed in large numbers; the freshwater aquatic animals in the Southeast have been so isolated in the small river basins typical of this part of the country that, over time, separate populations have evolved into completely new species, endemic to only one river system. Therefore, it is not unusual for aquatic species in North Carolina to have a small range limited to one river. Even so, the Deep – upper Cape Fear River aquatic habitat has been especially disturbed by construction of 17 impoundments from High Point to Raven Rock State Park. This reduction and fragmentation of range, along with its small population size, makes the Cape Fear shiner and other aquatic species particularly vulnerable.

Fresh-water mussels – specifically, the notched rainbow, brook floater, triangle floater, Atlantic pigtoe, squawfoot (creeper), yellow lampmussel, and Roanoke slabshell – are also in danger in the river corridor, if not already gone. The squawfoot and the two floaters still survive in the Deep River upstream of US 1, and the yellow lampmussel exists in both the lower Deep and the upper Cape Fear. The Roanoke slabshell is reportedly "barely holding on" in the Deep, though it has a stronger population in the Cape Fear River downstream to Fayetteville.

The notched rainbow is also struggling in the lower Deep, and a single shell that was recently found at Raven Rock State Park gives hope that this species might still exist in the Cape Fear, as well. Several years ago, a few shells of the Atlantic pigtoe were found, but even at that time the shells were many years old. Therefore, experts suspect that this species has probably vanished from this stretch, since no live specimens have been found in recent years.

Like the shiner, most of these mollusk species have always been local in their range, but modern-day dams further isolate and fragment their populations. Their survival is also threatened by river pollution. Excessive sedimentation, for example, can bury the mussels outright, bury their habitat, or clog their gills. These filter feeders are harmed by

other pollutants, as well, such as chlorine, pesticides, or toxic metals, which they often ingest directly. Humans further threaten their existence by digging them for consumption.

Several other listed species in the river corridor have suffered habitat loss due to damming, including Septima's clubtail dragonfly, harparella, and buttercup phacelia. There are only five populations in the world of the federally-listed dragonfly, including two in this study area. The harparella plant, a member of the parsley family, is also federally-listed and restricted to gravel bars and rocky shoals in swift-flowing streams. Buttercup phacelia, a spring ephemeral, is indigenous to floodplain forests, many of which have been inundated by impoundments.

(See Map 3: Natural Heritage Sites. Also see Appendix A: Listed Species; Appendix B: Regionally Rare Species; and Appendix C: Natural Heritage Sites.)

D. History

It is believed that before white settlement, Sioux, Tuscarora, Occaneechie, Saponi, and Keyauwee people inhabited the Deep – Cape Fear River Corridor. Today little is known about these Native Americans, and written records are sparse because most of them seem to have disappeared before large numbers of Europeans arrived. A few artifacts or archaeological sites recall their presence, including a grave site close to Raven Rock and the ruins of a few linear stone structures that span the river. These are believed to be fish traps, designed to impede fish passage by damming the water, making the fish easier to catch. One such structure is located near Camelback Bridge; another is close to the Plank Road crossing; another is at the TLC LaGrange Riparian Reserve. Early Scottish settlers also built and used stone fish traps, and the remains of which can be found in Raven Rock State Park.

The white settlers who migrated to the area came by the rivers. They were predominantly English, Welsh, and Scottish, though some Germans and Quakers soon followed. Most of the first white settlers who arrived were farmers, settling to work the more fertile soil in the riparian bottomlands, and spreading out once those lands were all taken. Historic and current crops include cotton, tobacco, wheat, oats, peas, beans, sweet potatoes, and flax; livestock, especially hogs and cattle, was also important. Slaveholding was relatively uncommon here, especially in comparison to the eastern Carolinas, since so many of the farmers here were subsistence yeomen. By the mid-1800s, however, when slavery was at its peak in the South, enslaved blacks made up about 22% of the population. Landholdings were also generally small, although Joseph John "Chatham Jack" Alston's estate, which came to over 40,000 acres in Chatham County, is a notable and breath-taking exception. Joseph Alston was the brother of Philip Alston, the whig colonel, state senator, two-time murderer, and former resident of House in the Horseshoe.

The area's aristocratic segment was not made up entirely of large plantation owners. Some of the most prosperous people in this area were also the entrepreneurs. Lawrence Haughton, for example, was the first owner of the Haughton-McIver Inn (circa 1850), located in Gulf on the Cameron and Gulf Plank Road. Haughton was also one of the founders of the Gulf and Graham Plank Road, and a founding stockholder of the Pittsboro Rail Road Company and joint owner of the nearby Gulf Coal Mine. Connor O'Dowd is another historic figure. He was the operator of a gristmill, saw mill, tanyard, distillery, and store near Carbonton in 1754. Colonel Ambrose Ramsey owned a prosperous tavern and mill near present-day Lockville in the late 1700s. Phillip Robinson operated the aforementioned fish traps close to Raven Rock and a mill in the nearby falls in the late 1700s. The Northington family, also prominent in the Raven Rock area, owned three mills, a tavern, 6,000 acres (and many slaves to work them), and a ferry business, all close to Avents Creek.

Mills were common because of the high number of falls on the river. Lumber and naval stores were also important industries; hardwoods were cut for their timber, while longleaf pine trees provided tar, pitch, and turpentine. By 1850 most of the bottomland trees in

the river corridor had been clearcut, and so timbering moved inland. By 1920 most of the old growth stands in the region were gone, and clear cut fields were soon converted to farmland. Today the timber industry is still very important in the river corridor.

Mineral deposits were another historic natural resource in the area. Substantial deposits of iron, coal, clay, shale, and copper have been exploited from the Deep – Cape Fear River Corridor throughout history. Copper, for example, was mined from the 1850s until the early 1900s in Chatham and present-day Lee Counties, off Copper Mine Creek, the Rocky River, and current-day 15-501. In 1870 the village of Osgood was formed by the Southern Copper Company to accommodate the mining families, but none of the original buildings remain today. The Bridges House on Deep River Road, however, was built by the property owners of the Copper Mine Creek copper mine, and the first two owners of the Farrish-Lambeth House were also copper entrepreneurs.

The brownstone industry has also been important to the area, with activities centered around the town of Sanford. Many of the most beautiful historic structures in the region, including the Endor Iron Furnace, are constructed of brownstone. Millstones were quarried in two places at the turn of the century on the east bank of Little Governors Creek, close to the Deep River; old millstones and metal machinery parts can still be found at the site.

Clay has been mined in the corridor since the late 1800s, with brick production focused at the communities of Colon and Brickhaven. In Colon the remains of several different historic brick plants, including office buildings, mixing and grinding mills, a 32-foot beehive kiln, a railroad depot, and a company store, endure at the present Cherokee Sanford Group complex on Colon and Post Office Roads. In Brickhaven two company tenant houses survive, built from their own Cherokee bricks in the 1910s by the Cherokee Brick Company for their nonlocal workers.

The first iron operation in the area was the Willcox Iron Works, begun by John Willcox and two friends in 1768 on the south side of the Deep, across from Gulf. At first serving

local needs, the industry was converted to state use during the Revolutionary War, and then reverted to private use afterwards. The business folded in the 1780s. During the Civil War, however, the Confederate army's critical need for iron reinvigorated the industry briefly. The iron was mined close to Buckhorn, then transported by river or rail to be fired in one of two local blast furnaces: the Buckhorn furnace north of the Cape Fear River in Harnett County, or the Endor Iron Furnace on the southern banks of the Deep, east of Cumnock. Even after the war the industry stayed strong, until approximately 1876, when the ore vein abruptly ended at a fault line and the iron ran out. It is unclear if any remains of the Buckhorn furnace can be found today, but the brownstone Endor Furnace still stands, 35-feet high. John Willcox is buried in a cemetery near Gulf.

Transportation for all of these goods and raw materials was always a problem for the industrialists, traders, and merchants in the Deep – Cape Fear River Corridor, and difficulties in export were a large factor in the eventual failure of many of their efforts. Dirt roads were muddy and not fit for travel, and so with the help of slave labor, plank roads were built. However, the wooden planks quickly rotted. Meanwhile, the river, which could have been a good connector to Fayetteville, Wilmington, and other downstream markets, was generally impassable due to rapids, falls, and shallow waters. Attempts to open the waterway to navigation were made by five separate companies from the late 1700s to the mid-1800s. The Cape Fear and Deep River Navigation Company, formed in 1849, was the most successful of the five, constructing dams and locks at a total of 19 sites on the waterway. Although none of these systems are still operating, some of their ruins still remain today along the river, including at Lockville, where the old dam and canal endure from the 19th Century. This site is also the location of a 1922 powerhouse, built inside the stone retaining walls of the old lock system.

Despite all these efforts to tame the river, it was the railroads that finally opened up the Deep – Cape Fear River Corridor to bigger, outside markets. During the Civil War period, a rail line was built to connect Egypt (present-day Cumnock) to Fayetteville, and later to Greensboro and Wilmington. Soon afterwards, another line was constructed to

link the area to Raleigh. Where the two lines crossed just south of the river, the city of Sanford was born. Later the railroads would connect the area to Charlotte, Norfolk, Virginia, and beyond, and several of them would go right through the coal mining areas in Egypt. The brick-making center of Colon formed at another railroad intersection.

The construction of the railroads played an enormous part in the success of the coal industry. John Willcox of Willcox Iron Works fame was the first individual to attempt commercial coal mining in the Deep River Coal Field, but it was not until the 1850s that the industry really began to thrive, albeit in a perpetual boom and bust cycle. The industry was centered around the town of Egypt, with smaller mines in Moore County (Murchison and Garden Mines), Gulf, and Farmville (Carolina Slope / Coal Glen Mine).

The Deep – Cape Fear River was envisioned to one day be a national coal capital, but the industry suffered many set-backs, primarily due to poor financing and planning. Coal profits would sometimes even fall below the sales profits for fertilizer shale, which was mined concurrently with coal since both could be extracted from the same shafts. The coal mines were also notorious for floods, explosions, and fatal accidents. In 1895 a gas explosion took the lives of over 40 workers in the Egypt slope mine, and in 1925 a blast at the Coal Glen Mine claimed 53 lives. Mining was so dangerous that the operations were temporarily ceased in the 1890s and had mostly petered out by the 1930s and 40s. During one peak of production, however, in 1898, the 200 miners at Egypt were extracting 400 tons of coal per day. Though many of the houses of the miners are long gone, the Egypt Big House, home of Samuel Henszey, manager of the Egypt Coal Mines in the late 1800s, is well-preserved.

(See Maps 4 and 5: Mining Past and Present; and Historic Bridges, Locks, Dams, and Fish Traps. Also see Appendix D: Historic Sites.)

E. Current Land Uses

1) Industry

Today neither coal mining, nor copper mining, nor iron production is significant to the economy of the Deep – Cape Fear River Corridor, except in history books. Brick-making, however, is still a leading industry, and clay is actively mined from many sites near the river, especially in the Gulf, Colon, and Brickhaven areas. Timber is another major operation in the area, and lumber companies like Willamette Industries, Sustainable Forests, and the General Timber Company own sizeable tracts of forest land. Individual, private landowners also timber their lands for profit.

Agriculture is another significant part of the area's economy, though farm lands are generally concentrated in the river bottomlands and in the Coastal Plain areas. Animal operations tend to be on a smaller scale here, and none are registered in the study area because they are beneath the minimum size threshold. Gold Kist, a poultry company, has a large plant in Cumnock.

Forest and farm lands are now under increasing pressure as accelerated development activities

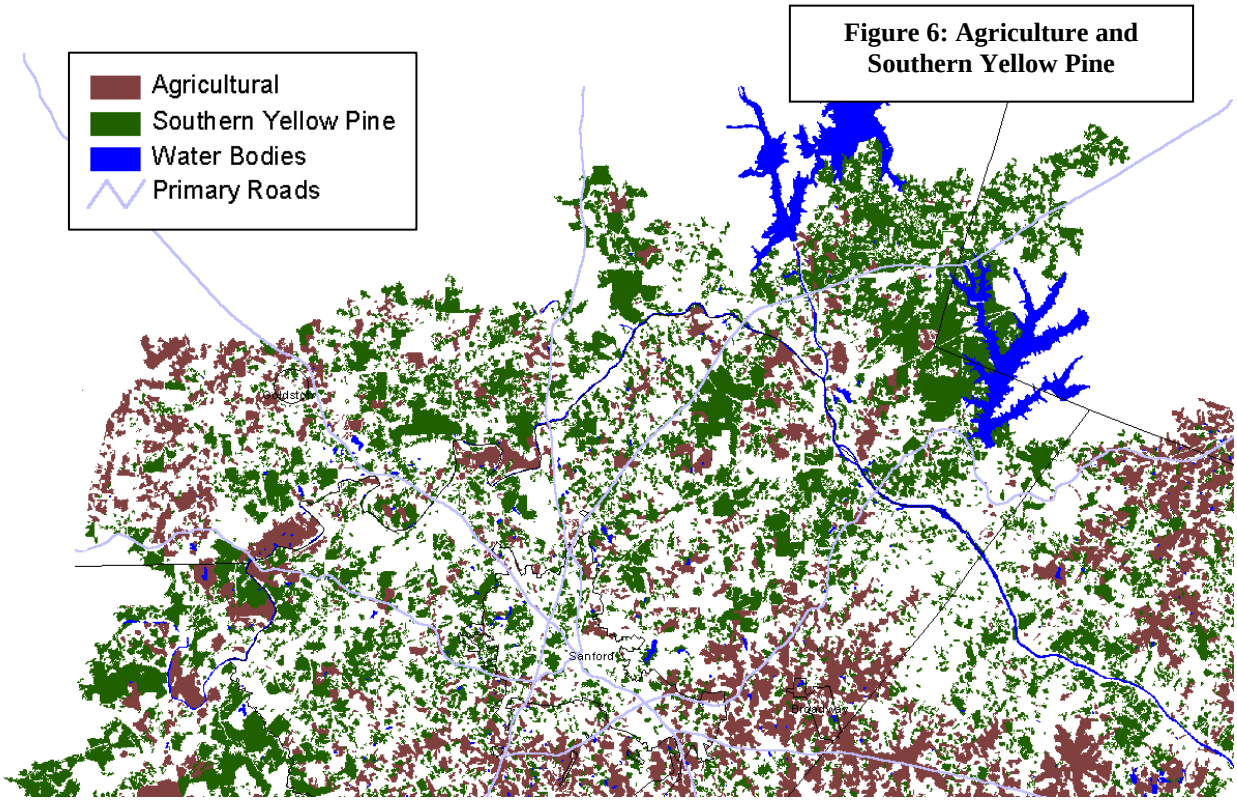

Figure 6: Agriculture and Southern Yellow Pine

result in higher land values. These higher land values translate into higher property and estate taxes, which are often so steep that landowners are forced to sell their property just to pay them off. Meanwhile, in today's economy it becomes harder and harder for farmers and foresters to sell their products profitably in the changing market.

This area needs a rural economic development program to focus on the promotion of the local farming and timber industries. In addition, in order to preserve farming and forestry lands, a well-funded purchase of development rights program will be essential. This is because most landowners cannot afford to simply give up their development rights through a donation of a conservation easement. Development rights will have to be purchased.

2) Transportation

This stretch of the Deep – Cape Fear River is no longer used for the commercial shipping of goods, and most of today's boats are used for recreation. Railroads (Figure 7), which have had such a prominent place in the river's history, are still active except for a few unused lines, though paved highways, especially Routes 1, 42, 15-501, and 421, are the most important transportation routes today. The widening of Route 1 and the Sanford Airport will certainly lure residential development and new businesses to the area.

The Chatham County Parks and Recreation Department has been working with NC Rails to Trails to study how the unused rail corridors can be converted to rail-trails. One potential rail-trail is the abandoned connector from Osgood to Cumnock. In addition, where two rail lines run side by side close to Gulf and the Endor Iron Furnace, one line is actually in disuse and being targeted for a loop nature trail to run in Chatham and Lee Counties, crossing the Deep River at the Camelback Truss Bridge and again at the unused railroad Warren Truss bridge. The loop trail is planned to link to the 3½-acre Deep River Park trailhead, owned and managed by the nonprofit Deep River Park Association.

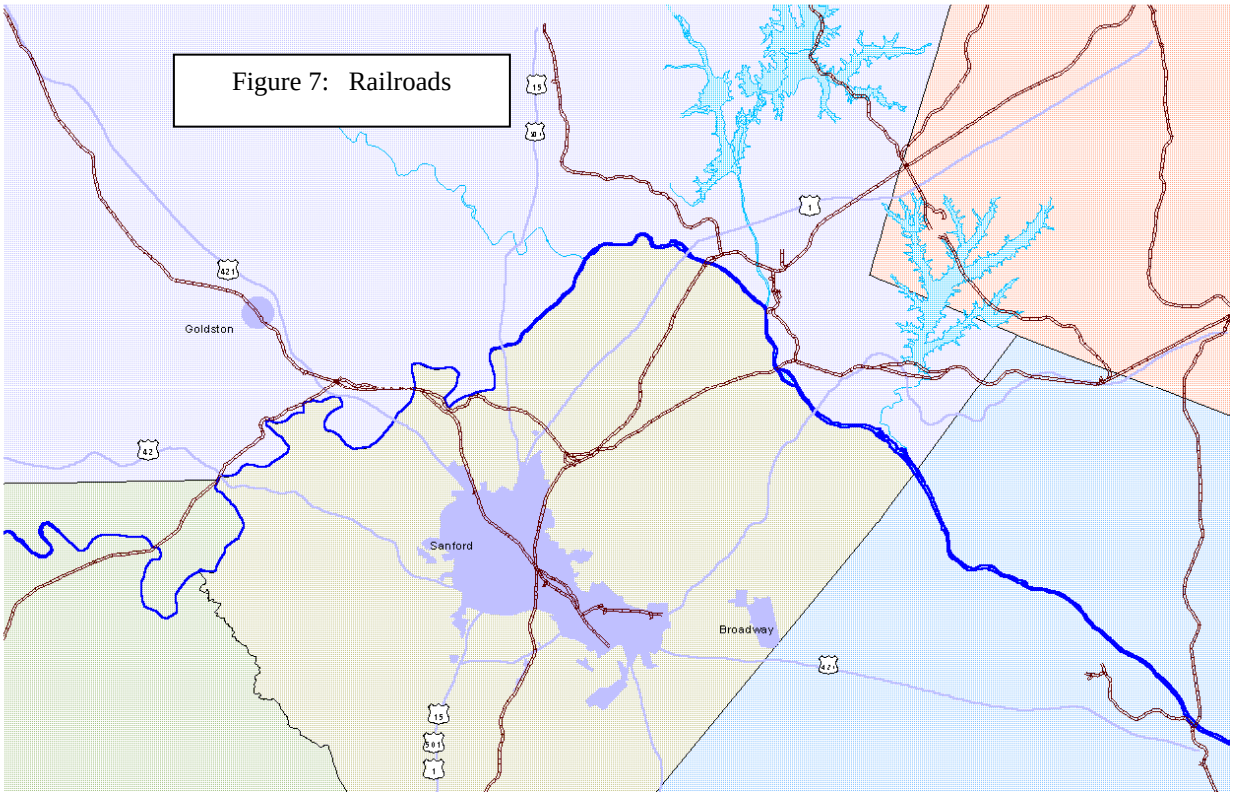

Figure 7: Railroads

3) Protected Lands

Triangle Land Conservancy (TLC) and the Deep River Park Association are the two nonprofit organizations with holdings in the area. TLC's land consists of the White Pines Nature Preserve, LaGrange Riparian Reserve, McIver Landing, and Georges Creek Bottomlands. The Deep – Cape Fear River is one of TLC's priority areas for land protection, and the land trust hopes to protect many more sites in years to come.

TLC also helped to protect the 104-acre Hardee Tract at Raven Rock, which is now under state ownership as part of Raven Rock State Park. Including the Hardee Tract, Raven Rock now consists of 3,653 acres, featuring over 19 miles of hiking and equestrian trails leading to several historic and natural sites. North Carolina also owns 17 acres around House in the Horseshoe, a State Historic Landmark. In addition, the Lee and Chatham Game Lands (total 5,289 acres) along the river are leased and managed by the NC Wildlife Resources Commission (NCWRC) from Carolina Power and Light and can be

considered semi-protected. NCWRC also owns a public boating and fishing access site on the upstream Chatham side of Avent's Ferry Bridge, and immediately upstream of the Carbonton dam in Chatham County, it leases 3½ acres from Babcock Lumber Company for the same purpose.

Figure 8 summarizes the Protected Lands in the Deep – Cape Fear River Corridor. (Also see Map 6: State Parks, Game Lands, Protected Properties.)

Figure 8: Protected Lands

State Owned Lands		
Raven Rock State Park (incl. Hardee Tract)	3,653 Acres	Harnett
House in the Horseshoe	17 Acres	Moore
Endor Iron Furnace Preserve	426 Acres	Lee
Game Lands (owned by CP&L, leased and managed by NCWRC)		
Chatham Game Land	2,868 Acres	Chatham
Lee Game Land	2,421 Acres	Lee
Boating Access Areas		
Carbonton, upstream of dam (leased)	3½ Acres	Chatham
Avent's Ferry Bridge (owned)	2 Acres	Chatham
Land Trusts		
LaGrange Riparian Reserve (TLC Owned)	308 Acres	Chatham
White Pines Nature Preserve (TLC Owned)	258 Acres	Chatham
Georges Creek Bottomlands (TLC Owned)	37 Acres	Chatham
McIver Landing (TLC Owned)	5 Acres	Chatham
Coffer Forest (TLC Easement)	257 Acres	Lee
Deep River Park (D.R. Park Assoc Owned)	3½ Acres	Chatham
Total By County	3,653 Acres	Harnett
Total By County	3,485 Acres	Chatham
Total By County	3,104 Acres	Lee
Total By County	17 Acres	Moore
Total Open Space Lands Protected	10,259 Acres	

4) Recreation

Recreation areas are beginning to be developed in the Deep –Cape Fear River Corridor. Hiking trails are open to the public at White Pines and Raven Rock and are planned for

LaGrange Riparian Reserve. Raven Rock also features seven miles of equestrian trails and one each of backpacking, group, and canoe/kayak campgrounds. Popular public fishing sites include the NCWRC sites at Carbonton and Avent's Ferry Bridge, the Fish Traps at Raven Rock, and the mouth of Camel Creek. Hunting is practiced on the Lee and Chatham Game Lands, and public canoe access points are at Carbonton, Deep River Park, and Avent's Ferry Bridge. The Deep River Park Association holds an annual Deep River Festival and is advocating a Deep River Water Trail in addition to the aforementioned loop hiking trail. Triangle Land Conservancy is planning to open a water access point at McIver Landing close to Gulf. For cyclists, State Bike Route 1 passes through Moncure and Haywood before crossing the Cape Fear River and traveling on to Sanford.

F. Water Quality

While the overall water quality of the lower Deep – upper Cape Fear River is generally good, some severe problems exist. For example, dissolved oxygen levels are low in the section of the river below the Carbonton dam. This condition limits the river's capacity as a water supply, as habitat for aquatic life, and as a receiving stream for wastewater. The water quality of the river can therefore be seen as a limiting factor on economic growth in the surrounding area, because if the community experiences more growth and generates more wastewater, the water quality of the river would have to be improved before it could receive any additional waste. The Cape Fear River Basinwide Water Quality Plan for 1996, the Basinwide Assessment Report of 1999, and the Basinwide Plan for 2000, all prepared by North Carolina's Division of Water Quality (DWQ), provide the most comprehensive examinations of water quality issues for this area.

1) Point Sources

Pollution in the lower Deep – upper Cape Fear River can be attributed to many sources, both point and nonpoint. Point-source pollution originates from a well-defined, fixed spot, such as a pipe from a wastewater treatment plant (WWTP) or from an industrial stormwater system. Usually the flow of discharge from a point source is constant, even during dry conditions, when the amount of emitted waste may be greater than the river's flow. In some of the river's tributaries, this is often the case during dry periods because the underlying Carolina Slate Belt and Triassic Basin rocks hold very little groundwater. Point sources can contribute a number of different pollutants to a river, but in this study area the primary problems are nutrients and other oxygen-consuming wastes. Beneath the Carbonton Dam there are low dissolved oxygen levels because of the discharge from the High Point East Side WWTP. DWQ also reports a secondary sag in dissolved oxygen levels just below the Sanford WWTP.

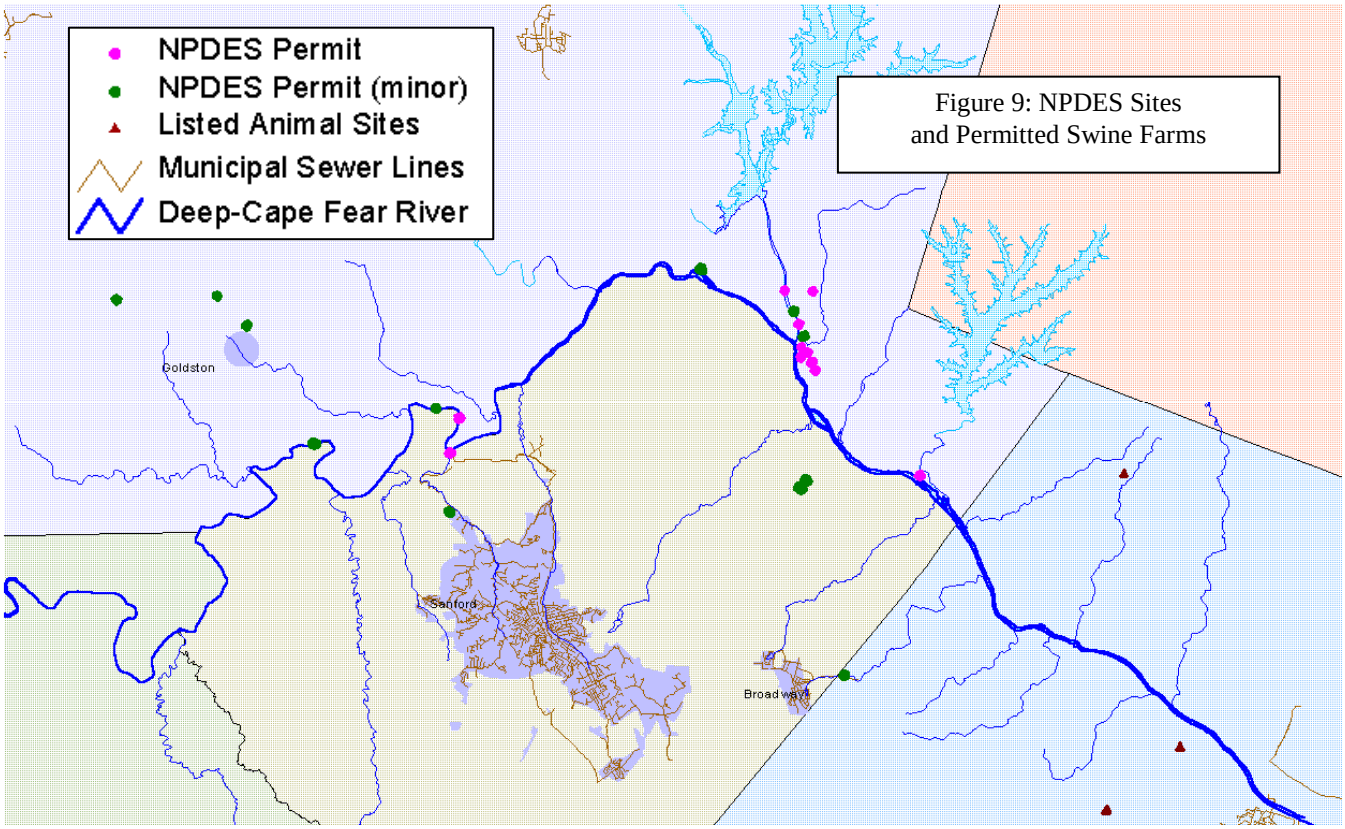

Figure 9: NPDES Sites and Permitted Swine Farms

Point source discharges are not allowed in North Carolina without a National Pollutant Discharge Elimination System (NPDES) permit issued by the state. The NPDES program regulates the amount of effluents that facilities are permitted to discharge (Figure 9). There are a total of 6 NPDES permitted dischargers along the mainstem of the river inside the study area: 3 minor and 3 major, including the Sanford WWTP just west of Endor and the Gold Kist discharge in Cumnock. In addition, there are 9 major and 9 minor dischargers in the rest of the watershed, including Honeywell, Inc. (Shaddox Creek and Haw River), Weyerhaeuser Company (Shaddox Creek), General Timber, Inc. (Georges Creek), and Neste Resins Corporation (Haw River) WWTPs, located on tributaries that all eventually feed into the mainstem.

Point sources upstream can also seriously affect water quality in the study area. For example, High Point's Eastside WWTP on Richland Creek has been implicated in a number of studies as a major contributor of nutrient-loading in the lower Deep. In fact, the DWQ recently reported that this plant alone contributes more phosphorus to the river than all of the other discharges above Carbonton combined. In 1996 the DWQ recommended nutrient limitation on this facility in the Basinwide Management Plan, and a total maximum daily load (TMDL) has since been established for Richland Creek. The High Point Eastside WWTP is now undergoing a major upgrade so that the facility can meet the TMDL requirement. However, the imminent construction of the Randleman Reservoir will probably reduce any deleterious effects from the High Point plant on our stretch of the river since the impoundment will keep most of the nutrients upstream. On the other hand, the dam will also certainly reduce water velocity as it travels downstream to House in the Horseshoe and beyond, and it will further fragment the fragile aquatic habitat.

2) Non-Point Sources

In some ways it is easier to monitor and control point sources because they originate from a fixed spot. Non-point sources, on the other hand, are diffuse and therefore harder to

identify and control. Unlike point-sources, they are sporadic and inconstant, usually occurring at random intervals depending on rainfall. Non-point sources include various types of agricultural and urban run-off, which contain sediments from construction and erosion and nutrients from animal waste, fertilizer, and other pollutants. Non-point sources are probably the biggest threat to water quality in the study area. For example, a five-year decline in water quality in the lower Deep River mainstem can only be attributed to non-point sources, since discharge levels from the NPDES sites have remained constant during this time period.

Big and Little Buffalo Creeks, both of which flow through Sanford, are both degraded from urban stormwater run-off. Sanford is required by the Clean Water Act to develop a stormwater plan by 2003, which will hopefully address these problems. Harnett County will also be required to develop a stormwater management plan by 2003. Sanford has also planned for a 7-mile greenway along Little Buffalo Creek from Charlotte Street in downtown north to Amos Bridges Road. This greenway would protect a 300-foot buffer on both sides of the streambank, for a total of 250 acres.

Sedimentation and nutrients from clay pits are the primary cause for degradation of Gulf and Cedar Creeks. Although the required best management practices (BMPs) are in place for the quarries on both streams, this tactic does not appear to be helping. Gulf Creek is on a priority list of impaired waters, and DWQ will continue to monitor the implementation of the BMPs to assess their effectiveness. Cedar Creek is currently Non Rated and will therefore not be included on the priority list.

Sedimentation is probably the worst non-point source pollution problem in this stretch of the river. The 1996 Cape Fear River Basinwide Water Quality Management Plan listed five tributaries that were considered impaired by sedimentation problems: Gulf Creek, Big Buffalo Creek, Cedar Creek, Indian Creek, and Little Buffalo Creek. At this time DWQ also attributed agricultural runoff as a problem for Indian, Little Pocket, and Georges Creeks, and severely eroded stream banks for Big Governors Creek. In the 2000

Plan all of these creeks were Non Rated because of low flow, so it is unclear whether these problems still exist for these streams.

Sedimentation and other types of non-point source pollutants can be controlled by land-use regulations and best management practices. For example, low-density, cluster, or buffer zoning might help reduce urban run-off by keeping construction and development away from the waterways. Best management practices might target mining and construction activities, and agricultural and animal operations. Examples of agricultural BMPs include managerial practices (e.g. pesticide management, conservation tillage, buffer preservation, etc.), and structural systems to control animal waste, run-off, and erosion (e.g., waste lagoons, sediment basins, terraces, etc.).

For the most part best management practices in this area are voluntary. The state requires BMPs for agricultural activities only in the WS-IV Critical Areas (See Section G). In addition, Chatham County mandates BMPs for animal operations over 100 animal units in its designated WS-IV Critical and Protected Areas, and in its River Corridor and River Corridor Special Areas. Lee County requires BMPs for construction activities, but only in the designated WS-IV Critical and Protected Areas.

3) Impoundments

Pollution problems are made worse in this stretch of the river because of the high number of dams on the waterway. The Deep River flows over 16 small dams between High Point and its confluence with the Haw River; this slows the water's velocity and limits its assimilative capacity. The Carbonton impoundment is a good example of this. Rapids and falls tend to increase the levels of dissolving oxygen in a river, so when water is slow-moving and flat, it does not get as much aeration.

Many, but not all of the dams in the Cape Fear River Basin are regulated to meet minimum streamflow standards, including the Lockville Dam. Those dams that have no

such requirement, including the Carbonton Dam, are still mandated to operate in a run-of-river mode so that instantaneous outflow equals instantaneous inflow. Unfortunately, these facilities are not well-monitored, and so compliance is not certain. The Division of Water Quality has recognized in the 1996 and 2000 Plans that the removal of unnecessary and unused impoundments would improve water quality in this stretch of the river, and such a move would certainly improve the aquatic habitat, as well. DWQ is currently investigating whether the hydropower facilities at the Carbonton, Lockville, and Buckhorn dams are still operating and generating power. The possible deregulation of the power industry in North Carolina could mean that these smaller hydroelectric dams will shut down on their own.

4) Use Support Ratings

In the 1996 Basinwide Water Quality Management Plan, DWQ rated the integrity of the Deep – Cape Fear River and its tributaries using the results from several different water quality readings, based on benthic macroinvertebrate tests. Benthic macroinvertebrates, or benthos, are mostly aquatic insect larvae that live on the bottom of rivers and streams; they are considered reliable indicators of water quality because their populations respond to and show the effects of a wide variety of river pollutants. Using the benthos data, DWQ rated the waters in the Cape Fear River Basin according to how well the streams were thought to support their intended use, whether it be WS-IV (water supply) or Class C (aquatic habitat and secondary recreation, such as wading, boating, and other activities that involve infrequent human body contact). Waters were rated either as Fully Supporting, Support Threatened, Partially Supporting, or Non Supporting. Waters were considered "Impaired" if they rated Partially or Non Supporting.

The mainstem of the river was well-rated according to this system. From House in the Horseshoe to Little Buffalo Creek, it was designated Support Threatened, and thereafter, down to Raven Rock and beyond, it was designated Fully Supporting. The tributaries, on the other hand, ranged from Fully Supporting to Non Supporting (Figures 10 and 11).

Figure 10: 1996 Use Support Ratings

Fully Supporting

- Deep River (Little Buffalo Creek to Raven Rock)
- Richland Creek (upstream portion)
- McLendons Creek (upstream portion)
- Smith Creek

Non Supporting

- Big Governors Creek (downstream portion)
- Indian Creek
- Little Buffalo Creek
- Gulf Creek (upstream portion)

Partially Supporting

- Richland Creek (downstream portion)
- McLendons Creek (downstream portion)
- Little Indian Creek
- Little Pocket Creek
- Pocket Creek
- Georges Creek
- Gulf Creek (downstream portion)
- Camels Creek

Support Threatened

- Deep River (House in the Horseshoe to Little Buffalo Creek)
- Big Governors Creek (upstream portion)
- Little Governors Creek
- Fall Creek
- Daniels Creek
- Cedar Creek
- Fish Creek
- Hector Creek

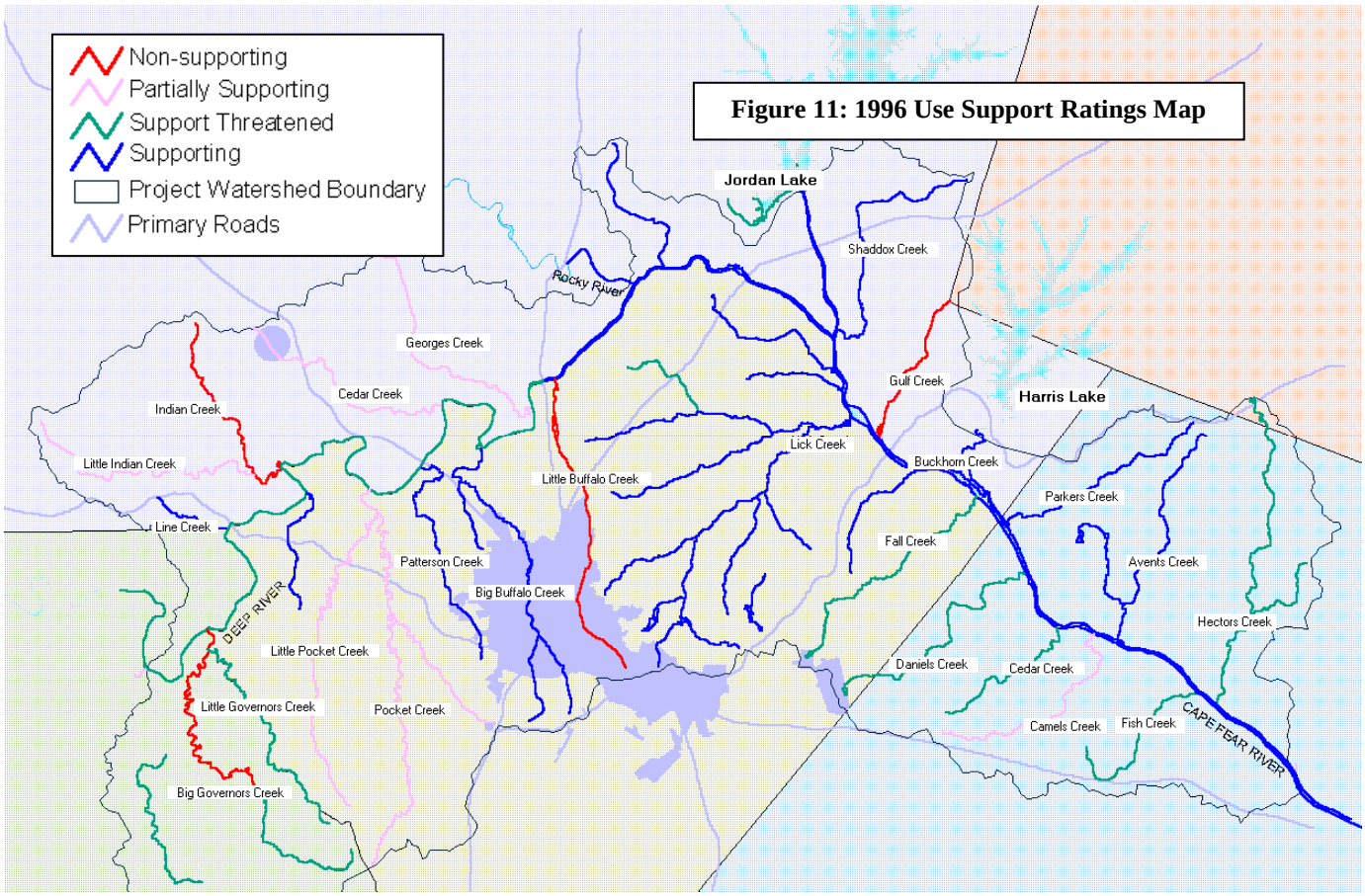

Figure 11: 1996 Use Support Ratings Map

Since 1996 the use support rating system has changed. The Support Threatened category no longer exists, so surface waters with a good-fair benthos rating are now classified with waters

with good and excellent benthos ratings. Therefore, the 2000 Fully Supporting list should not be considered as precise because there is no longer this fine-tuned distinction.

There is one other big difference between the 1996 and the 2000 ratings, which is that many of the streams that were once listed as Partially or Non Supporting are now Non Rated. This is because the 1993 and the 1998 benthos tests for many of these streams either did not happen or were later considered unreliable. Most of these streams originate from the slate belts or from the Triassic Basin and therefore suffer from extremely low flows during the dry periods. Because these conditions are not conducive to the water quality tests that DWQ currently administers, the samples were either not taken or later deemed inaccurate. Streams without recent test results were then classified Non Rated. Figure 12 lists the 2000 Use Support Ratings.

Figure 12: 2000 Use Support Ratings

Fully Supporting	1996 Rating
Smith Creek	Full
Pocket Creek	Partial
Patterson Creek	Full
Rocky River	Full
Rocky Branch	Full
Haw River	Full
Hughes Creek	Non Rated
Roberts Creek	Non Rated
Lick Creek	Full
Bush Creek	Non Rated
Buckhorn Creek	Full
Parkers Creek	Full
Daniels Creek	Threatened
Cedar Creek (Harnett)	Threatened
Avents Creek	Full
Camels Creek	Partial
Fish Creek	Threatened
Hector Creek	Threatened

I. Support	II.
no longer a category	
Partially Supporting	**1996 Rating**
Gulf Creek (upstream)	Non Supp
Non Supporting	**1996 Rating**
Gulf Creek (downstream)	Partial
Non Rated	**1996 Rating**
Richland Creek	Full, Partial
McLendons Creek	Full, Partial
Big Governors Creek	Non Supp
Little Governors	Threatened
Indian Creek	Non Supp
Little Indian Creek	Partial
Little Pocket Creek	Partial
Cedar Creek	Partial
Georges Creek	Partial
Big Buffalo Creek	Full
Little Buffalo Creek	Non Supp

Because so much water quality information is now missing, these new support ratings should not be considered exhaustive. Unfortunately, these Non Rated streams will probably not receive as much attention because they are no longer rated Impaired, even though they may well be. For

example, they may not make the EPA's 303(d) List, which is based on use support ratings. Streams that make it to the 303(d) List are priority waterways for management strategies to reduce the total maximum daily load of nutrients. DWQ is currently developing a new testing system that will be able to accurately assess water quality of low-flow streams, even during drought conditions.

(See Appendix E: Water Quality Tests.)

5) High Quality Waters

The other water quality classification system that applies to the lower Deep – upper Cape Fear River Corridor is the High Quality Waters designation (Figure 13). Two sections of the waterway in the study area are currently listed as High Quality Waters: 1) the Deep River in Moore County from House in the Horseshoe to NC 42, and all of the contiguous tributaries; and 2) in Harnett County, Parkers Creek, Avents Creek, and Hectors Creek in Raven Rock State Park.

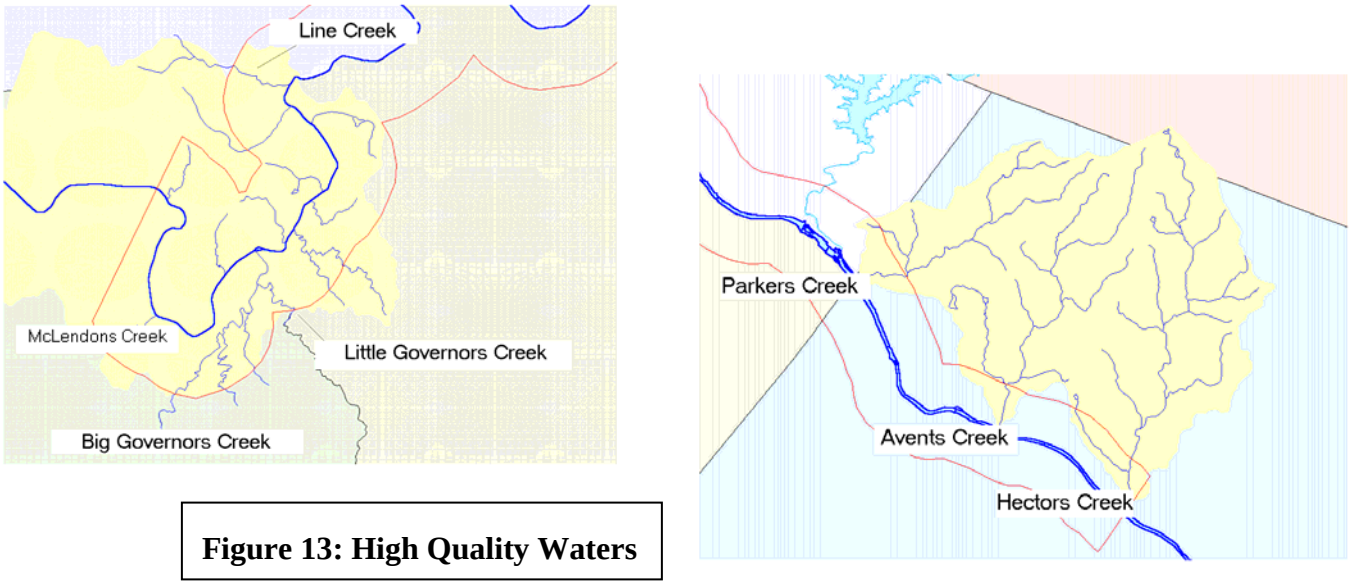

Figure 13: High Quality Waters

The High Quality Waters designation indicates that these streams should exceed state water quality standards; in addition, High Quality Waters are specially protected by the Division of

Water Quality with extra wastewater treatment and stormwater runoff controls. However, these ratings are old, and the quality of these waters has diminished in recent years. For example, fish community tests in Avents and Hectors Creek have resulted only in fair ratings, while benthos ratings in Parkers Creek have decreased from good to good-fair in the last five years. The tributaries listed as High Quality Waters in Moore County are Non Rated for use support today, but previous tests have indicated severe problems in these waters.

G. Regulatory Mechanisms

1) Buffers

One of the best ways to protect and restore water quality is through riparian buffers. Undeveloped, forested tracts along rivers protect and improve water quality by creating shade to moderate stream temperature and by stabilizing streambanks to prevent or lessen erosion. Buffers also remove pollutants from stormwater; for example, one study (Schueler 1995) concludes that buffers have the potential to remove up to 75% of the sediment, 40% of total nitrogen, 50% of total phosphorous, 60-70% of trace metals, and 75% of hydrocarbons from overland flow or groundwater on its way to the river.

The most appropriate width for buffers has been a contentious issue. Currently the model for mandatory buffers in North Carolina is the Neuse River Rules, which apply to all of the perennial waterways in the Neuse River Basin. The Rules mandate, among other things, a 50-foot buffer on both sides of the stream, measured from the streambanks. The first 30 feet of the buffer must be vegetated, of which the first ten feet must be undisturbed. The Neuse River Rules also allows for “grandfathering”, whereby existing uses in the 50-foot range are allowed to remain. In other words, the buffer is only required in areas that were already vegetated when the rules were set up in the 1990s.

The 50-foot width of the Neuse Rules, however, are based more on politics than scientific evidence. A study by Seth Wenger of the University of Georgia recommends 50 feet as an absolute minimum, plus an additional 2 feet per 1% of slope, plus all adjacent wetlands. Wenger recommends the buffer apply to both perennial and intermittent streams, and that impervious surfaces, slopes above a 25% grade, and adjacent wetlands not count towards the 50 feet. All major sources of contamination, he says, should be excluded from the buffer, including impervious surfaces, logging roads, mining activities, agricultural fields, livestock, clear cutting, land disturbance, septic tank drain fields, and pesticide and fertilizer use.

Wenger's buffer would provide good protection under most circumstances, but the 50 feet would easily be overpowered by any severe storm, flood, or contamination event, and it would provide little or no terrestrial habitat for wildlife species. To address this, his study strongly recommends, wherever possible, a buffer of at least 100 feet, including all floodplains, for long-term water quality protection, or 300 feet minimum to provide some habitat for wildlife.

Very little regulatory protection exists yet for the waters of the Cape Fear River Basin, although North Carolina is considering extending the 50-foot Neuse River Buffer Rule to all of the waterways in the state. There is some protection afforded to water supply watersheds, through state-wide regulations and through individual county watershed ordinances. For example, the state requires for all agricultural activities a ten-foot buffer from all perennial waters inside the designated WS-IV Critical Area, WS-IV being the classification for water supply watersheds in heavily developed areas (See Figure 14). In addition, Lee County restricts development within a 30-foot vegetative buffer on perennial waters in the WS-IV watershed. Chatham's rules are even stronger because they apply not just to the WS-IV watersheds, but also to perennial waters inside the designated River Corridor and River Corridor Special Areas. Chatham mandates a 50-foot vegetative buffer for developments on perennial waters more than 2,500 feet from the mainstem, and a 100-foot vegetative buffer for developments on all waters within 2,500 feet of the mainstem.

In Harnett County a Conservation District has been zoned, measured 500 feet from the north and south sides of the Cape Fear River and 200 feet from both sides of several major tributaries, including Parkers, Daniels, Cedar, Camel, and Avents Creek. Development is restricted in this district, but vegetation is required only on the first 30 feet from perennial streams inside the WS-IV watershed. Permitted uses in the Conservation District are bona fide farms, preserves, and passive recreation areas.

2) Water Supply Watershed Ordinances

Along with these buffer regulations, state and county watershed ordinances also limit development density in water supply watersheds. For this rule, distinction is usually made between Critical Areas, which are the areas immediately upstream of the water supply intake

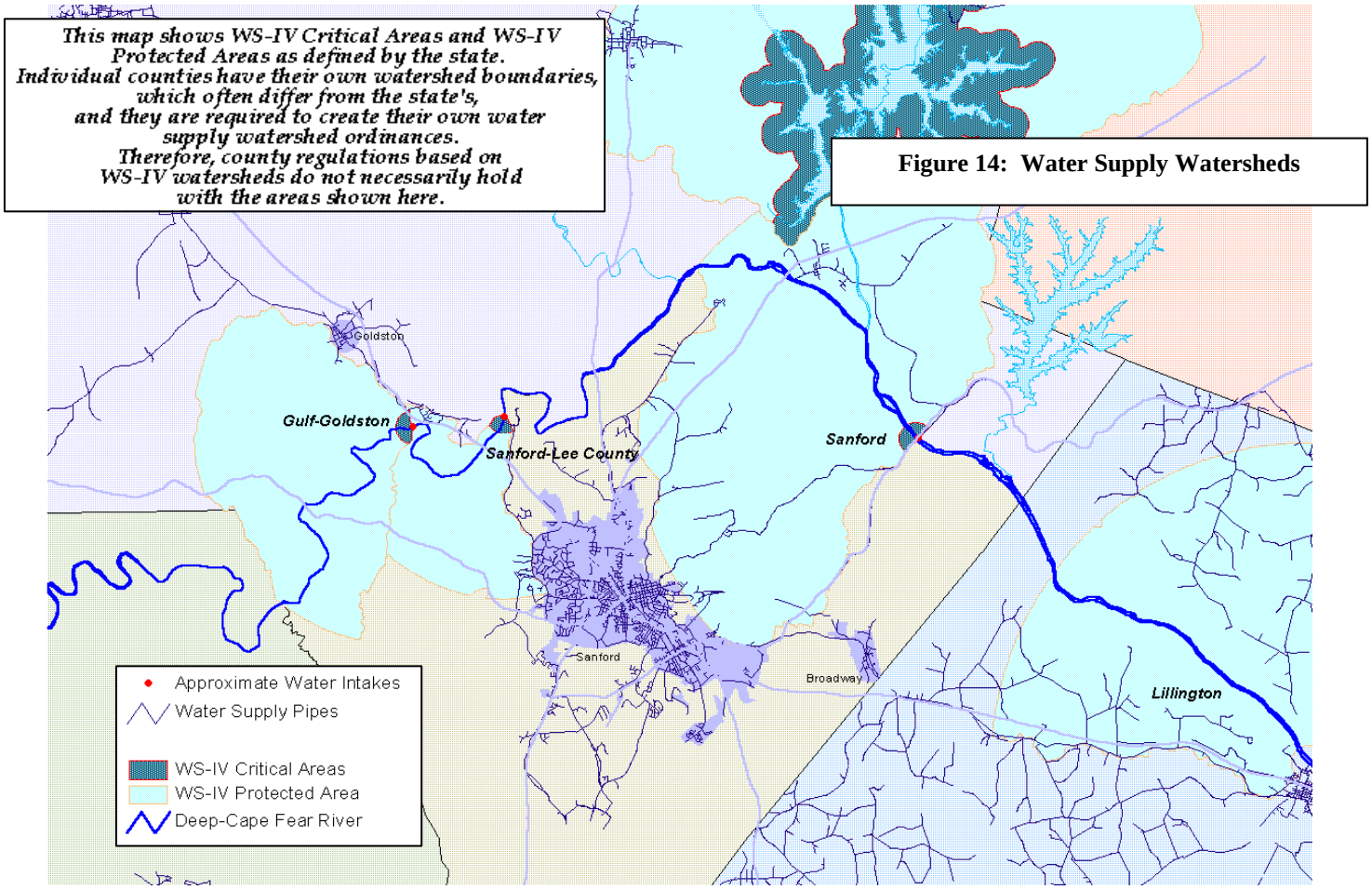

Figure 14: Water Supply Watersheds

point, and the Protected Areas, which are larger areas that stretch even farther upstream (Figure 14).

For the most part, the counties have modeled their water supply watershed ordinances after the requirements of the state. Typically they allow 24% to 36% built upon area in the Critical and Protected Areas, or, in some cases, up to 50% or 70% in the Protected Areas. Currently less than an estimated 5% of the surface area is built upon with impervious surfaces in the study area. A watershed that is developed with 12% or more built upon area will certainly suffer from degraded water quality due to urban run-off. For a complete summary of the water supply watershed ordinances, see Appendix F: Regulatory Mechanisms.

3) Zoning

Although it does have a separate zoning ordinance, Chatham County's toughest development restrictions are found within its watershed ordinance. Most of the county is actually unzoned. Moore County has zoned its portion of the river corridor RA, or Rural Agriculture, which indicates no minimum lot size requirement but restricts subdivisions to four lots or less. Most commercial and all industrial uses are prohibited.

Beyond the riparian Conservation District, Harnett has zoned most of the north and south sides of the Cape Fear River RA-30, which restricts industrial and commercial uses and requires a minimum area of 30,000 square feet per dwelling unit, or 25,000 square feet with public water and/or sewer. East of Hector Creek a small area is zoned RA-20R, which requires a minimum area of 20,000 square feet per dwelling unit, or 15,000 square feet with public water and/or sewer. South of the river along the western border is a small RA-40 district, which would limit lot size to 40,000 square feet, or 35,000 square feet with public water and/or sewer.

In Lee County, zoning has been designated mostly on a parcel-by-parcel basis, which makes for a complicated, random zoning pattern that is best illustrated on a map. Most of the land in Lee County in the Deep – Cape Fear River Corridor is zoned in a residential agricultural category, with industrial zones in Cumnock on the Gold Kist tracts, along 15-501 by the clay pits, and south of route 1. Along 421 there is a restricted residential zone, which is a more suburban area.

(See Map 7: Zoning and Watershed Ordinances. Also see Appendix F: Regulatory Mechanisms.)

4) Land Use Plans

In addition to the watershed and the zoning ordinances, Moore, Harnett, Lee, and Chatham Counties each have a land use plan, either in draft or finalized stages. The Lee County Land Use Plan designates a special Conservation Zone, measured about 5,000 feet from the river bank along the entire south side of the Deep – Cape Fear River and east of Little Governors Creek. This area is designated a minimum of three acres per lot, but because it is only a plan and not an ordinance, the minimum acreage is not a requirement. Denser development is beginning to occur, for example, along US 1. Figure 15 summarizes other relevant recommendations in each of the counties' plans.

H. Figure 15: Land Use Plan Recommendations
Lee County *(adopted May 1999)*
limit development in the 100- and 500-year floodplains
create a 100-foot minimum buffer from the riverbanks
create a 30-foot minimum buffer along all creeks and streams
promote the national registration of local historic sites
promote the adaptive reuse of historic sites
Chatham County *(from review draft)*
establish a county-wide open space, recreation, historic assets, and tourism master plan
adopt minimum open space set-aside standards for conventional subdivisons
consider establishing a county-wide sediment and erosion control ordinance
Harnett County *(adopted September 1999)*
provide cooperative extension programs that help farmers "gain a competitive edge"
do not permit the extension of urban services into farmland preservation areas
encourage the clustering of residential development in fringe farmland protection areas with the provision that the open area be active farmland
use subdivision regulations to require protected stream buffers on all perennial streams
require subdivisions to provide open space set-asides, or fees in lieu of
Moore County ***(drafted Dec. 1998, not yet adopted by Planning Board or Board of Commissioners)***
investigate transfer of development rights programs
develop an open space preservation policy
develop programs to assist farmers with sustainable agricultural activities
adopt zoning policies that protect prime agricultural and forestland from development
adopt policies that provide for low density residential development
in RA areas, require rezoning for major subdivisions
regulate stormwater management in developing areas
ensure best management practices are followed
investigate strategies to provide vegetated buffers along perennial streams
encourage the preparation of a master parks and recreation plan
consider an open space ordinance that encourages cluster zoning

III. Recommendations

Throughout history people have held high hopes for the natural resources of the Deep – Cape Fear River Corridor. These dreams of coal riches, a river trade route, and massive iron works all collapsed eventually, but a beautiful river has remained with a rich cultural and natural history. The river has the potential to be an exceptional resource for Moore, Lee, Chatham, and Harnett Counties. Today several industries remain profitable inside the corridor, such as clay mining, hydropower, water supply, agriculture, and timber. Meanwhile, the value of the river for wildlife and recreation has yet to be fully realized.

This report has identified and described seven attributes of the river corridor:

1. It is a water supply resource.
2. It is an aquatic habitat for rare fish and mussel species.
3. It has a vivid historical legacy.
4. It possesses great timber and agricultural lands.
5. It is terrestrial habitat for wildlife and rare plant species.
6. It is a recreational resource.
7. It is a beautiful, scenic area.

None of these attributes are completely protected to ensure their continued existence, and so far, few have been wholly actualized by the community. Now we offer a plan to take full - yet careful - advantage of the river's underutilized resources, and to secure their lasting existence and integrity. We suggest three main, broad strategies:

A. Protect and Improve Water Quality
B. Protect Land
C. Educate the Public

Improving and protecting water quality will preserve drinking water, while ensuring a safe habitat for the continued presence of the Cape Fear shiner, the Carolina redhorse,

and the many fresh-water mussel species in the river. Protecting land along the river is another way to protect and improve water quality, and such a strategy could also save agricultural and forestry lands, historic sites, terrestrial wildlife and botanic habitats, scenic landscapes, and recreation spots. Educating the community about the river - its history, resources, and features - will rally public support for the other preservation tactics and will increase voluntary participation in conservation programs. This common knowledge would also be a virtue in and of itself, bestowing the community with a sense of place, pride, identity, and heritage. Appreciation of the river would manifest itself easily in economic benefits, as well, including higher property values.

Our vision of this area in twenty years is a river that is still wild and beautiful, yet well-enjoyed by the public, protected and buffered by forest on both sides of the streambank. We predict that the Neuse River Buffer Rules will be extended to this river, mandating at least 50 feet of buffer, and we hope to see voluntary measures protecting an additional 350 feet, as well. This would enable a 400-foot buffer to function as wildlife habitat while protecting water quality.

We envision a river corridor that will remain in mostly private ownership, with a few key water quality, historic, scenic, natural, and recreational tracts in public hands, as well. We imagine the area as a popular recreation site for canoeing, kayaking, wading, hiking, bicycling, fishing, and hunting, and we hope that the river's historic legacy might also be well-preserved and taught. We hope that many of the current land uses will remain in the corridor, especially forestry and agriculture, able to sustain themselves profitably. Most of all, we hope that a combination of voluntary and regulatory measures will improve the river’s water quality so that in 20 years, it will remain a viable water supply and aquatic habitat for at least the number of endangered species it now holds. Here are the recommendations we suggest to fulfill this vision.

Strategy A: Protect and Improve Water Quality

In this stretch of the river, water quality problems are primarily due to point sources, non-point sources, and impoundments. Strategies to protect and improve water quality should address each of these problems individually.

1) Point Sources

In the 1996 Basinwide Plan, the Division of Water Quality made a number of specific recommendations that address point source pollution in our stretch of the river.

- On the Deep River above the Carbonton dam, the DWQ has recommended a more stringent limit on discharges from new and expanding facilities, and a regionalization wherever possible of wastewater treatment for smaller facilities.
- Beneath the Carbonton dam, and above the Haw River, the DWQ has recommended a moratorium on new NPDES permits.
- DWQ has also recommended total phosphorus limits for the major dischargers within the entire Deep River watershed.
- Specifically, the DWQ has advised a stricter limitation for discharges from the High Point Eastside WWTP, including a reduction in phosphorus. This facility has begun the recommended improvements.

2) Impoundments

Because impoundments can be so detrimental to water quality and aquatic species habitat, we recommend that DWQ list and prioritize all of the unused, unnecessary dams in the Deep River and remove them in order to increase water velocity, aeration, and dissolved oxygen levels in the river. For historic preservation, some remnants of the structures may be left at the original sites, as long as they do not impede water flow.

DWQ should also improve monitoring efforts of dams to ensure that the minimum release requirements are met.

3) Non-Point Sources

The State of North Carolina is considering the extension of the Neuse River Buffer Rule to all of the waterways in the state. In anticipation of that imminent legislation, we recommend that Moore, Harnett, Lee, and Chatham Counties strengthen and extend their own watershed ordinances to protect at least 50 vegetated feet [*] from both sides of the entire stretch of the Deep and Cape Fear Rivers, plus all of their tributaries and perennial streams. Counties should also investigate protecting an additional 2 feet of buffer per 1% slope grade, because run-off from steep slopes have a great impact on water quality. Slopes over 25% grade should not count towards the buffer width measurement.

Impervious surfaces, waste disposal sites, pesticide and fertilizer application, septic tank drain fields, livestock, agricultural fields, mining activities, clear cutting, and other types of major soil disturbance should be prohibited in this buffer area. Furthermore, while the Neuse River Rules allow for grandfathering, we recommend the reestablishment of vegetation in all areas within the 50 feet.

Besides the buffer mandate, some of the other Neuse River regulations could also be beneficial to water quality if extended to the Cape Fear Basin, especially the Agricultural and Stormwater Rules. In accordance with the Rules, we recommend extensive BMP requirements for all agricultural operations in the corridor, and BMP requirements for all timbering, mining, and construction activities as well. DWQ should continue investigating the implementation of BMPs on Cedar and Gulf Creeks to assess their effectiveness. We also recommend requiring stormwater management plans for all new

[*] Note: Although their vegetation requirements are not as extensive as the Neuse River Rules, Chatham and Harnett Counties go beyond 50 feet in their new development restrictions to protect as much as 100 feet in Chatham and 500 feet in Harnett. We do not recommend that Chatham and Harnett weaken their ordinances to equal 50 feet. Stronger rules are encouraged in order to better protect water quality, and in order to provide wildlife habitat in the corridor.

industries and developments adjacent to perennial waters. Existing developments and industries in these areas should be retrofitted with stormwater plans, whenever possible.

Finally, we recommend that Chatham's floodplain rule be extended to all counties, so that development is prohibited in the 100-year floodplain.

4) Ratings

In the 2000 Basinwide Water Quality Management Plan, many of the streams that were previously rated Impaired in the 1996 Basinwide Plan were Non Rated in this updated version. This will have a number of implications in the future because the public will have no way of knowing that these streams could still have serious water quality problems, despite their current unrated status. For example, streams that are rated Impaired are later included in the EPA's 303(d) list, a classification which promises future water quality management planning. Most of the streams in the study area that were listed Impaired in 1996 will not get this special attention because they were Non Rated this year, even though they may well have critical water quality problems that need to be addressed.

Therefore we recommend that the Division of Water Quality continue to work to develop new water quality tests that will be reliable during low-flow conditions. We also recommend that DWQ include McLendons, Big Governors, Indian, Cedar, Big Buffalo, and Little Buffalo Creeks onto the 303(d) List, despite their current Non Rated status. Big Buffalo Creek should be listed because it has shown a five-year decline from Good to Poor according to the Fish Community Structure test, which assesses a stream's biological integrity according to the structure and health of the fish community that it supports. Cedar Creek should also be included because it was rated Fair by the Fish Community test. Although not tested in 1998, McLendons, Indian, and Little Buffalo Creek should also be listed because of their Fair to Poor results from the 1993 benthos tests.

Strategy B: Protect Land

1) Water Quality

We have already recommended the protection of 50-foot buffers through regulatory mechanisms similar to the Neuse River Rules. Although this is the "politically standard" width for buffers in the State of North Carolina, it is not sufficient when steep slopes or wide floodplains extend beyond those 50 feet, as is often the case, and scientific analysis has determined that such a width would not be effective during a storm or flooding event.

The North Carolina Wildlife Resources Commission, for example, recommends a buffer width of 300 feet for water quality, and if the riparian area is expected to fulfill a meaningful wildlife habitat or recreation function, an even larger width is needed. Realistically, however, a mandatory buffer of anything over 50 feet might not be politically practical in this river corridor. Therefore, we recommend *voluntary* measures to protect an additional 350 feet of vegetated buffer on all perennial streams, to equal a total of 400 protected feet.

These voluntary measures could include stewardship practices by landowners, land and easement acquisition by governments and land trusts, or purchase of development rights programs. Counties should also consider tax incentives to reimburse landowners for voluntary buffer implementation. Other options include mandatory riparian open space set-asides for new developments, which should consist of at least 400 feet from the streambank, or cluster zoning options with even greater buffer requirements. We recommend that Lee, Chatham, Harnett, and Moore Counties explore all of these options.

We also recommend that the counties investigate the various funding possibilities for riparian land acquisition. Possibilities include bond referenda, impact fees for new developments, a dedicated sales tax, and grants from state programs, including the North Carolina Clean Water Management Trust Fund. These counties should work with the

Triangle Land Conservancy or consider hiring their own staff to acquire land and easements.

2) Historic and Natural

This document has identified the key historic and natural sites in the study area in Appendices C and D. Priority for protection should be placed on these tracts, which contain natural heritage or historic features.

3) Scenic

Some of the most scenic panoramas in the corridor are vistas from the road of green pastures and fields that allow open views of the rolling topography. Particularly scenic areas in the corridor include the open land surrounding House in the Horseshoe and the southward viewshed from Deep River Road in Lee County close to Blacknel. Conservation easements might be the best way to protect these areas to ensure that they remain in agricultural use.

4) Recreation

The recreational activities with the most potential in the area are probably canoeing and kayaking. We recommend that priority sites for land protection for public land acquisition should be the unofficial water access sites off of 15-501, 421, 1, and 42 at Carbonton beneath the dam. Possibilities for Moore County access sites should also be explored. Lee, Chatham, Harnett, and Moore Counties should work with TLC and the Deep River Park Association to identify and acquire land for future water access sites. In addition, Lee and Chatham Counties should work with the Deep River Park Association on their plans for the loop trail at Deep River Park. The counties should also continue to

support Triangle Rails to Trails in its work to identify, acquire, and convert abandoned rail corridors.

For cyclists and motorists, we recommend the development, implementation, and designation of the proposed Deep – Cape Fear River Scenic Route (See Map 8: Scenic Route). Our suggested route would stretch from House in the Horseshoe to the Lee Game Lands, winding through Moore, Lee, and Chatham Counties and passing numerous historic, natural, scenic, and recreation sites. The Scenic Route could double as a bike route and a designated NC Scenic Byway, though safety measures for cyclists, such as "share the road" signage, widened shoulders or separate lanes, must be explored. The Scenic Route could be a local tourist attraction and economic boost for many of the existing and potential businesses in the area. Priority for land protection should be given to adjacent tracts with significant features, since official designation of the Scenic Route does not offer any degree of protection beyond the value of recognition.

We recommend that Moore, Lee, and Chatham Counties work with the NC Department of Transportation and with local chambers of commerce to form a committee of interested citizens, cyclists, landowners, and other stakeholders to investigate the implementation and potential funding sources for the Deep – Cape Fear River Scenic Route.

5) Timber and Agriculture

Forest and agricultural landowners are struggling in this area as increasing land values drive up property and estate taxes. Timber and agricultural lands are an important part of the area's economy, and compared to the likely alternative -- residential development -- agricultural and forestry uses require fewer government services in exchange for taxes, and they have a lesser negative impact on water quality and wildlife habitat.

We recommend that North Carolina Forestry, county Cooperative Extension offices, and the Natural Resources Conservation Service continue to work with farmers and forest landowners to ensure that their products remain profitable within the current market. In addition, we recommend that local economic development corporations incorporate the development and promotion of agriculture and timber industries into the local economic development strategic plan.

We also recommend that local governments and land trusts, such as the Triangle Land Conservancy, work with landowners to plan their estates so that agricultural and timber uses may remain viable in the river corridor. Funding for a purchase of development rights program should be pursued.

Strategy C: Educate the Public

One of the greatest accomplishments of the Triangle Land Conservancy's 1999-2000 Deep River Campaign was the public outreach that happened through the campaign's various educational programs. These included historic tours, slide shows, guided hikes, and interpretive canoe trips, many of which were free to the public. We recommend that these programs continue because of all the benefits of public outreach. For example, most of our recommendations will require a critical mass of support in order to be implemented, and public education is the best way to gain it. In addition, many of the area landowners were reached through these outreach programs. We recommend that Triangle Land Conservancy, the Randolph Heritage Conservancy, and the Deep River Park Association partner together to conduct these educational programs.

More educational materials are needed to further the goal. Possibilities are a guidebook accompanying the Deep River Water Trail, historical markers at significant sites, and interpretive signs in protected natural areas. The Randolph Heritage Conservancy should strengthen its educational work in this stretch of the river and its efforts to officially designate the Deep River Heritage Corridor at the state and national levels. In addition,

the Deep – Cape Fear River Scenic Route, which could be a great educational tool, should be supplemented with a descriptive guidebook.

Landowner outreach, however, might be the most important educational program that could occur in the Deep – Cape Fear River Corridor. We recommend that TLC and the Natural Resources Conservation Service (NRCS) begin an extensive outreach program targeting landowners of riparian tracts. The focus of the NRCS efforts should be the application of best management practices, voluntary riparian buffers, and other restoration strategies.

TLC should continue its own outreach program, focusing on estate planning and other conservation strategies to keep land in agricultural and forestry uses. For example, TLC could hold a series of meetings for local landowners, also inviting landowners from other areas who have already saved their properties with the help of land trusts. The meetings might include a brief presentation on conservation options and their tax benefits. These get-togethers would provide opportunities for landowners to ask questions to the experts on hand.

IV. Implementation

Preservation of the Deep – Cape Fear River Corridor and all of its attributes will require action by the NC Division of Water Quality, local Cooperative Extension and Natural Resource Conservation Service offices, local economic development offices, and the Lee, Chatham, Moore, and Harnett Counties governments. In addition, local non-profits like the Triangle Land Conservancy, the Deep River Park Association, the Deep River Coalition, Triangle Rails to Trails, and the Randolph Heritage Conservancy, must work together to implement these common conservation goals. The list below itemizes our recommendations, reordered according to stakeholder.

A. NC Division of Water Quality

- list and prioritize all of the unused, unnecessary dams in the Deep River and remove them in order to improve water quality and aquatic species habitat
- better monitor the dams in the study area and upstream to High Point to ensure that the minimum release requirements are being met
- determine why the BMPs off the clay pits on Gulf and Cedar Creeks are not protecting water quality on the streams; enforce better practices so that the streams are protected
- develop a reliable water quality test for low-flow streams that will be dependable during dry periods
- include McLendons, Big Governors, Indian, Cedar, Big Buffalo, and Little Buffalo Creeks on the 303(d) List, based on Fish Community Structure tests and previous benthos tests

B. Lee, Chatham, Moore, and Harnett Counties

- partner to create a regional plan for the protection of the Deep – Cape Fear River Corridor and adopt the regional plan into respective county land use plans
- strengthen and extend watershed and zoning ordinances to protect at least 50 vegetated feet from both sides of the entire stretch of the Deep – Cape Fear River, plus all tributaries and perennial streams

- protect an additional 2 feet of buffer per 1% slope
- eliminate the grandfather clause from the Buffer Rule so that vegetation must be restored on the first 50 feet of buffer in all areas
- provide tax incentives for landowners who voluntarily implement buffers of 400 feet
- prohibit development in 100-year floodplains
- mandate best management practices for all agricultural, mining, construction, and timbering activities and animal factories adjacent to perennial and intermittent streams
- require stormwater management plans for all new developments and industries adjacent to perennial and intermittent waters, and retrofit stormwater management plans for existing developments and industries, wherever possible
- require buffer set-asides for all new developments adjacent to perennial and intermittent streams
- require wider riparian buffers for cluster developments adjacent to perennial and intermittent waters
- seek out funding sources for acquisition of buffer lands
- investigate the creation, implementation, and funding of a purchase of development rights program to protect riparian buffers
- work with Deep River Park Association to build the proposed truss bridge loop trail
- work with Triangle Rails to Trails to identify and acquire abandoned rail corridors for rail-trails
- work with the Triangle Land Conservancy on land acquisition projects and/or hire full-time land acquisition staff
- work with the NC Department of Transportation, local chambers of commerce, landowners, cyclists, and other interested citizens to investigate the implementation and potential funding sources for the Deep – Cape Fear River Scenic Route

- work with Triangle Land Conservancy and the Deep River Park Association to identify and protect water access sites along the river

D. North Carolina General Assembly

- increase funding for the NC Farmland Preservation Trust Fund, the Clean Water Management Trust Fund, the Parks and Recreation Trust Fund, and the Natural Heritage Trust Fund to protect land along the river
- designate the Deep River as a State Heritage Corridor

E. Triangle Land Conservancy

- outreach to landowners to permanently protect riparian buffers
- outreach to farmers and forest landowners to keep agricultural and timber lands in their existing uses
- partner with Randolph Heritage Conservancy, the Deep River Park Association, and local historical societies to organize educational programs, tours, hikes, water trips, etc.
- work with Lee, Chatham, Moore, and Harnett Counties and with the Deep River Park Association to identify and protect water access sites

F. Deep River Park Association

- partner with Triangle Land Conservancy and the Randolph Heritage Conservancy to organize educational programs, tours, hikes, water trips, etc.
- work with Lee, Chatham, Moore, and Harnett Counties and with the Triangle Land Conservancy to identify and protect water access sites
- work with the Randolph Heritage Conservancy to design and write a guidebook for the Deep River Water Trail

G. Deep River Coalition

- serve as citizen "watchdog group" to ensure the implementation of the Cape Fear Basinwide Plan

- lobby General Assembly, state agencies, and local governments to implement the recommendations from this report
- educate the community about water quality and other environmental issues as they arise

G. Randolph Heritage Conservancy

- partner with Triangle Land Conservancy and the Deep River Park Association to organize educational programs, tours, hikes, water trips, etc.
- work for official designation of the Deep River as a state and national Heritage Corridor
- work with the Deep River Park Association to design and write a guidebook for the Deep River Water Trail

H. Local Natural Resources Conservation Service and Cooperative Extension Offices

- work with farmers and forest land owners to keep their operations profitable within the current market
- outreach to landowners to revegetate riparian buffers and implement best management practices

I. Local Economic Development Corporations

- incorporate the development and promotion of agriculture and timber industries into the local economic development strategic plan

Appendix A: Listed Species in the Lower Deep – Upper Cape Fear Corridor

Animals

Species Name	Location	Fed Listing	State Listing	Status	Reason for Rarity
Triangle Floater (mussel) *Alasmidonta undulata*	Deep River – above and below reservoir at High Falls to US 1		T	G4/S1	pollution, habitat fragmentation due to impoundments
Brook Floater (mussel) *Alasmidonta varicosa*	Deep River – above and below reservoir at High Falls to US 1	FSC	T (PE)	G3/S1	pollution, habitat fragmentation due to impoundments
Roanoke Slabshell (mussel) *Elliptio roanokensis*	Deep River – above and below reservoir at High Falls to US 1 Cape Fear River to Fayetteville		T	G2/S1	pollution, habitat fragmentation due to impoundments
Atlantic Pigtoe (mussel) *Fusconaia masoni*	Probably extirpated (old shell found several years ago – no live specimens)	FSC	T (PE)	G2/S1	pollution, habitat fragmentation due to impoundments
Septima's Clubtail Dragonfly *Gomphus septima*	White Pines Promontory Deep River Harparella Bars East White Pine Slopes	FSC	SR	G2/S1	narrow habitat requirements, pollution, habitat loss due to impoundments
Yellow Lampmussel *Lampsilis cariosa*	Deep River Cape Fear	FSC	T (PE)	G3G4/S1	pollution, habitat fragmentation due to impoundments
Carolina Redhorse (fish) *Moxostoma sp 3*	Identified at four locations in study area	FSC	SR	G1G2/ S1S2	
Cape Fear Shiner (fish) *Notropis mekistocholas*	Deep River – Coleridge to US 1 Rocky River Bear Creek Haw River above Bynum and below Jordan Lake	E	E	G1/S1	Piedmont endemic, habitat fragmentation due to impoundments
Eastern Fox Squirrel *Sciurus niger*	Identified at one location in study area		SR	G5/S3	species is a game animal and therefore by law cannot be listed for state protection as endangered, threatened, or special concern
Creeper (mussel) *Strophitus undulates*	Deep River – above and below reservoir at High Falls to US 1		T	G5G4/ S2S3	pollution, habitat fragmentation due to impoundments
Gray Petaltail (dragonfly) *Tachopteryx thoreyi*	Identified at two locations in study area		SR	G4/S3?	
Notched Rainbow (mussel) *Villosa constricta*	Deep River – above and below reservoir at High Falls to US 1 Cape Fear (maybe) – one shell found at Raven Rock		SR (PSC)	G3G4/S3	pollution, habitat fragmentation due to impoundments

Plants

Species Name	Location	Fed Listing	State Listing	Status	Reason for Rarity
Douglass's Bittercress *Cardamine douglassii*	Cape Fear Slopes Below Fall Creek		SR	G5/S2	
James's Sedge *Carex jamesii*	Buckhorn Bluffs and Levees Deep River at US 1 (historically)		SR	G5/S1	
Piedmont Horsebalm *Collinsonia tuberosa*	Indian Creek Diabase Slope		C	G3G4/S1	
Creamy Tick Trefoil *Desmodium ochroleucum*	Identified in one location in study area		C	G2G3/S1?	
Leatherwood *Dirca palustris*	East White Pine Slopes				
Atlantic Isopyrum *Enemion biternatum*	Cape Fear Slopes Below Fall Creek East White Pine Slopes		SR	G5/S2	
Tall Boneset or Tall Thoroughwort *Eupatorium altissimum*	Carbonton Diabase Sill		W	G5/S2	narrow habitat requirements
Large Witch Alder *Fothergilla major*	White Pines Promontory		C	G3/S2	marginal from mountain habitat
Whiteroot Rush *Juncus brachycarpus*	Moncure Road Wetlands, South		W	G4G5/S2?	
A Liverwort *Lejeunea glaucescens var acrogyna*	Identified at one location in study area		C		this subspecies is of historical occurrence and has not been found in the past 20 years, but it is believed to be extant
Carolina Birdfoot Trefoil *Lotus helleri* (or *Lotus purshianus*)	Carbonton Diabase Sill	FSC	C	G3/S3	narrow habitat requirements
Ginseng *Panax quinquefolius*	Indian Creek Diabase Slope		W-SC	G4/S4	overexploitation
Buttercup Phacelia *Phacelia ranuculacea (*or *Phacelia covilei)*	Buckhorn Bluffs and Levees Cape Fear Slopes Below Fall Creek Cape Fear – Buckhorn Dam Bluffs Deep River Slopes Near Carbonton Cape Fear Game Lands Floodplain		C	G2?/S2	narrow habitat requirements, habitat loss due to impoundments
Indian Physic *Porteranthus stipulatus*	Deep River Mesic Slope		SR	G5/S2	
Wafer Ash *Ptelea trifoliata*	Carbonton Diabase Sill		W	G5/S2	narrow habitat requirements
Harparella *Ptilimnium nodosum*	Deep River Harparella Bars East White Pine Slopes	E	E	G2/S1	habitat loss due to impoundments
Southern Skullcap *Scutellaria australis*	Norfolk Southern – Cape Fear Mesic Slope (historically)		C	G?/S1	
Shale Barren Skullcap *Scutellaria leonardii*	Carbonton Diabase Sill		C	G4/S1	narrow habitat requirements
Virginia Spiderwort *Tradescantia virginiana*	Identified in one location in study area		SR	G5?/S1	

Key

Federal Listing	State Listings	Global Status	NC Status
E - Endangered	E - Endangered	G1 – 1 to 5 extant populations	S1 – 1 to 5 e.p.
T - Threatened	T - Threatened	G2 – 2 to 20 e.p.	S2 – 6 to 20 e.p.
C - Candidate	SC - Special Concern	G3 – 21 to 100 e.p.	S3 – 21 to 100 e.p.
FSC - Federal Species of Concern	C - Candidate	G4 – 100 to 1000 e.p.	S4 – 100 to 1000 e.p.
	SR - Significantly Rare	G5 – 1000+ e.p.	S% - 1000+ e.p
	W - Watch List		
	P - Proposed		

Appendix B: Regionally Rare Species in Lower Deep – Upper Cape Fear

Animals

Species Name	Location	Reason for Rarity
Velvet (or Sumo) Mite *Allothrombium* sp.	White Pines Promontory	marginal from mountain habitat
A Landsnail *Anguispira fergusoni*	White Pines Promontory	marginal from coastal habitat
Carolina Anoles *Anolis carolinensis*	White Pines Promontory Buckhorn Bluffs and Levees	marginal from coastal habitat
Southern Dusky Salamander *Desmognathus auriculatus*	LaGrange Diabase Bog	marginal from coastal habitat
River Otter *Lutra canadensis*	Buckhorn Bluffs and Levees	pollution, overexploitation
Wild Turkey *Meleagris gallopavo*	White Pines Promontory	overexploitation, habitat loss
Red-headed Woodpecker *Melanerpes erythrocephalus*	Buckhorn Bluffs and Levees	
A Landsnail *Mesomphix* sp.	White Pines Promontory Buckhorn Bluffs and Levees Indian Creek Diabase Slope	Ice Age relict
Red-backed Salamander *Plethodon cinereus*	White Pines Promontory	Ice Age relict

Plants

Species Name	Location	Reason for Rarity
Maidenhair Fern *Adiantum pedatum*	Indian Creek Diabase Slope White Pines Promontory	
Blue Star *Amsonia tabernaemontana*	Buckhorn Bluffs and Levees	
Three Awn Grass *Aristida virgata*	White Pines Promontory	marginal from coastal habitat
Yellow Oakleach *Aureolaria flava*	White Pines Promontory	
Hedge Bindweed *Calysetgia sepium*	White Pines Promontory	
Bluebells *Campanula americana*	Indian Creek Diabase Slope	Ice Age relict
Coastal Sweet Pepperbush *Clethra alnifolia*	LaGrange Diabase Bog	marginal from coastal habitat
Dutchman's Britches *Dicentra cucullaria*	White Pines Promontory Deep River Slopes Near Carbonton	Ice Age relict
Spikerush *Eleocharis tortilis*	LaGrange Diabase Bog	marginal from coastal habitat
Galax *Galax aphylla*	Big Buffalo Creek Galax Slope Indian Creek Diabase Slope	marginal from mountain habitat
Legget's Pin-Weed *Lechea leggettii*	White Pines Promontory	marginal from coastal habitat
Small Duckweed *Lemna perpusilla*	Deep River Harparella Bars White Pines Promontory	marginal from coastal habitat

Yellowseed Pimpernel *Lindernia dubia*	White Pines Promontory	
Stiff Cowbane *Oxypolis rigidior*	LaGrange Diabase Bog	marginal from coastal habitat
Longleaf Pine *Pinus palustris*	White Pines Promontory	habitat loss
White Pines *Pinus strobus*	White Pines Promontory East White Pine Slopes	Ice Age relict
Catawba Rhododendron *Rhododendron catawbiense*	White Pines Promontory	Ice Age relict
Sabatia brachiata	White Pines Promontory	marginal from coastal habitat
Sicyos angulatus	Deep River Harparella Bars White Pines Promontory	
Blaspheme Vine *Smilax laurifolia*	LaGrange Diabase Bog	marginal from coastal habitat
Valerianella radiata	White Pines Promontory	
Virginia Chain Fern *Woodwardia virginica*	LaGrange Diabase Bog	marginal from coastal habitat

Appendix C: Natural Heritage Sites in the Lower Deep – Upper Cape Fear

#	Site Name	County	Description	Listed Species	Ownership
01	White Pines Promontory	Chatham	promontories and steep bluffs, scenic vistas of river, public access and trails, abundance of wildlife, Ice Age relicts, montane and coastal marginal species	Septima's clubtail dragonfly large witch alder	part TLC owned, part privately owned
02	Deep River Harperella Bars	Chatham	gravel bar, shallow rocky section of river with island, alluvial forest and floodplain	harparella Cape Fear shiner Septima's clubtail dragonfly	part timber company, part privately owned
03	Buckhorn Bluffs and Levees	Chatham	steep bluffs, alluvial bottomlands, levee deposits, levee forests, floodplain	buttercup phacelia	NCWRC leased and managed as game lands
04	Indian Creek Diabase Slope	Chatham	diabase sill, steep north-facing slope	Piedmont horsebalm ginseng	part privately owned, part timber
05	LaGrange Diabase Bog	Chatham	diabase sill, hillside seepage bog, coastal marginal species		TLC owned
06	Cape Fear Game Lands Floodplain	Lee	floodplain, transition slopes to uplands, beaver impoundments, wetlands		part NCWRC leased and managed as game lands
07	Big Buffalo Creek Galax Slope	Lee	steep north-facing slope, small floodplain		privately owned
08	Deep River Slopes Near Carbonton	Lee	steep north-facing slope, spring ephemerals, narrow floodplain terrace at bottom of slope	buttercup phacelia	privately owned
09	Fall Creek Slopes	Lee	steep north-facing slope		
10	Cape Fear – Buckhorn Dam Bluff	Lee	extension of Buckhorn bluffs and levees area		
11	Cape Fear River Slopes Below Fall Creek	Lee	floodplain, east-facing slope, spring ephemerals	buttercup phacelia Atlantic isopyrum Douglass' bittercress	
12	Deep River at US 1	Lee	steep north-facing slope, rocky areas, ravines, rocky streambed, dam		mining company
13	East White Pine Slopes	Lee	extension of white pines area		part utilities company, part privately owned
14	Little Governors Creek Floodplain and Slopes	Lee	slopes, alluvial forest		privately owned
15	Deep River Corridor North of Little Governors Creek	Lee	alluvial forest, west-facing slope		part privately owned
16	Endor Furnace	Lee	historic tract, also flooplain and slopes		privately owned

17	County Line Deep River Slopes	Lee	rock outcrops, north-facing slope, alluvial forest, spring ephemerals		privately owned
18	Deep River Floodplain at US 421	Lee	alluvial forest, lots of wildlife		privately owned
19	Patterson Creek Beech Slopes	Lee	steep north-facing slope above floodplain		privately owned
20	Deep River Mesic Slope	Lee	steep north-facing slope	Indian physic	privately owned
21	Big Buffalo Creek Beech Slope	Lee	north-facing slope		privately owned
22	Moncure Road Wetlands, South	Lee	wetlands, swampy areas	whiteroot rush	
23	Moncure Road Wetlands, North	Lee	wetlands, swampy areas		
24	Norfolk – Southern Cape Fear Mesic Slope	Lee	east-facing slope, small floodplain		
25	Deep River Bend	Lee	steep west-facing slope, alluvial forest, floodplain, spring ephemerals		privately owned
26	McLendons Creek – Diabase Sill and Levees	Moore	diabase sill, meanders, old oxbows, levees		
27	Raven Rock State Park and Vicinity	Harnett	granitic flatrock habitat	many listed species but no inventory for area	North Carolina
28	Deep River Critical Aquatic Habitat	Lee, Chatham	river	Cape Fear shiner Carolina redhorse brook floater triangle floater Roanoke slabshell yellow lampmussel notched rainbow Atlantic pigtoe ?? squawfoot (or creeper)	
29	Carbonton Diabase Sill	Moore	diabase sill, rare plants	Carolina birdfoot trefoil shale barren skullcap wafer ash tall thoroughwart (or boneset)	
30	Gulf Diabase Forest	Chatham			investment company

Appendix D: Historic Sites in the Lower Deep – Upper Cape Fear

Brickhaven

Brickhaven is located in the southeastern corner of Chatham County, about four miles south of Moncure on Corinth Road. It is mostly an industrial area, historically a brick-making center.

Name	Status	Description
Cherokee Brick Company Tenant Houses		The Cherokee Brick Company built these two small brick houses between 1910 and 1920 to house its nonlocal workers. Both houses are now owned by a local farmer and used for residential and agricultural purposes.
Brickhaven School		This schoolhouse was constructed with brick from Cherokee Brick Company. It was the last school, and the only brick one, to be constructed in Chatham County's Cape Fear Township before the township schools were consolidated with Moncure's in 1929.
Ortis Cotten Farm		This small farm complex contains a circa 1910 house and several outbuildings, including an unusual brick potato house. The abundance of brick in the area explains the odd choice of building material.

Carbonton

The village of Carbonton is one of the earliest Deep River settlements, named by Mrs. Peter Evans for the element of carbon, a primary constituent of coal, which was thought to be present in the area. Mrs. Evans was the daughter of Governor John Motley Morehead and probably the wife of Peter Evans of Egypt. Irishman Connor Dowd may have been one of the first citizens of Carbonton, though as a Loyalist he was forced to abandon his property after the Revolutionary War. Before the war, however, he claimed to have owned over seven thousand acres of land, on which he grew corn, oats, wheat, and rye. Dowd also owned and operated an important merchant mill complex on the river, which included a grist mill, saw mill, bolting mill, tanyard, and distillery.

After Dowd, among Carbonton's earliest prominent families were the Tysons, the McBrydes, and the Harringtons. The town grew in the 1850s, when a plank road was built connecting the area to Gulf. Today Carbonton remains a small village in Chatham and Lee Counties. Historic residences include the George Tally House and the Roberts House.

Name	Status	Description
Tyson House		The Tyson House stands in the center of the historic village of Carbonton in Lee County. It was built circa 1800 by either Cornelius Tyson, Sr. or his son Aaron. Aaron Tyson co-managed a store in town, described in 1800 as "one of the most public places in the county," with partners Archibald McBryde and Murdock McKenzie. He also acquired the Connor Dowd Mill in Carbonton in 1791 with his brother Benjamin.

McBryde – Willcox House		This property originally belonged to Connor Dowd, the early mill owner and operator in Carbonton. Archibald McBryde, a partner with Aaron Tyson in the Carbonton store, acquired it in 1800 and built the house shortly thereafter, possibly on the same site as the Dowd house. Archibald McBryde later served as county clerk of court, US congressman, and state senator. His family migrated to Tennessee after his death, and his gravestone stands in the nearby Farrar Cemetery. Later owners included Confederate Captain George Willcox, a local leader in the Farmers Alliance and representative in the NC State Legislature; and Joseph Martin Willcox, a Lee County commissioner.
Carbonton Academy Dormitory		Built in 1853-1854, this Greek revival building was a girls' dormitory for the Carbonton Academy, established by Cyrus Harrington, operating from 1854-1877. The property was later converted to a mill by George Cole.
Sand Hill Power Company Hydroelectric Plant	SL	"This 1920s hydroelectric plant occupies a mill seat near Carbonton on the Deep River that was first utilized in the mid-1700s. The power plant itself is a utilitarian brick building that stands on tall concrete piers above a set of sluice gates. The dam is concrete." *information provided by the NC Dept of Cultural Resources, Survey and Planning Branch*
Walter and Beulah Gilliam House and Store		Alex McIver sold this property to the Gilliams, on which they built the frame house and store circa 1899. The store served as a voting place for most of the 1900s.

Corinth / Buckhorn

The Corinth / Buckhorn area lies north of the Cape Fear River around the current site of Buckhorn Dam. Two of the earliest families to settle here were the Buchanans and the Avents. In the mid to late 1700s, at the present site of the NC 42 crossing, several different ferries operated to transport people and goods across the river. Henry Braswell, for example, started his ferry service in 1761, and John Avent began his in 1779. In the 1800s the area was mined for iron, some of which remained in Buckhorn to be blasted at the nearby furnaces, some of which was shipped up river to the Endor Furnace near Cumnock. Coal was also excavated in the Buckhorn area.

At Buckhorn Falls the Cape Fear and Deep River Navigation Company built a system of canal, locks, and dams in the 1850s and 60s, and in 1908 CP&L completed a hydroelectric plant at the site. This development, along with the nearby railroad activities, began to spur growth in the area, and today the electric industry remains one of the primary activities. Some of the historic residences that survive in the Corinth / Buckhorn area include the Thomas Ausley, Willie Davis Ragland, Denton Cross, Thomas Fred Cross, Palmer, and Smith Houses.

Name	Status	Description
John Cotten Farm, Reece Cotten Farm		The Cotten family has owned this property since 1791, but the surviving main residence dates from the mid-1800s, built by John Wesley Cotten, a well-known Methodist minister. At some point the area around the farm became known as Truth, NC, complete with a post office run by Susie Cotten, and the Truth School, which operated until 1929. The post office/store, barn, and family cemetery remain on the site. Another Cotten dwelling in the Corinth vicinity is the Reece Cotten House, which was built between 1916 and 1918 and remains today in Cotten hands.

John H. Lawrence House, Lawrence School		John Hinton Lawrence built this late Greek Revival coastal cottage circa 1870, in addition to the nearby Lawrence School, circa 1885, which closed in 1919. Today both buildings are vacant and dilapidated.
Corinth School		Following the shut-down of the Lawrence School in 1919, the Corinth School was built in 1921 as the replacement. This building operated only until 1929, however, at which point the Cape Fear Township school system consolidated with Moncure's. The former Corinth schoolhouse has been remodeled into a residence.
Buckhorn Plant Ruins	SL	Close to the current day site of the Buckhorn dam, Buckhorn Falls on the Cape Fear River was the location of a number of efforts in the early 1900s to build a hydroelectric plant to power Fayetteville. The Cape Fear Power Company was the first to make this attempt, building an earthwork dam in 1900-1905. In 1908 the company merged with two others to form Carolina Power and Light (CP&L), and this new conglomerate completed the project. The plant closed upon the opening of a much larger Cape Fear power plant nearby. Two deserted cement buildings, sections of the dam, and a dilapidated two-story house now mark the old site.

Cumnock / Egypt

Cumnock was originally known as Egypt, named when a local farmer came to Peter Evans' plantation during a time of drought to buy corn, just as the ancient Israelites came to the Pharaoh for food during the droughts of earlier centuries in the country of Egypt. In Egypt, North Carolina, Evans' plantation was the center of town through the early 1800s, but by the 1850s the community's attention had shifted almost entirely to coal. This resource was mined intermittently in Egypt from before the Civil War into the early 1900s. Throughout those years, several deadly accidents plagued the mines. One infamous explosion in 1895 killed over 40 miners, a disaster that supposedly tarnished the Egypt name so badly that owners decided to rename the area Cumnock. Throughout its existence a boom and bust cycle characterized the coal industry in Egypt, and today coal is not actively mined here at all. The major industry now is a Gold Kist poultry factory.

There are several rumors as to the origin of the name Cumnock. Some sources say it was named after an official of the mine. Others say the local post office was named Cumnock because it was poorly staffed, and you had to "come knock" if you wanted to get your mail. The most likely explanation is that the town was named for Cumnock, Scotland, a small mining burgh in the district of Cumnock and Doon Valley in the Strathclyde Region. Many of the early settlers in the area were Scottish, and perhaps some of the miners were imported coolie laborers from Cumnock, Scotland.

Name	Status	Description
Evans House (or N. H. Perry House), Cumnock Post Office		Peter Evans owned over 1000 acres in the Egypt vicinity and was one of the area's largest landowners. This house, built circa 1840, was probably occupied by the Evans family, serving as the seat of the Evans' Egypt Plantation and a center for the community. Peter Evans also owned a store in town, the materials of which were used to build the Cumnock Post Office, which is unused but still standing today. Evans was the namesake for the Evans Bridge, which spanned the Deep River in the 1800s close to the current day site of the Camelback Truss Bridge.

Egypt Big House (or Samuel and Katherine Henszey House)		This Greek Revival structure was built circa 1865 and served as a Confederate hospital after a battle near Fayetteville. During the late 1800s, it was occupied by Samuel Henszey, who was manager of the Egypt Coal Company after reopening it in 1888. This was after it had been closed for almost 20 years after the closing of the nearby Western Railroad station in the early 1870s. Upon the reopening, Henszey built a short line to Colon to connect Egypt to the Raleigh and Augusta Railroad, hence reintroducing the village to prosperity.
Cumnock Methodist Church		The Cumnock Methodist Church was organized in 1886 and built circa 1890 on the west side of Cumnock Road. In 1914 the building was moved to its present location. Several religious denominations have used the church building throughout its existence, including the original Congregational Christians, a group of Quakers, and the present Methodists.
St. Paul A.M.E. Zion Church		The congregation of this African Methodist Episcopal Church was formed after the Civil War, mostly by freed slaves who had worked on plantations in the area. In 1880 the trustees were granted a one-acre parcel south of the Egypt property to build the church, which was completed circa 1890.
Mike Atkins House	SL	The original owner of this 1908 house was Mike Atkins, a former slave turned brickmason who helped construct many of the buildings in downtown Sanford. The daffodils and hyacinths in the front yard are the original plantings from 1908. The house remains in the Atkins family today.
Palmer Farm, Bethlehem Methodist Church and Cemetery		The original section of the Palmer House dates from the 1800s or even the 1760s, when the farm was owned by John Thompson, a business partner of John Willcox, who eventually resold it to Robert William Palmer. The property includes the Palmer family cemetery, and it remains in the family's hands today. The Bethlehem Methodist Church was built in 1882 by Oroon Palmer, Sr. The church's congregation was formed in the same year.
Endor Iron Furnace	NR	During and after the Civil War, iron ore that was mined in Buckhorn was blasted in either the furnaces at Buckhorn or in the Endor Iron Furnace in the Cumnock vicinity. The Endor Iron Company was formed to supply iron to the Confederate Navy, though it is unclear how much iron the furnace actually produced during this time. After the war the furnace changed hands four times and continued operating until 1873, when the iron ore ran out in Buckhorn. Since then the furnace has been abandoned, though it still stands today, just a few feet from the Deep River, 35 feet tall.
Scotch Ever McIver Cemetery	SL	McIver is one of the most common last names in Deep River history, and the Scotch Ever McIver Cemetery, south of Cotten Road, is where many of the earliest McIvers were buried. The oldest legible gravestones here date back to the late 1790s, when the McIver family first emigrated to NC from the Isle of Skye.
Deep River Camelback Truss Bridge	NR	This metal truss bridge, built circa 1908, once spanned Neals Creek near Lillinton in Harnett County. After a partial collapse in 1930, John H. Kennedy convinced the State to move it to Cumnock to replace a wooden bridge that had burned down there in the late 1920s, itself a replacement of the aforementioned Evans bridge. In the 1990s a concrete span was built nextdoor, and today the Truss Bridge is closed to cars and preserved by the Deep River Park Association. The two other historic metal truss bridges in the study area were built for railroads; one crosses the river just shortly upstream, and the other

		spans the Cape Fear River at McKay Island.

Deep River Road Area

The area around Deep River Road includes historic properties associated with several different periods and communities. Blacknel is an African-American community that formed on Deep River Road close to the Haw and Deep River confluence in Lee County after the Civil War. Probably many of the original Blacknel residents were freed slaves from the Elias Bryan Plantation. The Blacknall Chapel AME Zion Church marks the center of the Blacknel area.

Also close to Deep River Road is the community of Osgood, which formed around the Clegg Copper Mine at the head of Copper Mine Creek. Most of Osgood, including the offices, worker houses, and subscription school, was built by the Southern Copper Company in the 1870s, but unfortunately none of these structures remain today. Two residences survive on Deep River Road, however, that were associated with the ownership of the mines.

Colon is another community in the approximate Deep River Road area. Colon's history began in the 1920s at the junction of the Norfolk Southern and Seaboard rail lines, and today it remains an important brick-making area.

Other historic structures on or close to Deep River Road is the circa 1860 Patishall-Wicker House, the Culver Wicker Farm, the old Clarence Womble Store, and the James F. Womble House. Early cemeteries include the Jones Chapel United Methodist Church Cemetery and the small, enclosed Carloss Cemetery (SL) off Farrell Road, just south of the river.

Name	Status	Description
Stokes Bryan Plantation		Up until recently, this house was the oldest dwelling in Lee County, but a fire in the 1980s burnt it to the ground, leaving only two chimneys behind. The original owner, Thomas Stokes, was a partner of Col. Ambrose Ramsey's; he was also the 4th largest slaveholder in Lee County. The next owner, Elias Bryan, was the 1st largest land and slave owner in the county.
Bridges House		The Bridges were the owners of property at the head of Copper Mine Creek, where a copper mine operated in the early 1900s. The original log core of the house was constructed circa 1895, and the Bridges' children made the additions in the early 1900s. The Bridges also were the owners of the Deep River School property before the county purchased it in 1923.
Farrish Lambeth House	SL	The original owner of this 1852 house was John Farrish, who owned a store across the river in Lockville and was involved in copper and coal mining. The next owner, Alfred Lambeth, was also involved in copper mining, and he served as a Chatham County Commissioner from 1888 to 1894. The house remains in the Lambeth family today.
Obediah Farrar House	NR	Obediah and Sally Farrar built this house circa 1850 just south of the old Haywood Road, which bridged the Deep River a short distance to the east. After Farrar ownership the house was rented to tenants until 1943, when Paul Barringer, Sr., acquired the property. The house remains in the Barringer family's hands today.
Deep River School	SL	In 1923 the county purchased the property for the Deep River School from the Bridges family, and by 1924 the building was complete. Laboratories were built in 1933, and federal relief monies funded the construction of a gymnasium in 1934.

Colon Brick Plants		In the 1920s four separate brick-making companies were active in approximately the same location in Colon: the Sanford Brick and Tile Company; the Shale Brick Company; the Little Plant; and the Wayne County Plant. The latter two were owned by Lewis Calvin Isenhour, who had a terrible reputation for labor practices. The Wayne County Plant, for example, was so named by an ex-convict worker who claimed that working for the plant was harder than working on the Wayne County chain gang. In the 1930s Isenhour bought out his competitors and adopted the name "Sanford Brick and Tile". The Cherokee Sanford Group grew out of this company. Today the Colon area is a mix of clay pits, active buildings, and ruins from the various old complexes. One beehive kiln remains of the three dozen or so that were once active in the 1920s, in addition to several mixing and grinding mills, office buildings, a railroad depot, a company store, and a post office.

Farmville

This community grew up around the Coal Glen Mine, which was operational in the 1920s and again in the late 1940s and early 50s. In 1925 an explosion and cave-in took the lives of over 50 miners; it was the worst, but far from the only, recorded accident in the history of the Deep River Coal Field. Today agriculture and forestry are the main industries in Farmville.

Name	Status	Description
Farmville Community Church		In 1922 the Farmville Union Church was founded to serve the coal miners and farm families in the Farmville Community. In 1925 the church converted to Presbyterianism, and today it is nondenominational and open only on an irregular basis. The current church building is a former schoolhouse; the congregation moved here in 1937 from a nearby structure.

Frank Seagroves House		This board-and-batten house was built by Frank Seagroves in 1880 but was first occupied by the Barley family. It is located close to the old Farmville coal mines and is probably similar in structure to the dwellings of many of the resident miners, which were clustered in the area during the 1920s at the peak of local coal production. After the 1925 explosion, however, many of the old miners' homes were destroyed.
Thomas William Seagroves and Richard Seagroves Houses		This circa 1885 house was the residence of Thomas William Seagroves, a prominent Farmville farmer who owned 500 acres of land and ran a cotton gin for the community. The circa 1900 Richard Seagroves House is nearby, which remains in the Seagroves family today.

Gorgas

There is not much documentation of Gorgas, or the "Gorge", a small black farming community north of the Deep and just east of the Rocky River, although it was one of the earliest settlements in Chatham

County. The Lees and the Bryants were prominent early families in the area. The John Robert Bright House, circa 1895, lies close to Gorgas but is not historically associated with the community.

Name	Status	Description
Bridges Bryant House		In 1916 Gade and Maude Lee Bryant acquired this 19th Century log house and greatly enlarged and altered it to its present condition. The Bryants were engaged in dairying, tobacco farming, and cucumber production, and the barn north of the house served as a weighing station for area cucumber growers.
Levander and Bessie Lee House		This colonial revival house was built circa 1925 by Levander and Bessie Lee, well-established farmers in the area, who grew cotton and subsistence crops. Outbuildings include a log smokehouse, a barn, and a well.
Thomas Lee House		Thomas Lee built the first floor of this house in 1917 and added the second floor in the 1940s, apparently reusing materials from a much earlier structure. There is also one outbuilding on the complex.

Gulf

Originally spelled Gulph, this settlement was named after an unusually deep portion of the river that lay between several shallows close to the settlement, dubbed The Gulf by the passing boaters. The town's history includes the nearby iron works of John Willcox, the early Willcox coal mine, several later coal operations up until the 1950s, and the current day clay mining activities. Gulf's early popularity can be attributed to the two plank roads that connected the village to outer markets, the railroad lines running through town, and, of course, its proximity to the river. In the mid-1800s the Cape Fear and Deep River Navigation Company attempted to build a lock and dam on the river near Gulf, utilizing Haughton's mill dam at the same site. In the end the entire dam was probably rebuilt, but the navigation works at Gulf and the other upstream points were eventually abandoned as focus turned to connecting Egypt to Buckhorn and Fayetteville.

Prominent families of the Gulf area included the Haughtons, the McIvers, the Palmers, the Russells, and the Jordans, many of whom congregated at the Gulf Presbyterian Church and the Gulf Masonic Lodge. Today the center of Gulf lies along J.R. Moore Store Road, named for the 1920s brick grocery store and gas station. Beautiful large, historic residences remain throughout the village.

Name	Status	Description
Haughton-McIver House	NR	The Haughton-McIver House is a Greek Revival structure built circa 1850 by Lawrence J. Haughton, a planter and one of the incorporators of the Gulf and Graham Plank Road. The building was probably originally built as a hotel at its prime location on the Cameron and Gulf Plank Road. In 1871 the hotel was sold to J. M. McIver, director of the Bank of Fayetteville and vice president of the Columbia Manufacturing Company and the Elmira Cotton Mills. McIver also operated one of the largest general stores in Chatham County, and he established the Gulf Mills, the first modern roller mill in the county.
Gulf Presbyterian Church		The congregation for this church was organized circa 1882, and the building itself was built in the same year. Many of the wealthiest Gulf citizens were members, including Dr. Palmer, Ruth Russell, and J. M. McIver.

Dr. Robert W. Palmer House		Dr. Robert William Palmer, not to be confused with Robert William Palmer of Cumnock of an earlier generation, was a prominent Gulf farmer in the late 1800s and early 1900s and the owner and builder of this 1903 Colonial Revival Queen Anne house. He was also a physician, assuming his father's medical practice, and the owner and operator of a drugstore. Dr. Palmer served on the county board of health in 1911.
McRae Hotel		The McRae Hotel was built circa 1890 by the original owner and operator, Colonel McRae, a Civil War veteran and depot agent. The building stood near the intersection of the former Cape Fear and Yadkin Valley Railroad line and the old Norfolk and Southern line, a location that behooved the business since many customers were layovers between the two rail services.
Gulf Masonic Lodge Number 465		The Gulf Masonic Lodge was chartered in 1895 and built on a deed of land granted by J. M. McIver. Dr. Palmer was elected the first junior warden; Marion Jasper Jordan was another charter member. The first floor of the lodge accommodated the town's post office, while lodge activities were based on the second floor. The masonic lodge was the hub of town activities during Gulf's heydey at the turn-of-the-century, but by 1927, after Gulf's bustle had begun to slow down, the lodge was consolidated with Goldston. The building has since been renovated for residential use.
Marion Jasper Jordan Farm	NR	This 1893 Victorian house with Queen Anne additions and an all-wood interior was the residence of forester and entrepreneur, Marion Jasper Jordan, and teacher and interior designer, Lydia Jordan. M. J. Jordan leased a private spur of the Norfolk and Southern Railroad that connected to his property for his lumber business.
Joe Beal House		This home was reportedly built circa 1900 for the local Presbyterian minister. Joseph Beal acquired the property in 1920 and it remains in the Beal family today.

Haywood

This community at the fork of the Haw and Deep Rivers was Chatham County's second town, incorporated in 1796 with the name of Lyons, which was changed to Haywoodsborough in 1797, and then to just Haywood in 1800. 1796 was also the year of the formation of the Cape Fear Navigation Company, and Haywood was supposed to the upper base of its operations. But the town's history goes back even further; in 1788 it was one of the localities nominated for the location of the State Capitol. Of course the State Capitol never went to Haywood, and the Cape Fear Navigation Company went bust by 1834. But the well-respected Haywood Academy in the same town was incorporated in 1818 and continued until after the Civil War. After the nearby town of Moncure began to develop, however, at the Raleigh and Augusta Railroad station, Haywood declined into its present quiet state.

Today Haywood is a predominantly African-American community; examples of historic black residences include the circa 1915 Samuel Crump House, the circa 1900 Carrie and Lyn Britt House, and the circa 1925 Nin Britt House. Most of Haywood's historic homes are grouped around a loop road that circles around the village center, the Haywood Presbyterian Church. Other historic structures outside the loop are the "Doc" Burns House, the Burns-Bland House, the Solomon Worley House, and the Peggy Thomas House.

Name	Status	Description
Haywood Presbyterian Church	SL	This ecclesiastical Greek Revival church was built in 1859 under the

		leadership of the prominent local families of Haywood, including the Bryans, the Faucettes, and the Scotts. Today it is an Independent Bible Church, with a congregation of about 12. The building is now the only remaining church of its type in Chatham County.
John Thomas House, Lucy and Eugene Walden House		Located across the street from the Haywood church, this Victorian house and parsonage was acquired and renovated in the early 1900s by John Thomas. Thomas was a deacon for the church and a storeowner, and he also ran an undertaking business with his brother Eugene Walden. The Walden House is situated prominently on the road leading into Haywood.
Toomer House		The Toomer House, so named by local tradition, was once a school for black children before converting into a church and then into a residential dwelling. Though it was not a Rosenwald School, it may have been connected to St. Bartholomew's Episcopal Church in Pittsboro, which led a mission at the time in Haywood. South of the house a mysterious, simple grave bears the name "Howard".
Dorey Thomas House, Ison Albright House		Allen Atkins was a black brickmason and carpenter who crafted a number of sandstone chimneys in the Haywood area. One example is the chimney of the Dorey Thomas House, a late 1800s home that once served as a school. Atkins lived on Branson Street in Haywood, close to the circa 1920 Ison Albright House, which was the property of his nephew's. Two nearby chimneys, one of which was built by Atkins, indicate that Branson Street was once the location of several other residences.
Mermaid Point		Mermaid Point is at the confluence of the Haw and Deep Rivers, about one and a half miles below Haywood. The legend of Mermaid Point is that long ago, mermaids would travel from the Atlantic up the Cape Fear River to the point to soak in the sun, wash the sea salt from their hair, and sing songs on the white sands. Travelers of the past would swear that they heard the mermaids singing as they passed through the area.

House in the Horseshoe Area

These mostly unrelated sites are located close to House in the Horseshoe in Moore County.

Name	Status	Description
House in the Horseshoe	NR	The House in the Horseshoe was built circa 1773 and was home to some of the most important political figures in the state. Philip Alston, distinguished as state senator, lieutenant colonel in the state militia, and justice of the peace, was the house's original builder. Despite these lofty appointments, Alston had a terrible reputation of a two-time murderer and general scoundrel. His brother, Joseph Alston, was the largest landowner in Chatham County with 40,000 acres to his name. During this time the house was the site of a Revolutionary skirmish in which a group of Tories led by David Fanning attacked P. Alston at his house, leaving several bullet holes in the walls, which remain to this day. After several casualties on both sides, Alston surrendered. The next resident of the property was Thomas H. Perkins, who bought the house in 1790 as the largest slaveholder in Moore County. He was also a member of the House of Commons. In 1798 Perkins sold the plantation to Governor Benjamin Williams, who owned the place until his death in 1814. Williams was a colonel under George

		Washington, president of the first Board of Trustees of the University of North Carolina, a member of the Third Congress in Philadelphia, and governor of North Carolina for four terms. After several more owners, the State acquired in the property in 1955. House in the Horseshoe is a State Historic Landmark and one of the most scenic places in the river corridor.
Euphronia Presbyterian Church and Cemetery	NR	This church's congregation was formed in 1814, but the church building itself was not built until 1885-1886. In the earliest years the clergy preached in both Gaelic and English, a fact which reflects the early demographics of the area. "Euphron" is Greek for harmony of mind and body.
Little Governors Creek Millstone Quarry	SL	"This millstone quarry was worked around 1900 and is located at an outcrop of conglomerate rock on the east bank of Little Governors Creek, near where it flows into the Deep River. Scattered around the quarry are millstones measuring approximately 4 feet in diameter and in varying states of completion. Also at the site are fragments of metal machinery, one bearing an 1883 patent date." *information provided by the NC Dept of Cultural Resources, Survey and Planning Branch*

Lett-Douglas Rural Historic District (SL)

This area in eastern Lee County, west of the Cape Fear River, has mostly an agricultural history. The area is on the study list for the National Register as a rural historic district, but the nomination has never been pursued, and little written information can be found about it.

Name	Status	Description
Douglas Lett House		Archibald Douglas was the original owner of this circa 1815 coastal cottage, but Andrew Lett, who operated a mill at nearby Lett's Landing on the river, acquired the property in 1853. The Douglas family and slave cemeteries are close to the house.
Memphis Methodist Church	SL	Organized in 1813, the Memphis Methodist Church has the oldest Methodist congregation in Lee County. Originally housed in a log chapel that stood close to the church's current site, the congregation moved to the present building after local farmer Archibald Yarborough donated the land circa 1875.
Burns Farm	SL	Though dilapidated today, the architecture of the Burns House makes it one of Lee County's most curious dwellings. It is a vernacular interpretation of a standard Queen Anne cottage, built circa 1900 by Patrick and Isabelle Burns to replace an earlier house that stood a short distance to the south. In front of the house, the Burnses operated a commissary; during the Great Depression customers would perform odd jobs on the farm in exchange for supplies.

Lockville

Lockville has been the site of a variety of river works throughout history. Colonel Ambrose Ramsey had a grist mill and tavern at this site at the time of the Revolutionary War, which Lord Cornwallis and his troops visited in 1781 during a trek from the Guilford Courthouse to Cross Creek (Fayetteville). The James A. Parham house, circa 1840, now stands at the Ramsey site. In 1894 John Barringer owned and

operated a three-story brick roller mill here until just before 1900. It utilized two 14-foot waterwheels, which were powered by the river, to grind flour. The mill was destroyed in 1915.

While the falls at Lockville were a boon to these two particular men, they were an impediment to many others. Pullen's Falls, as the falls in Lockville were once called, have historically been one of the greatest obstacles to navigation on the Deep River. By 1810 early navigational companies had cut a considerable canal through the area, but it was not until the mid 1800s that a complete lock, dam, and canal system was fully operational under the Cape Fear and Deep River Navigation Company. This activity spurred the town's growth for the first time since Ramsey's Mill, and a Raleigh and Augusta Air-Line Railway terminus that was built in 1870 further propelled development. When the rail station moved to nearby Moncure, however, and the navigation company failed, Lockville once again because a small, quiet town.

Name	Status	Description
Lockville Dam, Canal, and Powerhouse	NR	The Cape Fear and Deep River Navigation Company began work in Lockville in 1852, building a lock, dam, and canal system that was instrumental in the transport in coal and iron up and down the river until after the Civil War. Flooding, poor engineering, and financial difficulties plagued the company until its demise in 1873, and the Lockville navigation system changed hands several times. In 1922 the Moncure Manufacturing Company converted the Lockville site into a hydroelectric power facility, building the plant inside the stone crib of the old lock system. By the 1960s, however, the plant's technology had become obsolete, and it has since been sold.

Moncure

Moncure was founded in 1871 at the location of a railroad depot and switching yard; the town was named for the railroad engineer who selected the site for these facilities. Moncure grew up around the railroad; Pittsboro Street, for example, the town's main commercial drag, runs north and south and ends at the railroad tracks. Pittsboro Street is the site of the former white post office building, the former bank brick, the former drug and general stores, a former funeral home, and a small frame house that once housed migrant railroad workers.

Jones Street is another main street in town, with mostly residential structures occupied by railroad workers and their families. Jones Street is also the site for a former gas station, garage, and store built in the 1920s and owned by Sam Crutchfield. There are many significant historic residences in Moncure, including the Bryant-Davenport House, the 1919 Charles Thomas House, the circa 1917 Ben Moore House, the 1915 Lasater-Whatley House, the Bob Council House, the Charlie Poe House, and the turn-of-the-century John Bell House. Historic structures outside Moncure but in the vicinity are the 1905 Bob Ray House and the 1860 Harris-Headen House.

Name	Status	Description
John H. Wissler House	SL	Circa 1880 this unique residence was built for John H. Wissler, an agent for the Lobdell Car Wheel Company who was reportedly instrumental in naming the town of Moncure. He was a prominent citizen and a large landowner, mostly through the holdings of his wife, Minnie Jones, who donated the land on which the depot in town was built.

Dr. Patrick Lassiter House		Dr. Patrick Lassiter built this vernacular Greek Revival house outside of Moncure and Lockville just after the Civil War. From here he practiced medicine during the late 1800s and early 1900s for the Lockville and Moncure communities. In 1905 the Cape Fear Power Company built an earthwork dam at Buckhorn that eliminated many of the malaria-causing stagnant pools in the river. Dr. Lassiter reportedly claimed at this time, "Dam dam has plumb ruined my practice down here."
Lassiter-Foushee House		The ell of the Lassiter-Foushee house is reportedly a 1900 schoolhouse, which was moved onto this site by previous owners and attached to the main section. Then the Foushee family acquired the property in the 1940s and made further additions. Another small house to the east of this residence was probably the home of black landowner Aaron Green.
Thomas Farm		This property has been in the Thomas family hands for three generations. The first generation of Thomases began to farm this site in the late 1800s, and the main farmhouse was built in 1880. The second generation of Thomases converted to horse and dairy farming, and the site remains in active agricutural use today. In addition to the main farm house, there are many surviving outbuildings on the complex, such as a pump house, an outhouse and granary, a chicken house, and a smoke house.

Raven Rock

Native Americans, specifically the Sioux and Tuscarora, were the first humans to inhabit the Raven Rock area, as a burial mound of rocks close to the old Northington Road can attest. In the late 1700s white settlers, mostly Highland Scots, began to arrive; early families included the Northingtons, the Robinsons, the Tucks, the Campbells, the Laniers, and the Blaylocks. The many falls in the river became the hydropower for the settlers' many mills, including three Northington mills and one Robinson mill on the mainstem, and several more up Avents Mill Creek.

The Northingtons operated a ferry to cross the Cape Fear River at Camels Creek near Raven Rock from the 1770s until the 1820s or 30s. There is also some evidence to indicate that a bridge may have spanned the river at this point in the late 1870s or 80s, but historians know nothing for sure. In 1903 the people of Buckhorn Township, Harnett County petitioned their county Commissioners to operate a new ferry for the people, to run at the same spot. This request was approved, and the new ferry operated from the 1900s to the 1920s. Competition from the nearby bridge at Lillington made the ferry service obsolete, so it eventually closed down. There was also an old Northington Road, built by the Northingtons, which ran from Fayetteville to Raleigh, and passed through the Raven Rock area. Traces of the well-traveled road can still be seen on park grounds, but today there are no public, paved roads that lead directly to the river in the vicinity.

In the 1850s the Cape Fear and Deep River Navigation Company built a lock and dam system named after the Northington familly just below the mouth of Avents Mill Creek. A hurricane in 1859 caused considerable damage to these works, although they remained mostly operational until 1869, when the General Assembly authorized their complete dismantling. Some remains can still be seen today.

Name	Status	Description
Raven Rock		Raven Rock is a quartzite structure associated with the mica gneiss of the Pre-Cambrian and Early Paleozoic Age – meaning it is probably about 600 million years old. In the 1700s it was known as Patterson's Rock, named for Gilbert Patterson, who hid from wolves under its overhang in the 1740s with a broken leg after a canoeing accident. On 19th Century maps it is labeled as Tory Rock for some unknown reason. Its current name, Raven Rock, must have come from the ravens who were once known to roost on it. The rock was a favorite picnic spot for courting couples at the turn of the century.
Northington Plantation		Samuel Northington, a Justice of the Peace for Cumberland County and four-term General Assembly representative, arrived in the Raven Rock area in 1770s. He and his son Jesse, also a Justice of the Peace, over the years came to own over 6000 acres on both sides of the river, close to Camels and Avent Mill Creeks. The Northingtons operated three mills along the river, a general store, and a ferry close to Camels Creek. The Northington family cemetery and the associated slave cemetery still remain in Raven Rock State Park. The Norrington African-American community southwest of Lillington might well have been founded by descendents of Northington's slaves.
Robinson Plantation		Phillip Robinson operated a mill and set of stone fishtraps at Northington falls in the 1780s on the Cape Fear River. The ruins of the traps are jumble of rocks today, but they are a popular spot in Raven Rock State Park. Robinson also ran several mills up Avent Mill Creek.
Raven Rock State Park		Raven Rock State Park is the result of many years of patient lobbying from Walter Johnson of Goldsboro and Dr. Robert Soots of Campbell College. In 1968 the North Carolina General Assembly approved a bill to preserve the lands around Raven Rock, and in 1970 Governor Robert Scott accepted the deed for the first 300 acres of land. The Triangle Land Conservancy recently helped the state acquire an additional 104 adjacent acres on the old Hardee Farm.

Appendix E: Water Quality Tests in the Lower Deep – Upper Cape Fear Watershed

Site and Location	County	Fish Community Structure	Benthic Macroinvertebrate	Reason
McLendons Creek SR 1210	Moore	1998: Good-Fair (46) (SR 1210)	1984: Good (SR 1210) 1993: Fair (SR 1628)	
UT Suck Creek SR 1261	Moore		1984: Good 1986: Good	
Big Governors Creek SR 1625	Moore		1993: Poor 1998: Not Tested	eroding banks
Indian Creek Goldston Carbonton Rd	Chatham	1998: Good-Fair (48)	1993: Poor	agriculture; sedimentation
UT Deep River Alton King Rd	Chatham		1987: Good-Fair	
Deep River Plank Rd			1987: Good 1993: Good 1998: Good-Fair	
Little Pocket Creek NC 42	Lee		1993: Fair (later deemed unreliable) 1998: Not Tested	agriculture
Cedar Creek Everette Dowdy Rd	Chatham	1993: Good (48) 1994: Fair (38)	1993: Fair (later deemed unreliable) 1998: Not Tested	agriculture; sedimentation from clay pit
Big Buffalo Creek Cotton Rd	Lee	1993: Good (50) 1994: Fair (38) 1998: Poor (26)	Feb 1993: Fair Aug 1993: Poor	urban runoff from Sanford; sedimentation
Georges Creek Henry Oldham Rd	Chatham		1993: Fair (later deemed unreliable) 1998: Not Tested	agriculture
Deep River 15-501			1987: Good-Fair 1993: Good 1998: Good-Fair	turbidity
Little Buffalo Creek Amos Bridges Rd	Lee		1993: Poor	urban runoff from Sanford; sedimentation
Gulf Creek Trib. SR 1924	Chatham	1993: Poor (32)	1993: Not Tested	sedimentation and nutrients from clay pit
Gulf Creek SR 1916 SR 1924	Chatham	1993: Fair (43) (SR 1924) 1993: Poor (34) (SR 1916)	1993: Not Tested (SR 1924)	sedimentation from clay pit
Parkers Creek SR 1450	Harnett		1993: Good 1998: Good-Fair	agricultural runoff
Parkers Creek SR 1418	Harnett		1988: Excellent	agricultural runoff
Avents Creek SR 1418	Harnett	1998: Fair (42)	1988: Excellent	
Hectors Creek SR 1412 SR 1403	Harnett	1993: Fair (44) (SR 1412) 1994: Fair (42) (SR 1403) 1998: Fair (40) (SR 1412)	1988: Excellent (SR 1412)	

Shaded streams are Non Rated in 2000 Basinwide Plan.

Appendix F

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NC Division of Water Quality (contact: Cam McNutt)

NC Natural Heritage Program, NC Department of Environment and Natural Resources, Division of Parks and Recreation (files, maps)

NC Rails to Trails (contact: Al Capehart, Curtis Pope)

NC Wildlife Resources Commission (contact: John Alderman)

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Moore County

- Tax Parcels

Very Special Thanks to the Deep River Planning Advisory Committee

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Appendix H: About TLC

The Triangle Land Conservancy (TLC) is a local land trust working on a voluntary basis with landowners to protect open space in the six-county Triangle region. From its establishment in 1983 through the time of this report (June 2001), TLC protected 3,081 acres of open space in the Triangle through fee-simple acquisition and conservation easements, including 969 acres in the Deep – Cape Fear River Corridor:

- White Pines in Chatham County, located at the confluence of the Deep and Rocky Rivers, is TLC's flagship property, the first one purchased by TLC (in 1985) and perhaps the most biologically significant. TLC's total land holdings at White Pines have grown gradually over several years to include 258 protected acres. White Pines has 3½ miles of hiking trails and is open to the public year-round. For more information about the natural significance of the White Pines preserve, see Appendix C.
- Georges Creek Bottomlands was donated to TLC in 1992. This wooded property lies alongside Georges Creek in Chatham County, just upstream of the confluence with the Deep.
- LaGrange Riparian Reserve, or the historic Hester Farm in Chatham County, was purchased by TLC in 1998 through a grant from the Clean Water Management Trust Fund. The 308-tract contains 2½ miles of river frontage and a rare diabase seepage bog. See Appendix C for more information.
- McIver Landing is a 5-acre tract along the Deep River in Chatham County purchased by TLC in 1999. TLC plans to build a canoe launch on this site for access to the river.
- The Hardee Farm was purchased by TLC in 1999 and transferred to the State to include in Raven Rock State Park. This 104-acre tract along the Cape Fear River is in Harnett County.
- TLC also holds a conservation forestry easement on Coffer Forest in Lee County. The easement protects 257 acres, including a hardwood buffer along the Deep River and three of its tributaries, and it ensures sustainable harvesting of the upland pines. This easement also protects a portion of the County Line Deep River Slopes natural area, identified in Lee County's Natural Heritage inventory. See Appendix C for more information.
- Endor Iron Furnace Preserve was purchased by TLC in 2001 and was transferred to the NC Department of Cultural Resources in 2002. The 426-acre preserve includes 250 acres of floodplains and wetlands, 3.5 miles of river frontage, and the historic iron furnace, which is planned for restoration by the Railroad House Historical Association of Lee County. See Appendices C and D for more information about the natural area and the history of Endor.

The Deep – Cape Fear River is one of TLC's priority areas for conservation, and we remain committed to working with landowners and government agencies on the protection of the river.