



Southwest Shore Conservation Assessment Chatham County, NC

Prepared by

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and

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In addition we would like to thank Preston Development Company for approaching TLC with this Project. Too often development gives little consideration to the natural elements of a site, if consideration is given it often just due to regulatory constraints. We appreciate Preston Development Company's innovation and foresight into the role open space and conservation can play in the development and hope that this report will be a useful resource as they and other developers move forward with projects in Southwest Shore area.

Finally we would like to thank the Cannon Foundation, Inc for their financial support of this project.

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- Wildlife Resources Commission
- North Carolina Division of Parks and Recreation
- Army Corps of Engineers
- U.S. Fish and Wildlife Service
- North Carolina Natural Heritage Program
- Robeson Creek Watershed Council
- NC Department of Environment and Natural Resources
- Pittsboro Planning Department
- Chatham County Planning Department
- Interested Citizens

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Front Page Pictures: *Pictures taken during site inventories -- Old Chimney near Gum Spring church Rd, Robeson Creek, Eastern Box Turtle (Terrapene carolina)*

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EXECUTIVE SUMMARY

Spreading southwestward from the banks of the Haw River and the shore of Jordan Lake lies an undeveloped wilderness of more than 10,000 acres. Just a few roads and a scattering of homes break up this forested landscape dotted with the remnants of previous settlement: old family cemeteries, stone walls, and home sites. Laying within the Cape Fear River Basin and draining into Jordan Lake--the second largest drinking water supply for Triangle area communities--the Southwest Shore Wilderness is one of the largest remaining unfragmented areas in the six-county Triangle region .

Within this setting, Preston Development Company has assembled nearly 6,500 acres of land with plans to develop a large, mixed-use project--the largest project in Chatham County's history. The Preston property extends from Bynum in the north to just shy of the Deep River in the south and is characterized by rolling hills, steep ravines, upland forests, open water, wetlands and floodplains.

In early 2008, Preston Development Company approached Triangle Land Conservancy (TLC) to assess the land's conservation value and to make recommendations on which lands should be conserved, based on their natural, historic, cultural and environmental value. TLC assembled a team of experts from government agencies, nonprofit organizations, and interested citizens to carry out the assessment.

This assessment provides recommendations to maximize the conservation potential of the property. Any development in the study area inevitably will fragment and reduce the quality of existing habitat, not only on private lands in the study area, but also on public lands around Jordan Lake. In addition, development could further harm water quality in Jordan Lake, which is already impaired by development-related runoff from upstream communities, and the tributaries that feed it.

Our recommendations, if implemented, would conserve critical lands and provide additional buffers for streams, trails, and game lands. The steps we recommend would:

- * Protect the water quality of Jordan Lake
- * Protect the most sensitive natural areas of the Southwest Shore Wilderness
- * Protect and enhance game and wildlife habitat
- * Utilize prime agricultural soils for market farms and crops
- * Create a system of trails connecting the new community, cultural assets, and natural areas
- * Protect scenic views
- * Preserve areas of cultural and historic significance

Executive Summary

The following recommendations are provided to guide future development in this area.

1. Protect Water Quality - Minimize stream crossings by roads and utilities, and avoid alteration to natural stream flow. Implement techniques such as green roofs, rain gardens, and pervious pavement to limit stormwater runoff. Adopt measures to minimize water use such as landscaping with drought tolerant plants and using reclaimed water for irrigation.

2. Protect and Enhance Wildlife Habitat - Design wildlife core areas and corridors to preserve the highest quality wildlife habitat, including vernal pools, wetlands, rock outcrops, mature hardwood forests, and lands adjacent to existing protected areas. Incorporate wildlife-friendly landscaping materials into the project. Continue prescribed burning and timber management, and locate all houses outside the 150 yard hunting safety buffer around Game Lands. Keep all utility lines out of Game Lands and other protected lands.

3. Protect Sensitive Natural Areas - Conserve lands adjacent to US Army Corps of Engineers Jordan Lake Lands, as well as of areas of steep and dissected lands. Protect and enhance wetlands, floodplains and seeps. Avoid development on areas with slopes greater than 15%.

4. Protect and Restore Riparian Corridors - Preserve wildlife corridors along the Haw River, Robeson Creek, Stinking Creek, and US Army Corps of Engineers lands. Through buffers, protect streams (perennial, intermittent, and ephemeral), wetlands, seeps and springs throughout the property. Maintain upland buffers along riparian areas as well to minimize erosion and help prevent runoff from entering rivers and creeks.

5. Identify and Preserve Landscape Linkages - Conserve areas adjacent to Jordan Lake and its tributaries. The area adjacent to the Haw River corridor should be added to the Lower Haw River State Natural Area. Design and conserve an integrated network of habitats and corridors, connecting core natural areas with wildlife corridors inside and outside of the study area.

6. Develop a Network of Open Space and Trails - Develop a trail system that connects the proposed development to key cultural and natural areas including Stinking Creek and Robeson Creek riparian corridors, Jordan Lake, the Lower Haw River State Natural Area, and the Town of Pittsboro. Set aside lands to connect the Haw River corridor to the Deep River along the western shore of Jordan Lake. In selecting routes for trails, avoid sensitive environmental areas and incorporate natural and stone trail surfaces to limit the impervious surfaces.

7. Minimize Development Footprint - Cluster development to preserve large contiguous forested areas, particularly those areas adjacent to existing protected lands and areas important for recreation or wildlife habitat. Avoid ecologically important areas.

8. Preserve Areas of Cultural or Historic Significance - Conduct a full historical inventory of the site before any development occurs. The study area's unique history should be preserved and incorporated into development plans for the site.

9. Protect Working Lands - Set aside land on prime soils for lease as market farms. Set aside larger areas of land for biofuel crops, native plant nurseries, and/or hayfields. Incorporate a local farmer's market into development plans.

10. Protect Scenic Viewsheds - Set aside prominent hills and scenic views in the study area as conservation areas. Incorporate the existing tree canopies and natural views into road design. New development should be respectful of the rural nature of the county and town entrances.

11. Develop and Implement a Long-term Conservation and Management Plan - Develop a plan to conserve and manage sensitive and unique natural resources. Create a long term funding mechanism to implement the goals and objectives of the plan, such as fees from future businesses and a HOA. Hire a qualified conservation land manager to implement the plan, oversee all resource management activities, and organize environmental education programs for future residents.

A note on buffers:

Varying buffers widths are mentioned throughout the report. Stream buffers can help protect water quality and link conservation areas. These buffers can also provide wildlife corridors, opportunities for trails, and protect new residence from designated burning and hunting areas. There is no magic number for the width of these buffers and recommendations range from 50 to 1000 ft per side depending on the purpose of the buffer. The following widths per stream side are general recommendations in this report

1000 ft minimum buffer along the Haw River to protect the lower Haw State Natural Area and Haw River Significant Aquatic Habitat

450 ft buffers around game lands (for built structures) and 1/2 mile buffer around all prescribed burn areas

300 ft Along Robeson Creek, and Stinking Creek to accommodate potential trails, wildlife, and water quality protection measures

200 ft buffers on perennial streams and 100 ft buffers on intermittent streams draining into the Haw River Aquatic Habitat (area designated as Cape Fear Shiner Habitat)

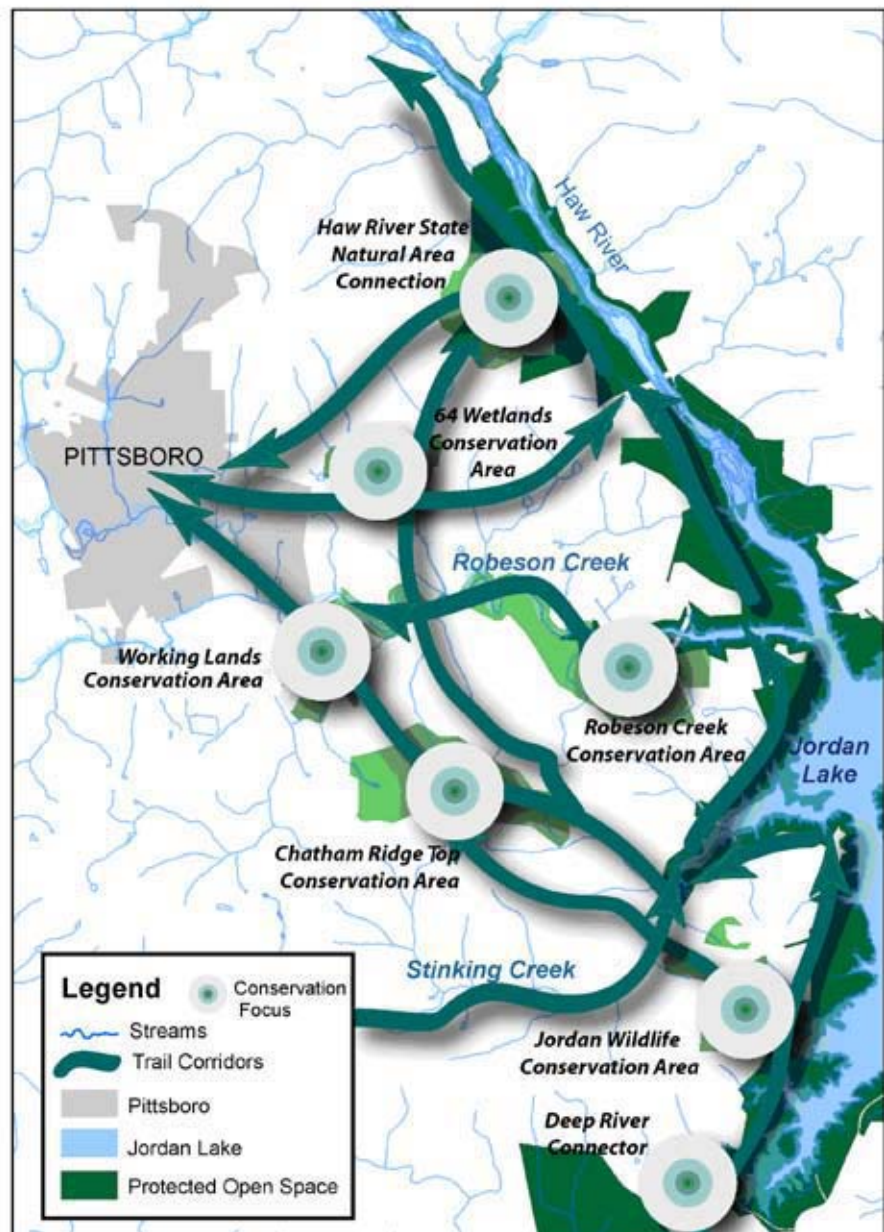
100 ft buffers on perennial streams, 50 ft buffers on intermittent streams, and 30 ft buffers on ephemeral streams throughout the study area

Executive Summary

In order to set the stage for developers to implement these strategies, TLC suggest that the Town of Pittsboro

- Develop and implement a local stormwater ordinance to minimize stormwater runoff.
- Implement and develop infrastructure systems that can support the use of reclaimed water.
- Revise subdivision ordinances to allow for the implementation of Low Impact Development practices.
- Adopt more stringent buffer regulations to protect the streams and water resources of this area.

In addition to this series of recommendations TLC has identified several key conservation areas and corridors. These areas will protect most of the significant natural areas in the southwest shore and allow for wildlife passage. The areas are detailed in the report and a conceptual diagram of these areas is shown to the right.



	Area Name	Total Acres	Preston Acres*	Culture And History	Natural Heritage	Water Quality	Riparian Corridors	Wildlife Habitat	Working Lands	Recreation	Scenic Views	Connectivity
1	Haw River Slopes/State Natural Area Connector	450	375		✓	✓	✓	✓		✓	✓	✓
2	U.S. 64 Wetlands Complex	150	110			✓	✓	✓				✓
3	Robeson Creek Conservation Area	900	450	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Chatham Ridgeline Conservation Area	550	550		✓	✓		✓		✓	✓	✓
5	Jordan Lake Wildlife Conservation Area	260	260	✓	✓	✓	✓	✓		✓		✓
6	Working Lands Conservation Area	175	175	✓				✓	✓		✓	✓
7	Trail Corridors	Suggested 300 ft width				✓	✓	✓		✓	✓	✓
8	Haw River Corridor	Suggested 1000 ft portection area on each side		✓	✓	✓	✓	✓		✓	✓	✓
9	Deep River Connection	300	0		✓	✓		✓		✓	✓	✓
10	Army Corps of Engineers Game Lands	100 ft minimum buffer and 1/4 miles buffer around burn areas			✓	✓		✓			✓	✓

Various strategies can be used to protect these lands including acquisition by North Carolina State Parks, conservation easements, public and private trail corridors, county or municipal parkland, and or private conservation areas managed by homeowners and future developments.

Although this assessment has looked at potential conservation lands, it has not focused on the built environment. In order to truly develop an innovative “green community” the protection of water quality, natural communities, wildlife, working lands, cultural resources, and recreation areas needs to be extended to the site design on individual buildings and their interiors. By no means is this assessment meant to be a comprehensive guide to “green development.” TLC hopes that if development progresses in this area it will build on the recommendations provided in this report and truly be a model of innovative sustainable development and conservation.

I. Background

The Greater Region

Chatham County lies in central North Carolina, about halfway between the mountains and the coast. The county is home to a rich diversity of wildlife, scenic views, working forests and farms, water resources, a rich historic culture, and unique recreational opportunities. These features have been a great asset to long time Chatham residents as well as a major attractor to new residents from the Triangle and beyond. The county has grown rapidly over the last 10 years and likely will continue to grow. From 1990 – 2000, Chatham County’s population grew from 38,759 to 49,329, an increase of 27.3 percent, and has reached over 60,000 people today¹. Most of the growth has occurred in the eastern part of the county, where major transportation corridors provide easy access to neighboring employment centers such as Chapel Hill, Research Triangle Park and Raleigh.

Yet, despite recent growth, the county has retained its rural character. With a population density of only 72 per square mile, Chatham is one of the Triangle’s most rural counties. By comparison, the population density in Wake and Orange Counties is 754 and 285 people

The beautiful natural amenities and sparsely developed landscape give Chatham a unique identity that is felt as soon as one crosses the county line.

per square mile, respectively.² The beautiful natural amenities and sparsely developed landscape give Chatham a unique identity that is felt as soon as one crosses the county line. These amenities, along with land prices that are generally lower than in neighboring Wake and Orange

counties, continue to attract development. In the last three years alone, eastern Chatham County and the Town of Pittsboro have approved nearly 15,000 new homes. One of the largest projects is Briar Creek—a mixed-use project that will add nearly 2,400 homes on about 1,600 acres.

More development means more changes to the landscape, as forest and fields are converted into

houses, roads, stores, and parking lots. As the county grows, natural habitats will lose ground unless new development is carefully planned to protect the existing natural resources.

Over the past few years, the Preston Development Company has assembled nearly 6,500 acres of land southeast of Pittsboro, or roughly 10 square miles, extending from Bynum Road in the north to just shy of the Deep River in the south (Figure 1). Preston’s plans to develop a large, mixed-use project--the largest project in Chatham County’s history--would roughly double the population of the county over the next 20-30 years. In early 2008, Preston approached the Triangle Land Conservancy (TLC) to assess the land’s conservation value and amenities and to make recommendations on which lands should be conserved based on their natural, historic, cultural and environmental value.

TLC assembled a team of experts--a working group--to carry out the assessment. The group included representatives from the Wildlife Resources Commission, Haw River Assembly, North Carolina State Parks, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, North Carolina Natural Heritage Program, Robeson Creek Watershed Council, interested citizens, Town of Pittsboro, and Triangle Land Conservancy. The volunteers met monthly for 4 months (February – May) in 2008 to discuss

the assessment and make recommendations for areas that should be conserved.

In May and June 2008, members of the group conducted over 20 field visits to assess the conservation value of the study area—that is, to identify which areas should be conserved. Specifically, the Natural Heritage Program conducted on-the-ground inventories of approximately 1,375 acres of the site, while TLC and volunteers inventoried an additional 600 acres. Finally, members The Robeson Creek Watershed Council inventoried the Robeson Creek buffer. This report presents the findings of these assessments, recommends key areas for protection and provides conservation objectives

for the study area.

Conservation means different things to different people. To some it means simply protecting land from any type of development. To others it means protecting land from development while allowing some activities, such as farming or forestry. At Triangle Land Conservancy, conservation means protecting important open space, including stream corridors, forests, wildlife habitat, farmland and natural areas. This protection can occur through a variety of methods including public, non-profit, and private ownership of land. Conservation also means active stewardship and management of lands, such as controlling invasive plants that degrade the quality of wildlife habitat.

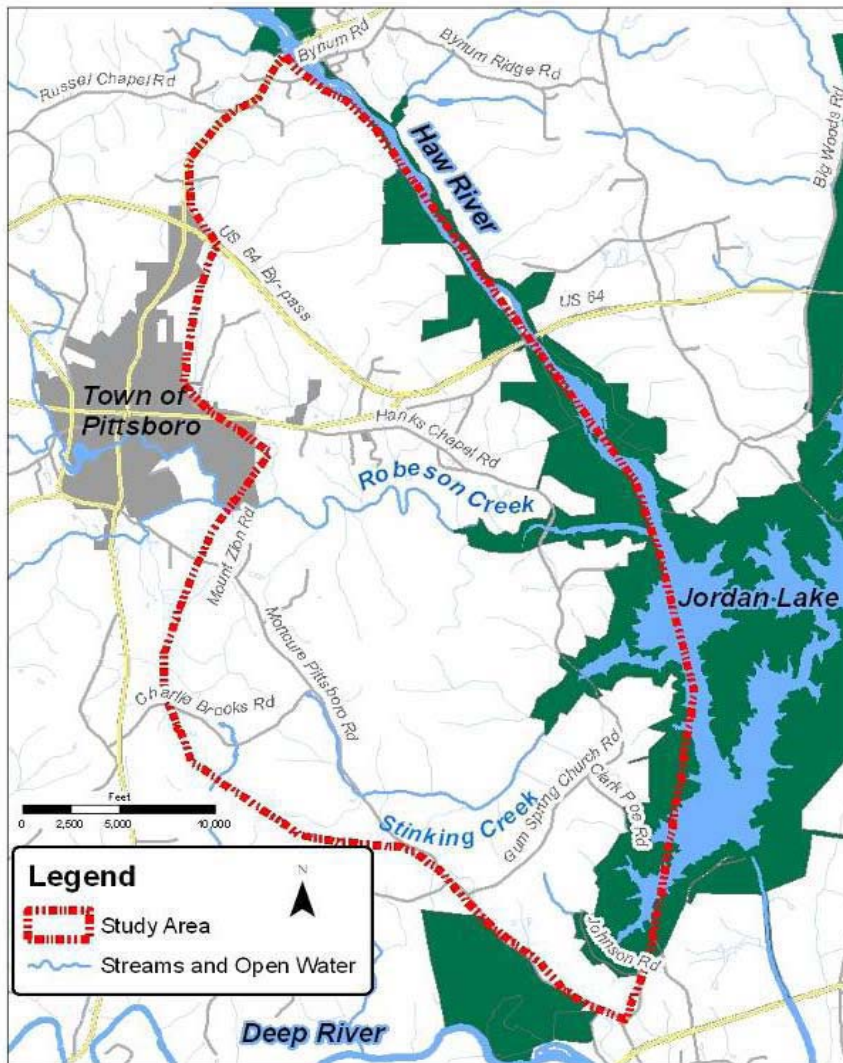


Figure 1: The Study Area lies between the Town of Pittsboro and Jordan Lake

This report examines the application of conservation in the study area through several perspectives, including conservation of natural communities, working lands, water quality, cultural resources, and recreation lands. These perspectives are addressed specifically in the report followed by recommendations for conservation or management of specific areas to achieve conservation objectives. These conservation areas are not considered in isolation -the environmental stewardship of adjacent lands is important as well. Thus, the value of conserved lands can be strengthened or undermined by the way in which adjacent lands are used and managed. Stewardship of lands outside the study area, by private landowners as well as federal, state and local governments, is crucial to protect the critical cultural, historic and environmental values of lands in the study area.

II. The Study Area in Detail

The Study Area

The area of interest for this conservation assessment sits on the southwest shore of the Haw River and Jordan Lake (Figure 1), thus we have named it the Southwest Shore Wilderness. The area is characterized by rolling hills, steep ravines, upland forests, open water, wetlands and floodplains and is dotted by old cemeteries, stone walls, home sites and other remnants of previous settlement (Table 1). There is relatively little agricultural land or residential development, most likely due to the hilly terrain and sharp dissection by numerous narrow stream valleys. Few roads cross the area, although there are many trails that have been used by local citizens for horseback riding, hiking, all terrain vehicles, and hunting. The U.S. 64 business route and bypass divide the two core contiguous areas.

Table 1: Land Cover of the Southwest Shore Area

Greater Study Area	Acres
Mixed Upland Hardwoods	6,445
Southern Yellow Pine	4,752
Mixed Hardwoods/Conifers	4,487
Bottomland Forest/Hardwood Swamps	1,392
Managed Herbaceous Cover	1,329
Water Bodies	588
Deciduous Shrubland	462
Evergreen Shrubland	461
Unmanaged Herbaceous Upland	36
Cultivated	33
Mixed Shrubland	13
Oak/Gum/Cypress	11
Low Intensity Developed	10
High Intensity Developed	7
Total	20,027

**Note: Data is taken from 2001 Land Cover Data and may not represent recent landscape changes*

Within the Southwest Shore Wilderness area are some 6,500 acres of land owned by Preston Development Company (5,875 of these acres are detailed in this section- See Table 2). This land is dominated by mixed upland hardwood and pine forests: about 2,427 acres is by mixed upland hardwoods, 1,789 acres is mixed hardwoods/conifers and 922 acres is southern yellow pine forest. The rest is a mix of

Table 2: Land Cover of Preston Properties (see figure 3)

Preston Properties	
Description	Acres
Mixed Upland Hardwoods	2427
Mixed Hardwoods/Conifers	1789
Southern Yellow Pine	923
Managed Herbaceous Cover	214
Evergreen Shrubland	201
Bottomland Forest/Hardwood Swamps	172
Deciduous Shrubland	137
Water Bodies	6
Unmanaged Herbaceous Upland	4
Cultivated	2
Total	5875

managed herbaceous cover, shrub land, wetlands and water bodies.

The northern section of the property is adjacent to the Haw River. Several creeks, including Robeson Creek and Stinking Creek, cross the property and empty into Jordan Lake--the area's largest drinking water resource and the second largest drinking water supply for the Triangle.

Developments within this study area will likely have a tremendous impact on the surrounding natural environment. This assessment considers the impact to the larger study area with a focus on the lands currently owned by Preston Development Company (these lands are shown in red in Figure 2).

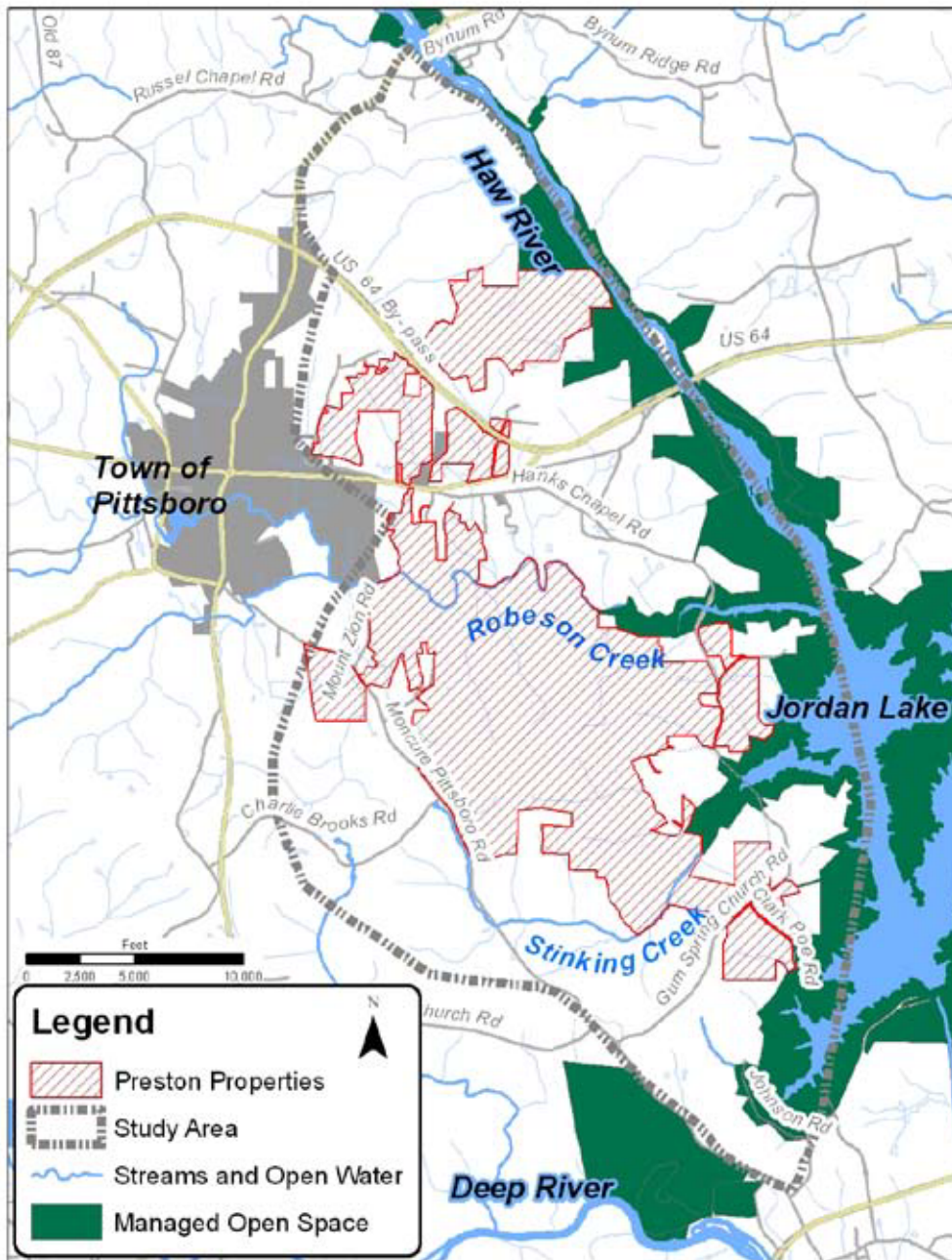


Figure 2: Preston Owned Properties Within the Study Area. Data based on land acquisitions from 2007, may not represent complete land holdings

Land Cover of the Study Area

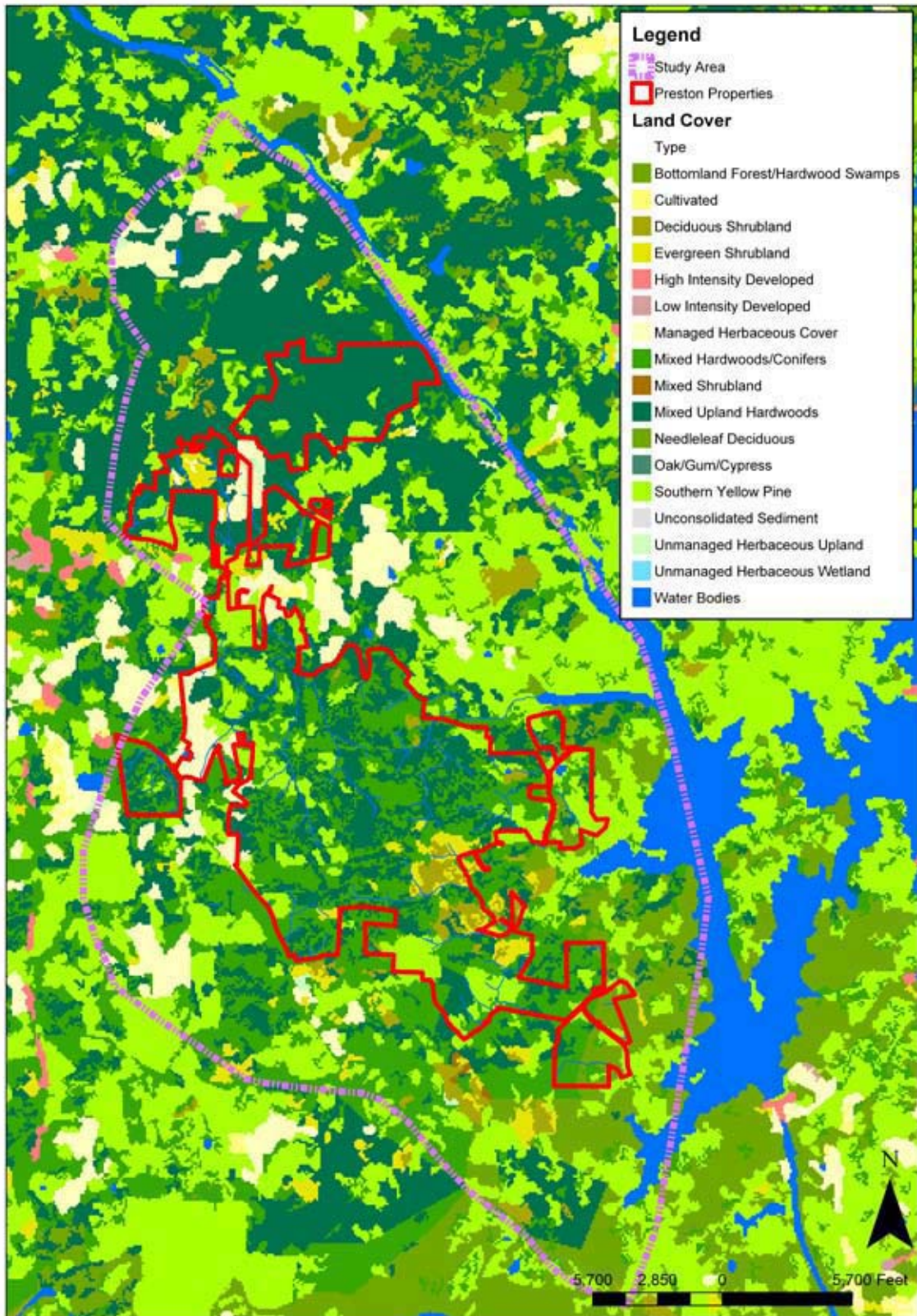


Figure 3: Land Cover in the Study Area, based on 2001 Land Cover Data

III. The Assessment

The following section provides an assessment of the Southwest Shore, focusing on several key issues or topics, including (a) cultural and historic preservation, (b) natural heritage, (c) riparian corridors, (d) water quality, (e) wildlife habitat, (f) working lands, and (g) recreation. The findings of each assessment are discussed separately below.

The assessment focuses primarily on Preston’s land holdings, but also includes adjacent lands, which together constitute some 20,000 acres. Although these lands were not inventoried at the same level of detail as the Preston owned lands, the recommendations of this report apply to any new developments in the study area.

Ideally, much of the undeveloped land in the study area would be protected as an intact nature preserve—one that protects the large roadless areas and connects the Haw River State Natural Area to US Army Corps of Engineers lands around Jordan Lake, and the Deep River Corridor. This extensive preserve would protect sensitive lands along the Haw River, Robeson Creek, Stinking Creek, and Jordan Lake, as well as the large roadless area that provides excellent wildlife habitat. However, given the strong development pressure in the region, the conservation of these 20,000 acres appears unlikely. Therefore, this assessment highlights priority areas for conservation and provides recommendations as well as guiding principles for both conservation and sustainable development of the study area.

The assessment of the Southwest Shore area was not comprehensive—not every acre of forest, wetland, shrub land and river buffer was inventoried and assessed. Time and resource constraints limited the areas that the assessment team could cover. Also, some areas were examined more closely than others. For example, Robeson Creek underwent an extensive assessment of both water quality and riparian buffer quality, while other creeks (e.g., Stinking Creek), were not assessed at all (figure 8 shows the areas inventoried in detail on the ground).

Ideally, much of the undeveloped land in the Southwest Shore Wilderness would be protected as an intact nature preserve—one that protects the large roadless areas and connects the Haw River State Natural Area to US Army Corps of Engineers lands around Jordan Lake, and the Deep River Corridor.

Most of the assessments were based on field visits. Other assessments, for example for cultural/historic resources and working lands, were based on secondary data sources, GIS data analysis, aerial photography, as well as general knowledge of the area among state agencies, citizens, and nonprofit organizations. This section provides a description of each the assessments along with a summary of findings and recommendations.

A. Culture and History

A. Culture and History

Chatham County was established officially in 1771, when the Colonial Assembly decided to divide part of Orange County into several new counties. The county had long been inhabited by Native Americans and later in the mid eighteenth century was settled by Quakers traveling by land from the north and by Scotch-Irish migrants traveling up the Cape Fear River from the southeast. Settlers, like the Native American hunters and gatherers before them, raised corn and other crops for home consumption and supplemented their diet with the abundant wild game of the rich bottomlands.³

Pittsboro was declared the county seat in 1787. It has historically been the business and cultural center of Chatham County. Many of the factories and industries of the largely agricultural county had central offices in Pittsboro. It also housed many churches, which were the center of the social life of the town.

Findings

Lying between the Haw River and Pittsboro, the study area was home to many small subsistence farms. It also was crossed by many of the old roads and trading paths that brought travelers across the New Hope Creek, the Haw River, and into Pittsboro. Old maps show several roads, fords, and bridges in the area. The 1870 Ramsey map (Figure 4) shows several homesteads and mills.⁴ A 1933 soils map (Figure 5) shows many of the historic roads and river crossings. A more recent soils map is shown in the Appendix.

Unfortunately, most of the historical significance of the study areas is not known. It did not play a major role in the Civil War, perhaps because of the difficult terrain and flooding of the Haw River. Nor was it home to the wealthy elite of Chatham County. Rather the study area was a longtime

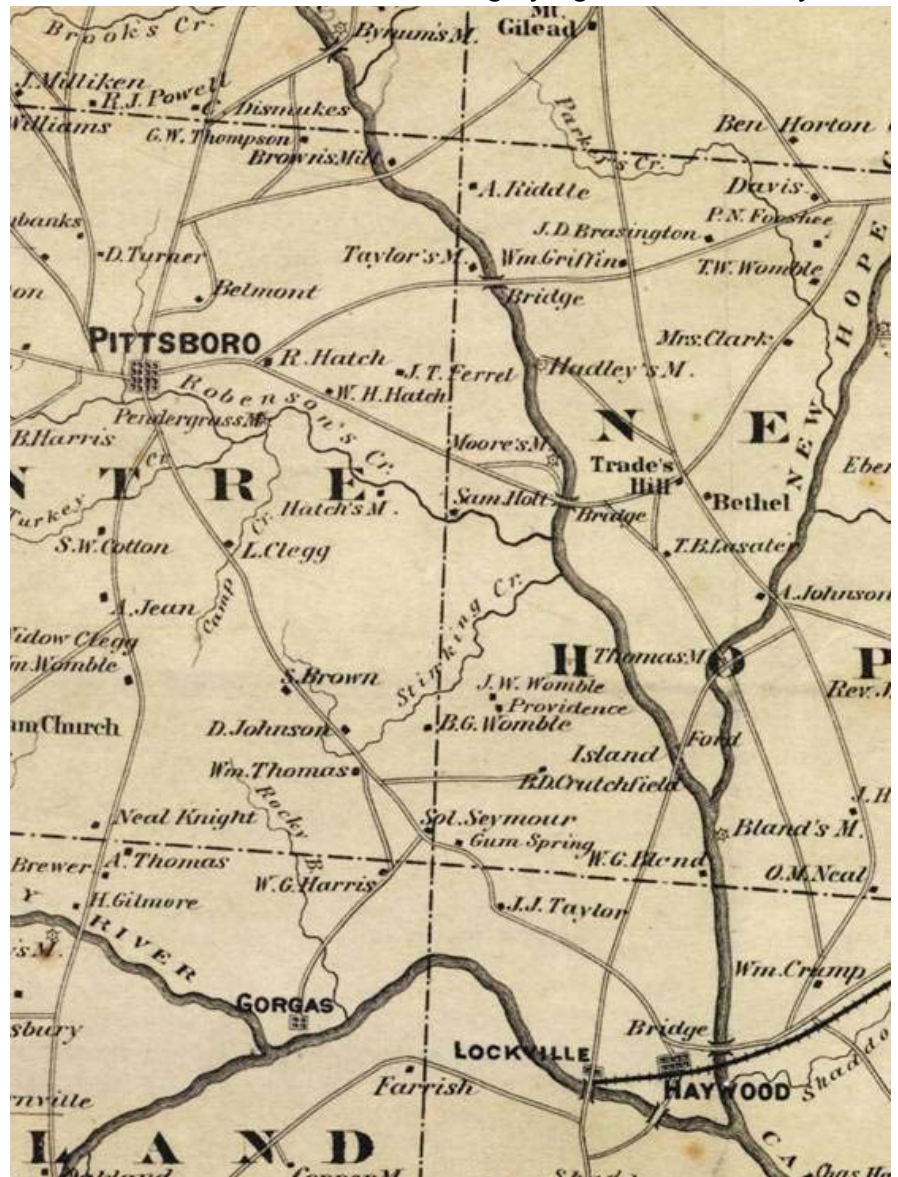
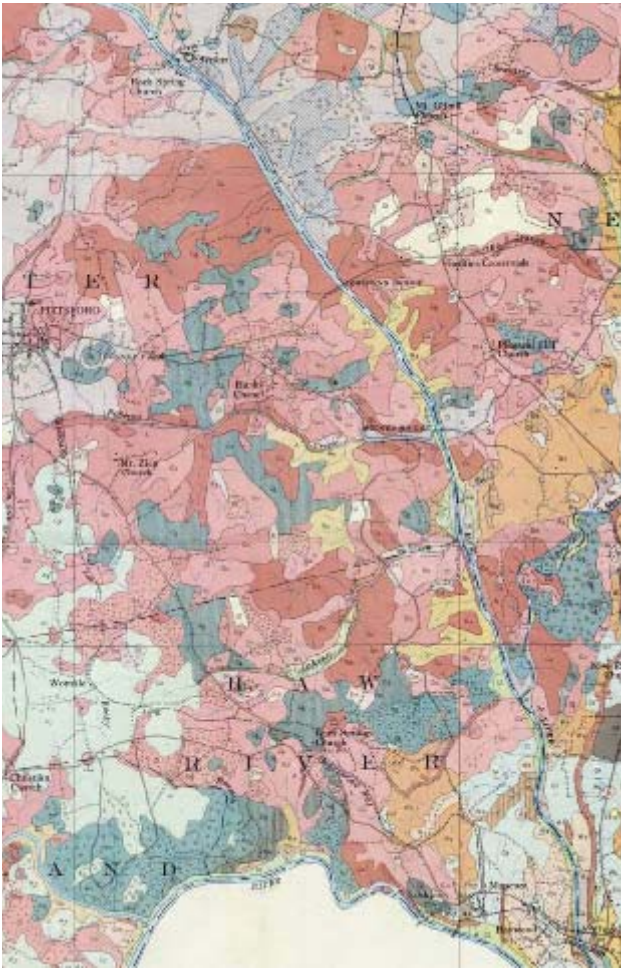


Figure 4: 1870 Map of Eastern Chatham County



settled “plain clothes” working area and serves an important role in conveying local history.

The study area is dotted with old homesteads, springs, stone walls, and graveyards. For example, on one of the southeast tracts, an old home site was discovered with an intact sandstone chimney. The chimney, shown in Figure 6 was marked with engravings from the mid 1800s.

During the Robeson Creek assessment, a man-made rock wall and ditch was found along the creek across from Allen Phillips land (see map of Robeson Creek in the Appendix). The rock structure could be evidence of an old mill site and race. These are just two examples of unique historic structures that exist on the study site. The site has a deep local history that needs to be investigated, documented and preserved, before development occurs.

Figure 5: 1933 Soil Map of Eastern Chatham County



Left: Chimney from an old home site with engravings from the mid 1800s found during a site inventory

Recommendations

This assessment recommends that

A.1. A full, on-the-ground historical inventory is conducted on the site before development begins.

A.2. Developers in the area should work to preserve the study area’s unique history and incorporate the historical and rural cultural identity of the site into new developments

B. Natural Heritage

B. Natural Heritage

Natural heritage is a term used to describe ecological features in our communities. In North Carolina, The Natural Heritage Program, a part of the Division of Natural Resource Planning and Conservation within the NC Department of Environment and Natural Resources, identifies elements of natural diversity including those plants and animals which are so rare, or the natural communities which are so significant, that they merit special consideration as land-use decisions are made. The program inventories, catalogues, and supports conservation of the rarest and the most outstanding elements of the natural diversity in North Carolina.

PREVIOUSLY IDENTIFIED NATURAL HERITAGE AREAS

- **Haw River Aquatic Habitat** supports one of the few known populations of the Federal and State Endangered Cape Fear shiner (*Notropis mekistocholas*) and the uncommon Septima's clubtail dragonfly (*Gomphus septima*). Rare freshwater mussels also occur here, including the Brook floater (*Alasmidonta varicosa*) and Yellow lampmussel (*Lampsilis cariosa*).
- **Pittsboro Fire Tower Wilderness** (subsumed under Haw River Levees and Bluffs as of April 2008) is the largest remaining roadless area in the county. As such, it has great importance as a wildlife reservoir, serving wildlife throughout the region through its connections to the Haw River. This large tract of land has largely escaped development, due to its extremely hilly terrain and sharp dissection by numerous narrow stream valleys. In 1992, the area was mostly uninhabited and covered by a mosaic of second growth hardwoods and pine forests.
- **Haw River Levees and Bluffs** includes several-miles of the Haw River, with rocky channels and numerous islands. Patches of high quality Floodplain Forest natural communities, with scattered Floodplain Pool communities, occur along the river. The bluffs above the river on both sides contain good quality Mesic Mixed Hardwood Forest natural communities. This site is owned partly by the North Carolina Division of Parks and Recreation and the U.S. Army Corps of Engineers; the remainder is privately owned.
- **Robeson Creek Ravine**, along the lower portion of Robeson Creek, contains perhaps the richest ravine community in the county. Robeson Creek has cut a deep ravine as it crosses the fault line. The steep slopes and large rock outcrops that in some spots rise nearly vertically above the creek, provide some of the most dramatic scenery in Chatham County. The stream still has a fairly high water quality, supporting mussels and providing habitat for river otters. Most of this site is currently protected as a Jordan Lake Natural Area. The ridge above the steep slopes, however, is privately owned and protection of this section would provide a critical buffer.
- **Robeson Creek Depression and Hardpan** contains the only known example of Upland Depression Swamp Forest in the Jordan Lake area. Willow oak (*Quercus phellos*) is the primary tree found around the perimeter of the depression.

The program also developed a classification of North Carolina's natural communities that describes more than 100 natural community types ranging from the grassy balds in the mountains to the maritime forests of the barrier islands.⁵ The Natural Heritage Program documents the best examples of these natural communities throughout the state with hope of informing local conservation and land use planning efforts.

Previous Heritage Inventories:

The Natural Heritage Program inventoried areas in Chatham County from 1988-1990 and in 1998⁶. It also inventoried areas along Jordan Lake in 1992. As a result of these inventories, the Natural Heritage Program identified over 40 significant sites, including the Haw River

Aquatic Habitat, the Pittsboro Fire Tower Wilderness Area, the Haw River Levees and Bluffs, the Robeson Creek Ravine and the Robeson Creek Depression and hardpan as significant natural heritage areas. Several of these areas fall within or are adjacent to the study area. Unfortunately, due to access, time, and scope constraints, the Natural Heritage Program was not able to inventory all areas within the county. Each of the previously identified and inventoried areas is described in the box on the previous page and shown in Figure 6.

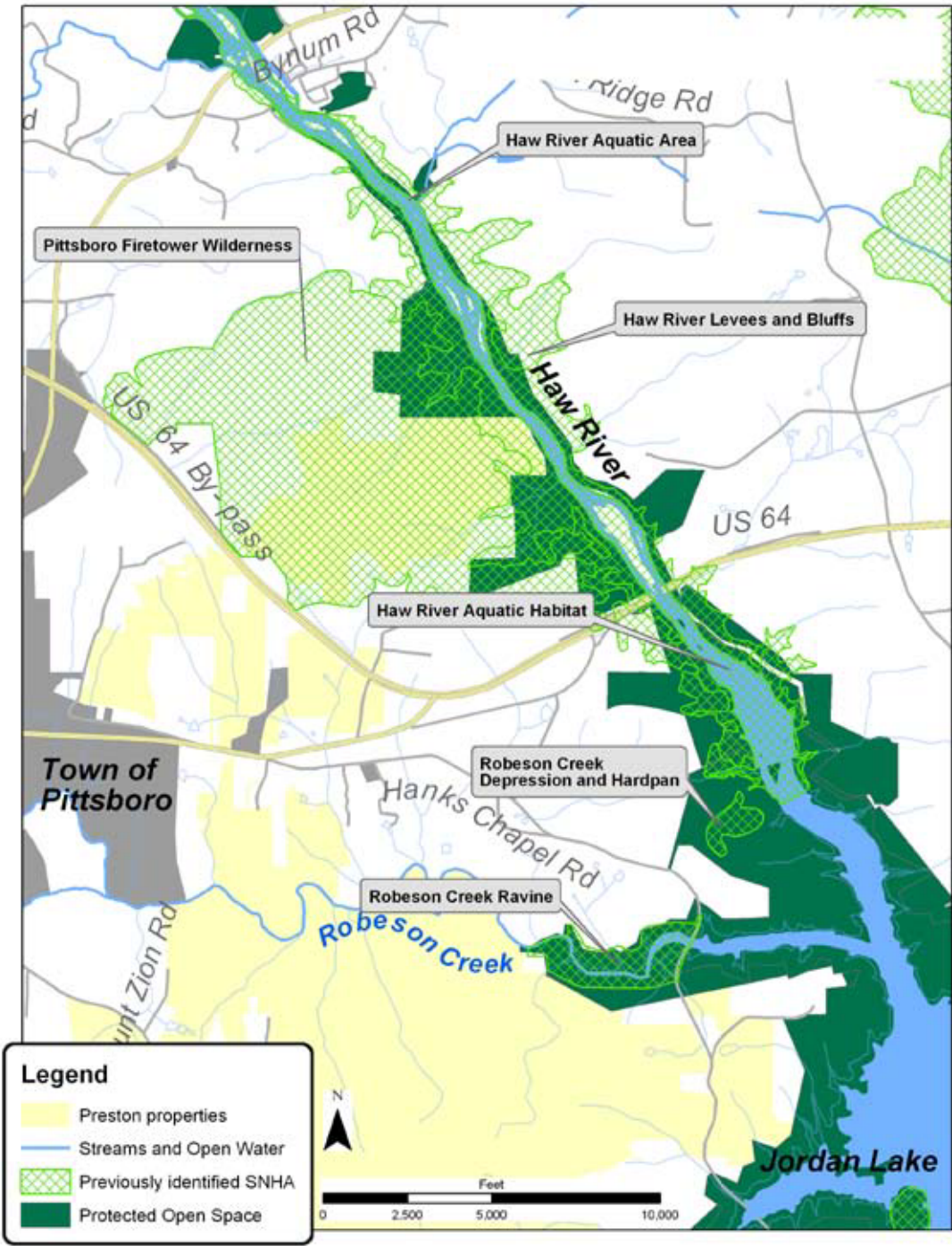


Figure 6: Areas Identified in the 1992 Natural Heritage Inventory

B. Natural Heritage Continued

In early 2008, TLC asked the Natural Heritage Program to conduct a conservation assessment of the Southwestern Shore Wilderness area to identify additional high quality natural areas. After an aerial photo reconnaissance, staff from the Natural Heritage Program initially identified several key tracts to inventory for potential high quality natural communities (Figure 7)

The program inventoried several of these areas and TLC conducted several site visits on some of the remaining areas. Due to staff capacity restraints, TLC and the Natural Heritage Program were not able to inventory all of the identified potential high quality sites.

Figure 8 shows the area inventoried by the Natural Heritage Program, Robeson Creek Watershed Council, and TLC.

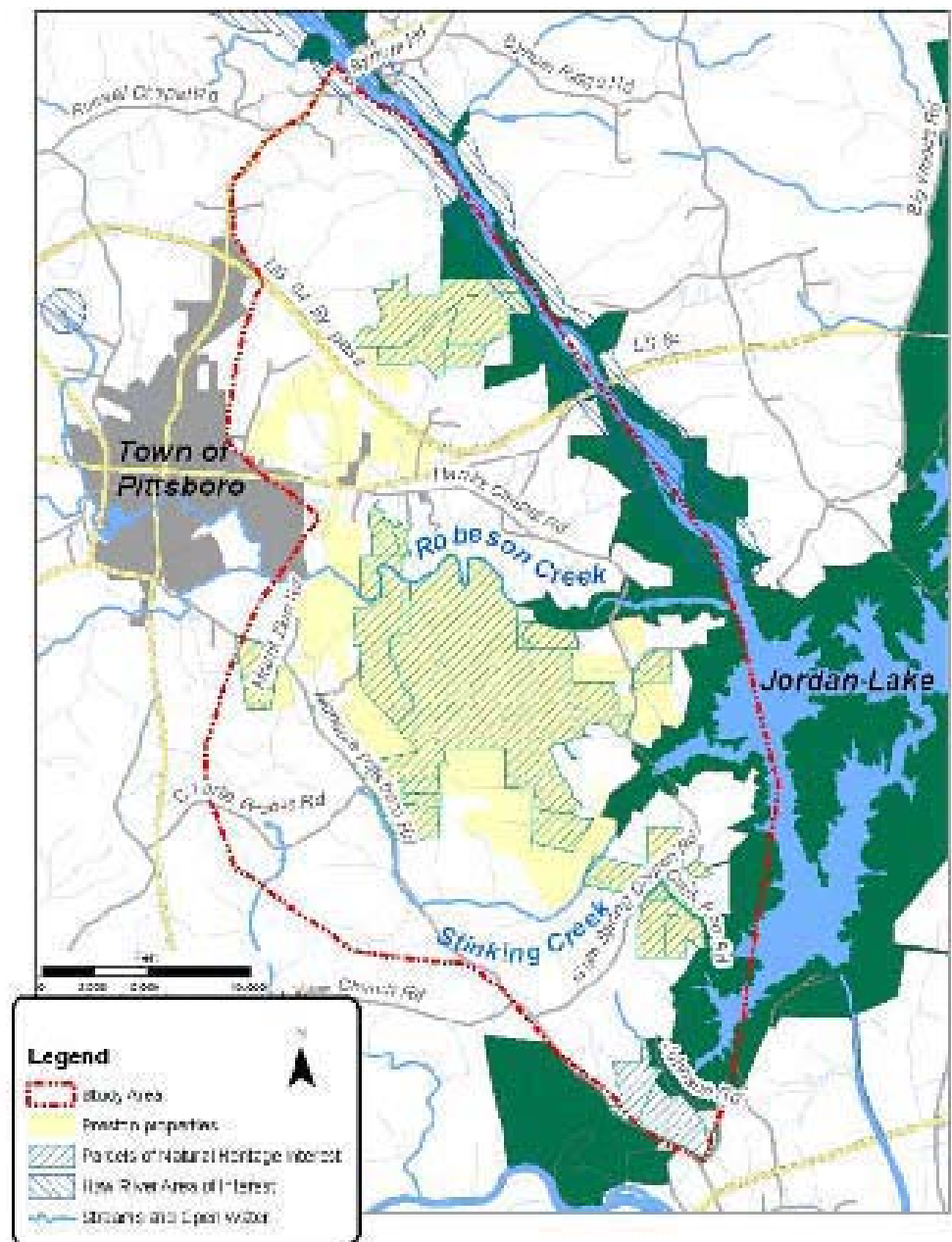


Figure 7: Areas identified through aerial photography of having potential high quality habitats

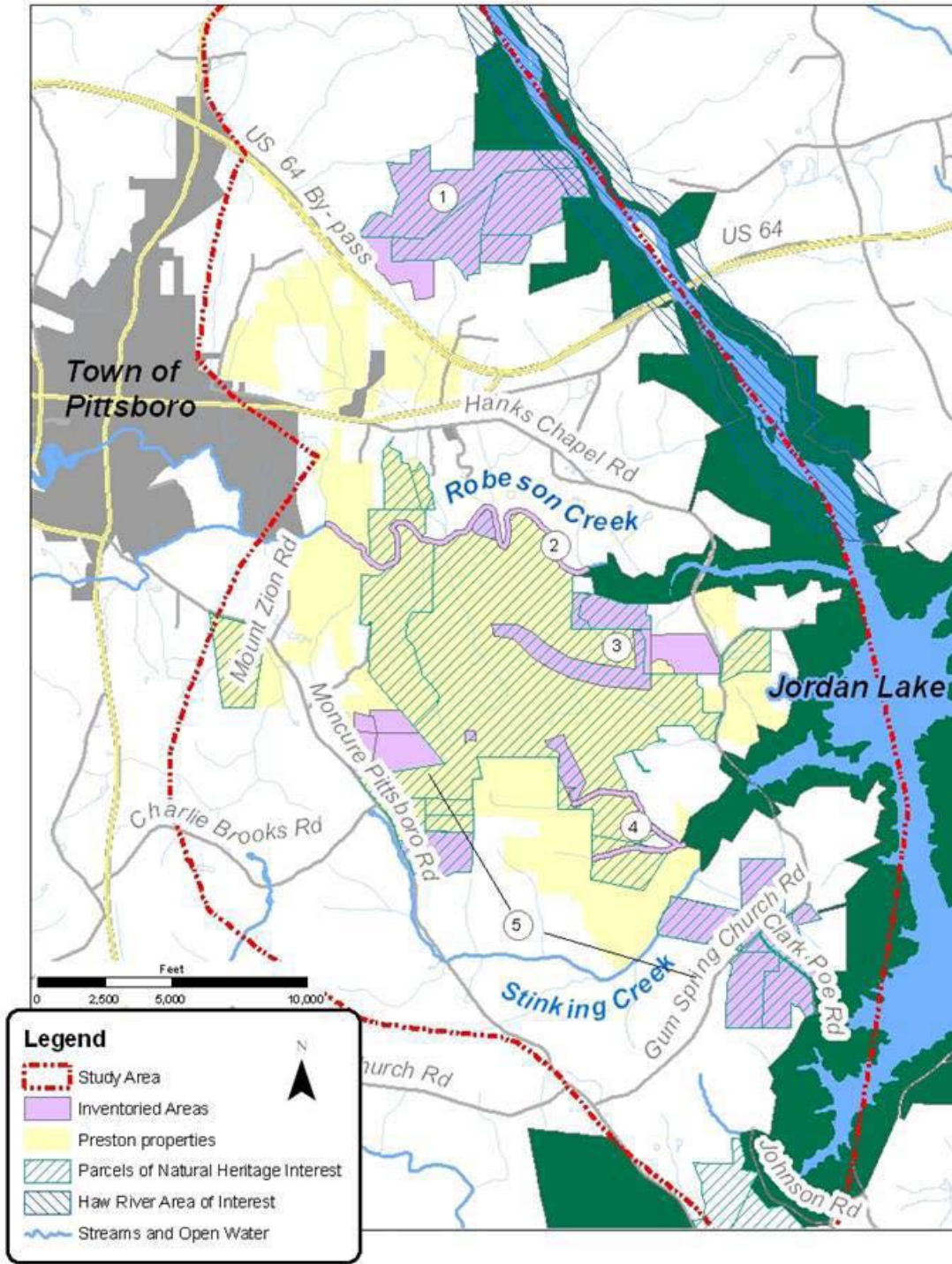


Figure 8: Inventoried Areas (shown in purple)

B. Natural Heritage: Findings

Findings

The following section summarizes some of the key conclusions of the Natural Heritage inventory. Detailed reports of these inventories are included in Appendix A of this report.

- 1) The area adjacent to the Lower Haw River State Natural Area is in good to excellent quality and is worth protecting. The area is mostly Dry-Mesic Oak-Hickory Forest, but with Mesic Mixed Hardwood Forest along the ravines. This portion could be added to the Haw River Slopes State Natural Area. At a minimum, the eastern portion of this area--the missing gap between the Park tracts--should be added to the Park unit. Unfortunately, much of this section is heavily overrun by the exotic autumn olive (*Elaeagnus umbellata*), and it is quite thick on portions of the steeper slopes close to the river. Some hand-cutting and spraying, or other techniques for eradication, are strongly encouraged.
- 2) The riparian assessment of Robeson Creek indicated that the 50ft buffer is of good to excellent condition. Contiguous tracts of undisturbed forest and canopy cover provide shade to the water surfaces and root mass to stabilize stream banks. Canopy structure is diverse with overlapping layers of overstory, mid-story, understory, and herbaceous plant cover. Though exotic invasive weeds are present throughout, native vegetation species are diverse in type and size. Large trees such as river birch (*Betula nigra*), ash (*Fraxinus* spp.), and sycamore (*Platanus occidentalis*) are scattered throughout. Spice bush (*Lindera benzoin*), painted buckeye (*Aesculus sylvatica*), and common pawpaw (*Asimina triloba*) are common mid-story shrubs and trees. Various sedges (*Carex* spp.) and rushes (*Juncus* spp.) dominate wetter areas. The wide expanses of vegetated stream banks act as filters for overland pollutant runoff. Riparian wetlands and seeps throughout the riparian area demonstrate that groundwater is close to the surface. (See Riparian Corridor Section for more information).
- 3) The area buffering the Robeson Creek Ravine is of good to excellent condition. The ridge tops observed generally contain stands of Dry Oak-Hickory Forest (which are dominated by large (approx. 30-40 dbh) White Oak trees (*Quercus alba*). A ravine leading down to a tributary of Robeson Creek has a large number of small (approx. 5-15dbh) Sugar maple (*Acer floridanum [barbatum]*) trees with scattered American beech (*Fagus grandifolia*) that are approximately 15-30dbh. The presence of these two species suggests that the soils in this area are more basic and potentially support a Basic Mesic Forest.
- 4) Much of the ravine area along northern tributaries to Stinking Creek has been recently logged with only a few areas having retained their original canopies. The topography in this area as well as the lack of floodplain terraces, isolated pools, or seeps make this area not as favorable to redback and four toed salamanders. Stinking Creek itself was not inventoried during this assessment.
- 5) Several smaller communities of mature Dry-Mesic Oak-Hickory Forest are located in the tracts inventoried in the southern portion of the study area. This area seems to have fewer contiguous tracts of mature natural communities, but contains a few notable areas that offer high conservation potential. These tracts range from 6- 80 acres with a total of 172 acres being identified as high quality forests.

- 6) Jordan Lake is by far the richest wildlife area in the county, and indeed, in the entire Triangle Region. The bald eagles that roost on the New Hope Point peninsula form one of the largest summer concentrations of this threatened species anywhere in the Eastern United States. Jordan Lake State Recreation Area and Gamelands are a source of recreation for residents and also provide drinking water to the region. Conservation of lands adjacent to the Lower Haw River Corridor, Robeson Creek, and Jordan Lake is critical to preserving this natural corridor.

Recommendations

This assessment recommends that developers in the study area work to:

- B.1. Conserve areas adjacent to the Lower Haw River Corridor, Robeson Creek, and Jordan Lake.*
- B.2. Work with the North Carolina Division of Parks and Recreation to add to the Lower Haw State Natural Area and the Deep River State Trail (see figure 21)*
- B.3. Ensure landscape connectivity by conserving lands adjacent to US Army Corps of Engineers Jordan Lake Lands, particularly the areas adjacent to the Robeson Creek Significant Heritage Area, as well as of areas of steep and dissected lands.*
- B.4. Cluster development to preserve large contiguous forested areas, particularly those areas adjacent to existing protected lands and areas identified in the state habitat guild analysis*
- B.5. Utilize the Department of Environment and Natural Resources' Conservation Planning Tool to plan for conservation, restoration, and site development (www.conservision-nc.net). Particular emphasis should be on the green and brown areas identified in the Biodiversity/Wildlife Habitat maps, as well as the preservation of a minimum of 100 foot buffers along all intermittent and perennial streams.*
- B.6. Conduct a full natural community inventory of remaining areas to inform sustainable site design and highest quality areas to be set aside as open space within the development.*
- B.7. Preserve 300 foot wildlife corridors along both sides of the Haw River, Robeson Creek, and Stinking Creek*
- B.8. During site design, incorporate recommendations from the NC Wildlife Resources Commission's "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality" (August 2002) found at http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf*

C. Water Quality

Water Quality

The assessment of water quality focuses on two areas: Jordan Lake and Robeson Creek, which traverses the study area and empties into the lake. Since the Southwest Shore Wilderness lies in the Cape fear Basin and drains into Jordan Lake, conservation of land in the study area will play a critical role in protecting the water quantity and quality of the lake. In addition to being a major drinking water resource, Jordan Lake is a popular recreational destination and supports a wide range of aquatic and water dependent wildlife.

Jordan Lake

Jordan Lake has consistently encountered environmental problems since its impoundment. The lake has historically been one of the most nutrient-rich reservoirs in North Carolina, frequently violating the state's water quality standards related to excess algal growth. In addition to natural sources, excess nutrients stem from many human activities throughout the lake's watershed, including fertilizer application on farms and residential lawns, livestock and pet waste deposited on the land, failing septic systems and wastewater treatment plant discharges.

The entire lake is currently listed as impaired because of excessive amounts of chlorophyll *a*, an indicator of algae growth that results from high levels of nitrogen and phosphorus. The Haw River arm of the lake is also listed as impaired because of high pH levels, which is detrimental to aquatic life. High pH levels, a condition that can result from excess nutrients, triggers federal Clean Water Act requirements to develop and implement nutrient loading reduction goals for the reservoir in the form of a 'total maximum daily load' (TMDL).

The State is in the process of approving a nutrient management strategy that defines goals and sets requirements for nutrient management, agriculture, wastewater discharges and stormwater management for new and existing development and government entities. The

requirements will address buffer protection and will call for stream buffers of at least 50 feet.

In addition, the Clean Water Responsibility Act of 1997, adopted by the NC General Assembly as S.L. 1997-458, includes requirements to address water quality problems in Nutrient Sensitive Waters, including Jordan Reservoir. The act mandates stricter nutrient concentration limits for point source discharges to these waters, and it directs the North Carolina Environmental Management Commission to establish goals for reducing overall nutrient inputs. Point and nonpoint sources, including stormwater runoff, are to share proportionally in responsibility for reducing inputs.⁷

Robeson Creek

Robeson Creek and its watershed serve as a water supply source to Jordan Lake. The creek is classified as a water supply watershed (WS-IV), nutrient sensitive (NSW), and a class C water body (Figure 9).⁸ In 2003, the state set a total maximum daily load (TMDL) for phosphorus that called for 71 percent reduction from urban runoff to Robeson Creek to address an earlier impairment designation for chlorophyll *a*. Sources of impairment include both point and nonpoint sources, including wastewater treatment plant effluent, urban development, stormwater runoff, and select agricultural practices.

The lower segment of Robeson Creek has also been identified as part of the Haw River arm of

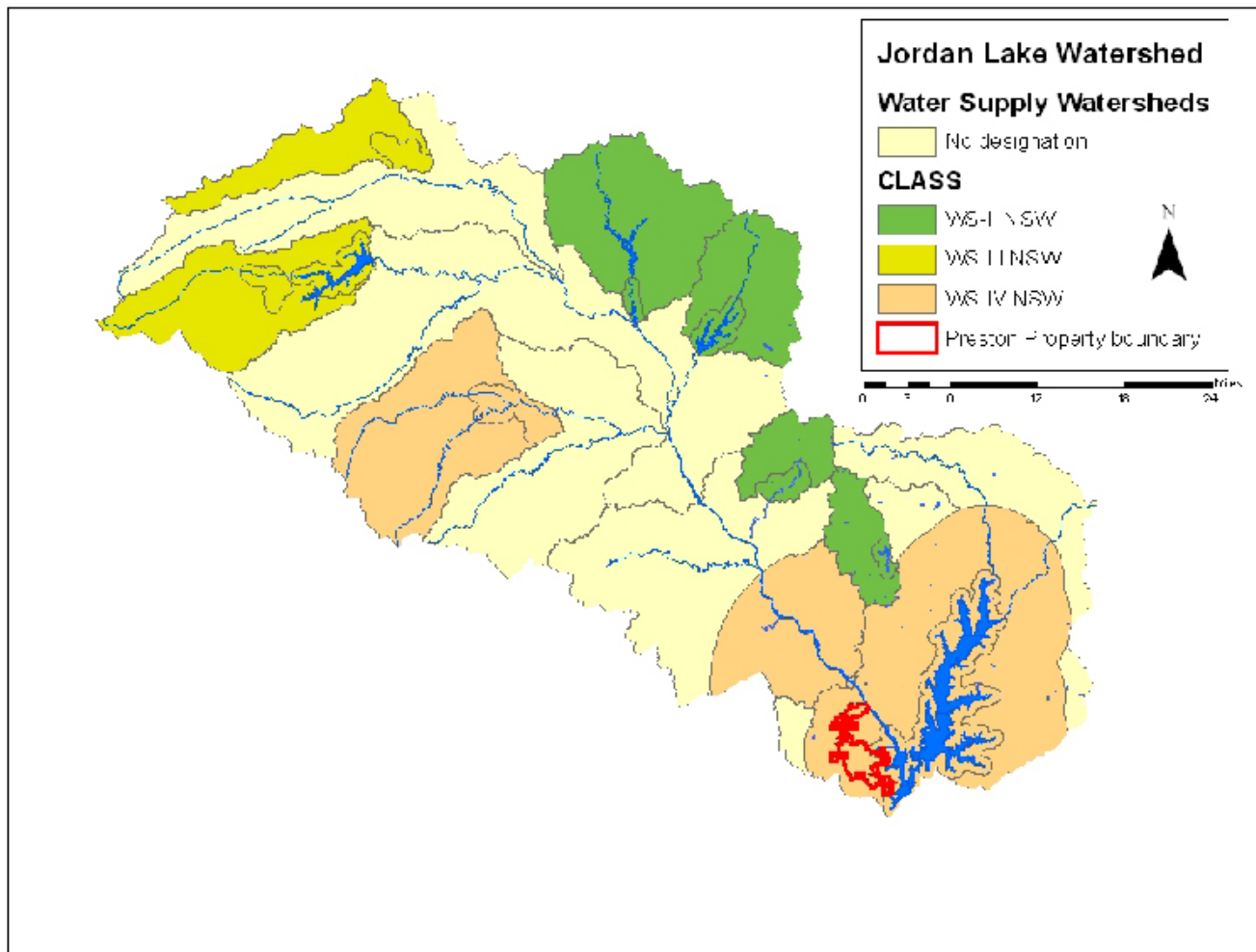


Figure 9: The study area is located in a WS-IV water supply watershed of Jordan Lake

Jordan Lake. The Jordan Lake TMDL will be applied to the Robeson Creek watershed. In May 2008, the North Carolina Environmental Management Commission unanimously adopted a revised set of rules designed to reduce nutrient levels in the lake. The Jordan Lake rules must receive additional legislative approvals before they go into effect. Updates on the new rules for the Jordan Nutrient Strategy can be viewed online at <http://h2o.enr.state.nc.us/nps/JordanNutrientStrategy.htm>.

The Draft 2008 NC State Impaired Waters List includes Robeson Creek from .9 miles upstream of Town Lake to an unnamed tributary downstream of Mount Zion Road as impaired for aquatic life (3.3 miles segment). According

to the NC Division of Water Quality (DWQ), the suspected cause of the impairment is high level of stormwater runoff. There is also an abundance of algae in Robeson Creek, which indicates nutrient enrichment. According to the 2005 Cape Fear River Basinwide Report, produced by the North Carolina Division of Water Quality, the habitat and riparian area were stable downstream of the impaired segment to Jordan Lake. The Robeson Creek Arm of the Jordan Lake Reservoir is listed as impaired for aquatic life due to high turbidity and high pH. This section is also impaired for fish consumption due to high levels of mercury (Draft 2008 303 (d) List-Integrated Report Category 5 http://h2o.enr.state.nc.us/tmdl/General_303d.htm). See figure 10 for a map of impaired waters.

C. Water Quality Continued

Findings

The only section of Robeson Creek that is not impaired lies within study area and borders much of Preston Development Company's land holdings. In order to maintain the water quality of this area, it will be critical for Preston and future developments to take into account the sensitivity of this watershed.

Jordan Lake and Robeson Creek already suffer from excess nutrient levels. Development in the study area will likely have a significant impact on the watersheds that feed into the lake, including the Robeson Creek watershed. The conversion

of forests and fields to houses, shops and offices will dramatically increase the amount of impervious surfaces (roofs, streets, and parking areas) in the watersheds, and could lead to even greater discharge of stormwater runoff into the creeks that empty into Jordan Lake, further compromising water quality.

As the population continues to rise, it is critical to maintain and improve the water quality of Robeson Creek and Jordan Lake, hundreds of thousands of Triangle residents will be relying on it.

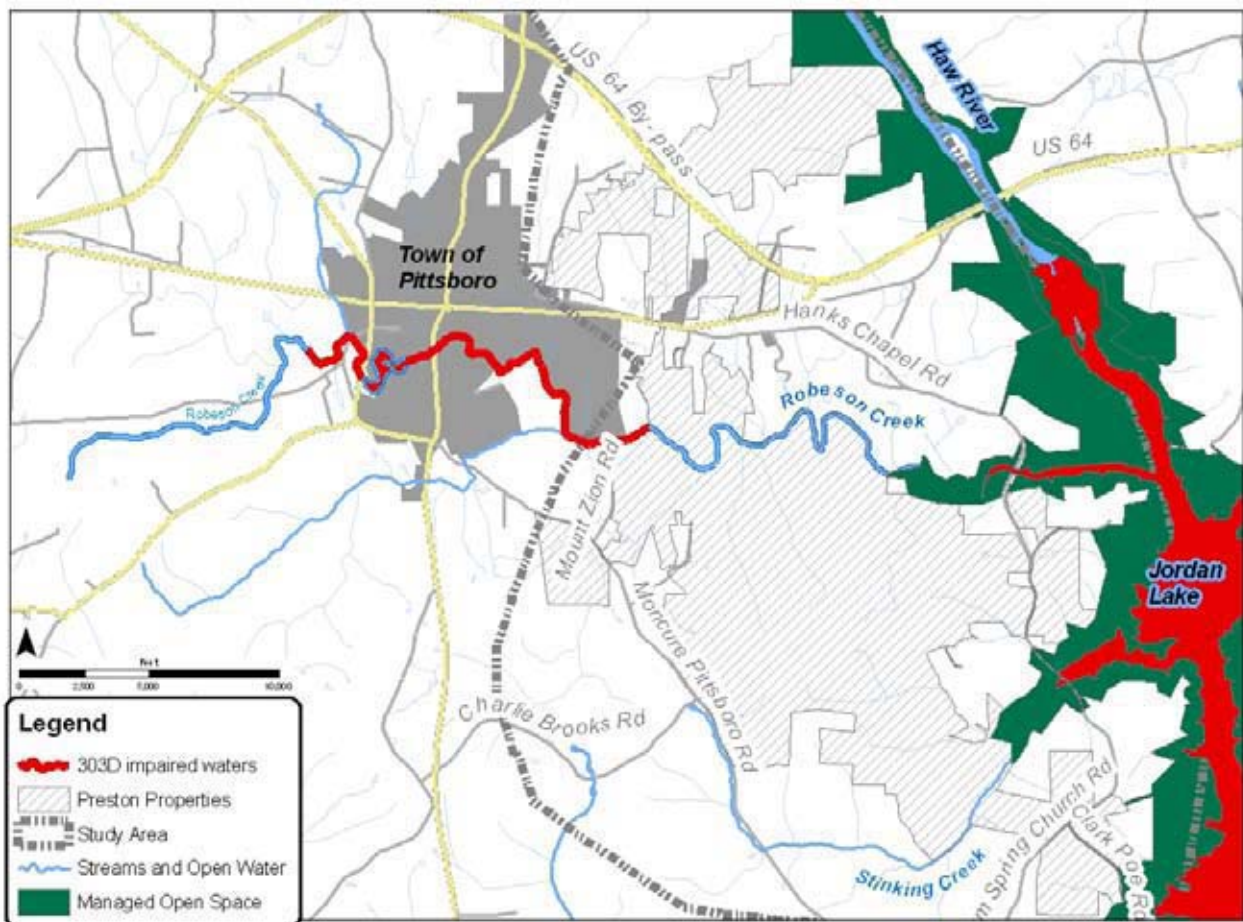


Figure 10: Most of Robeson Creek and Jordan Lake are considered impaired waters. The only section of Robeson Creek that is not impaired lies within study area and borders much of Preston Development Company's land holdings.

Recommendations

The rise of development in this watershed area could have tremendous impacts on Jordan Lake, its tributaries, and the Cape Fear River Basin. Therefore this assessment recommends developers and the Town of Pittsboro:

- C.1. Buffer streams, wetlands, seeps and springs throughout the property. Protect perennial streams with 100 foot buffers, intermittent streams and wetlands with 50 foot buffers, and ephemeral streams, seeps and springs with 30 foot buffers.*
- C.2. Preserve contiguous riparian buffers along streams and wetlands.*
- C.3. Minimize new stream crossings by roads and utilities.*
- C.4. Avoid alteration to natural stream flow.*
- C.5. Implement alternative building techniques to limit impervious surfaces, for example green roofs, rain gardens, and pervious pavement.*
- C.6. Implement and develop infrastructure systems which can support the use of reclaimed water.*
- C.7. Develop and implement a local stormwater ordinance.*
- C.8. Revise subdivision ordinances to allow for the implementation of Low Impact Development practices*
- C.9. Use native, drought tolerant species for landscaping.*



Figure 11: Robeson Creek has relatively good water quality. Development in this area should aim to not impact the quality of this stream though site design, stream buffers, and low impact development practices

D. Riparian Corridors

Riparian Corridors

The assessment of riparian corridors was limited to the main stem of Robeson Creek. Time and resource constraints prevented the work group from conducting an assessment of other creeks in the study area. Many of the findings and recommendations stemming from the assessment of Robeson Creek, however, might also apply to other creeks as well.

A total of 21 reaches were surveyed for riparian condition along approximately 16,000 linear feet of Robeson Creek that lies within the study area (see Figure 12). Using maps and GPS, the majority of the stream channel bordering the Preston property was quantitatively and qualitatively assessed for riparian buffer quality. A semi-quantitative vegetation assessment guide (beta version) developed by North Carolina State University was used in a series of reaches throughout the stream corridor. The findings of that survey are summarized in this section, a map of the surveyed area is shown in figure 12, Appendix B includes the complete inventory of Robeson Creek.

Riparian Assessment on the Robeson Creek - April 24 & 25, 2008

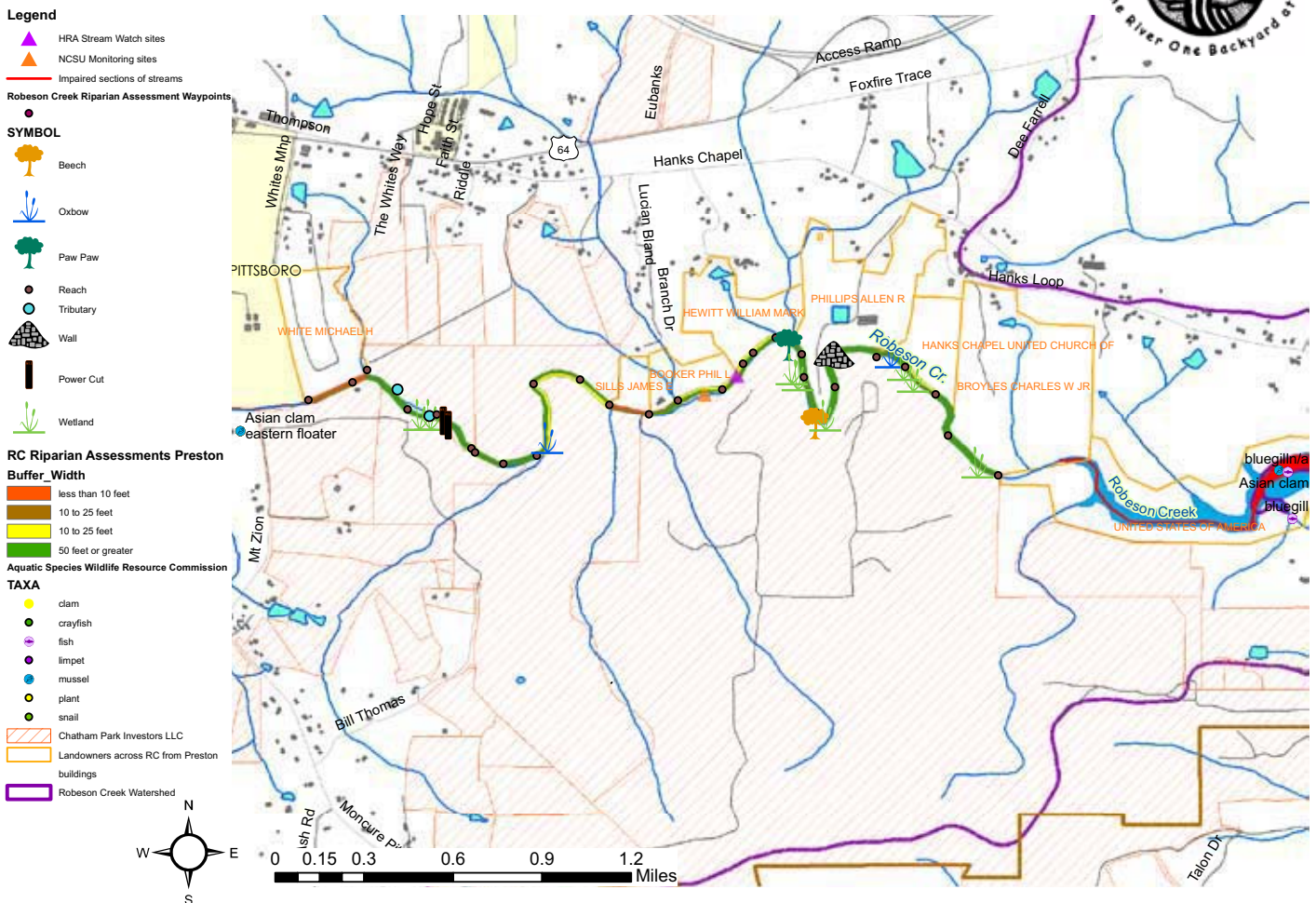


Figure 12: Overview map of the riparian assessment of Robeson Creek

Findings

- The floodplain is mostly a broad and expansive forest with areas of steep forested terrain that border the creek. The wide floodplain can be characterized generally as a Piedmont bottomland forest.
- A large section of adjacent land appears to have been logged several years ago, leaving an approximate 50-foot wide buffer on the right bank (looking downstream). Some sections were logged even closer to the stream.
- Overall structural complexity of the floodplain was very good with herbaceous, mid-story and canopy layers all present throughout the majority of the riparian area. Shade was persistently present over the majority of the creek with the exception of powerline right-of-ways.
- Root stabilization along the creek banks was average to poor. In general, a few large trees were spaced out at the top of the bank throughout the entire corridor. The creek has incised and widened through time causing erosion around these trees and they are slowly falling in, leaving the bank exposed to further erosion.
- Terrestrial habitat was varied throughout. A variety of large floodplain tree species such as sycamore and river birch occurred in wide expanses. Understory species included buckeyes, spicebush, and pawpaw. A variety of herbs were scattered throughout and included jack-in-the-pulpit, wood sorrel, and rushes and sedges.
- Invasive species were prevalent in most sections. Chinese privet and autumn olive occurred heavily in some areas. Japanese stiltgrass was also present in areas. In many sections, silverberry constituted nearly the entire mid-story canopy.
- Several intermittent and ephemeral streams entered the main channel at different locations. Wetlands were scattered throughout and most were in the form of old, abandoned channels.
- Beaver activity was present throughout. Some sections had more recent occurrences of beavers than others. Deer browse was heavy throughout. Chinese privet was heavily browsed by deer.
- Other wildlife noted included a pair of nesting woodducks, red-shouldered hawks, green herons, great blue herons, and tracks of raccoons and opossums.
- A man-made wall structure was a major feature in the lower section of the creek. At this time, it is unknown what the structure is.

In summary, this section of Robeson Creek and its riparian area are mostly intact with mature bottomland forests comprising the majority of the floodplain. The area provides excellent habitat, both aquatic and terrestrial. The creek is shaded by both buffer vegetation and upland vegetation. The floodplain is diverse with small tributaries, wetland areas, and numerous species of plants. The channel has suffered incision and widening most likely due to upstream inputs, but appears to be compensating well. Exotic invasive plants, especially silverberry, are pervasive throughout; the entire riparian area could benefit from a management plan for this problem vegetation. Additional planting of trees in areas where vegetation is sparse could also be part of an overall management plan to keep this section of Robeson Creek off of the impaired waters list and improve not only habitat, but also water quality.

D. Riparian Corridors: Recommendations

Figure 13: A man-made rock wall structure discovered during the Robeson Creek inventory should be investigated for its historical significance



Figure 14: Riparian Area of Robeson Creek

Recommendations

- D.1. Establish a conservation easement along the main stem of Robeson Creek. This easment should protect the riparian area of the creek and should eb at least 300 ft in width on each side. Triangle Land Conservancy, Haw River Assembly, or the North Carolina State Park system could potentially hold an easement. The easement could potentially be used for a trail to connect historic Pittsboro and Preston development to Robeson Creek Boat Ramp on land under the jurisdiction of the Army Corp of Engineers (see figure 23).***
- D.2. Maintain upland and riparian buffers to the maximum width possible. Riparian buffers should be no less than 100 feet on each side of Robeson Creek. Given that this is a major floodplain, wider buffers would accommodate more floodwater storage. Maintaining upland buffers would minimize erosion and help prevent runoff from entering the riparian buffer. Maintaining buffers is crucial to protecting the health of this segment of the creek and preventing it from becoming listed for biological impairment.***
- D.3. Buffer streams, wetlands, seeps and springs throughout the property. Suggested buffer widths for water quality include perennial streams with 100 foot buffers, intermittent streams and wetlands with 50 foot buffers, and ephemeral streams, seeps and springs with 30 foot buffers. Ephemeral and intermittent streams funnel the majority of water to larger order streams and should merit protection in addition to the perennial streams.***
- D.4. Protect and enhance wetlands and seeps. Robeson Creek has numerous floodplain wetlands and seeps. This not only diversifies terrestrial and aquatic habitat, but also filters water, thereby improving water quality of the creek as well as Jordan Lake..***
- D.5. Plant native vegetation in the buffer to enhance habitat and stabilize stream banks. Tree and shrub planting is recommended.***
- D.6. Invasive exotic vegetation is abundant in portions of the riparian area. Develop and implement a management plan to control and reduce these populations.***
- D.7. Investigate the potential historic significance of the man-made rock wall and ditch that borders the south-side Robeson Creek on Preston property across from Allen Phillips land.***
- D.8. Conduct a riparian corridor assessment on Stinking Creek and other major tributaries in the study area***

E. Wildlife Habitat

E. Wildlife Habitat

Conservation and management of wildlife habitat in Chatham County will benefit the local environment, economy, and community in many ways, as summarized below.

Conserving wildlife habitat will help support a healthy ecosystem. An ecosystem is made up of a complex web of interactions among the different plants, animals, and abiotic components (water, soil, air, sun). Different wildlife species play different, but necessary, roles in the functioning of ecosystems. Ecosystems that are intact and function well provide greater “ecosystem services” for the community—including clean drinking water, nutrient cycling, erosion and flood control.¹⁰ For example, floodplains and wetlands can help reduce downstream flooding as well as remove certain pollutants from stormwater. When important wildlife species are lost from an ecosystem, the system begins to break down and provides fewer ecosystem services.

Economic benefits accrue from wildlife habitat conservation. Conservation of wildlife preserves within a development project can increase property values and reduce costs of construction. Several studies have shown that homes adjacent to open space sell for a premium. **In Apex, North Carolina, homes in the Shepherd’s Vineyard development adjacent to the American Tobacco Trail sold for \$5,000 more than other homes in the neighborhood.**¹¹ Similarly, a recent study in South Carolina revealed that the cost of developing a 96-acre subdivision in a conventional pattern was \$10,000 more per lot than developing according to conservation subdivision principles, in which homes were clustered to preserve open space.¹² Finally, wildlife watching is an increasingly popular recreation activity, one that is becoming big business in North Carolina. In 2006 alone, approximately \$2.3 billion dollars were spent on wildlife-related recreation in North Carolina.¹³

Conservation of wildlife habitat is important to North Carolina citizens, and it will improve Chatham residents’ quality of life. A recent survey found that 89% of North Carolina residents believe conservation of wildlife habitat is important—even if it means limiting development.¹⁴ Research shows that people who live and work in developments with adjacent natural areas have a stronger sense of community and build better relationships with neighbors.¹⁵ Moreover, conservation and management of wildlife habitat will provide places for children in Chatham County to grow up learning about nature—and its diversity of plants and animals. Research shows such experiences are important in a child’s development.¹⁶



Figure 15: Neotropical migratory songbirds such as the scarlet tanager (*Piranga olivacea*) nest in the interior deciduous forests surrounding Jordan Lake. The area has been identified as an important bird area by the Audobon Society.

The Southwest Shore's Wildlife Habitats

The Southwest Shore Wilderness region of Jordan Lake currently provides important wildlife habitat, particularly upland habitat, in the otherwise rapidly developing Triangle region. The entire Jordan Lake-Southwest Shore area provides essential terrestrial habitat for animals that require large areas of interior forest to persist. This includes mammals with large home ranges like the bobcat (*Felix rufus*) and gray fox (*Urocyon cinereoargenteus*). Neotropical migratory songbirds—including the wood thrush (*Hylocichla mustelina*), scarlet tanager (*Piranga olivacea*), and hooded warbler (*Wilsonia citrine*)—also nest in the interior deciduous forests surrounding Jordan Lake. Small, isolated wetland communities (vernal pools, springs, seeps) in both the floodplain and uplands are inhabited by reptiles and amphibians that are identified priority species for conservation in the NC Wildlife Action Plan, such as the state-listed four toed salamander (*Hemidactylium scutatum*) and the spotted salamander (*Ambystoma maculatum*).¹⁷ The NC Natural Heritage Program has documented many unique natural communities in this area, particularly oak-hickory forests, which are an important food source for many wildlife species.

In addition to preserving large tracts of land, preserving wildlife corridors is also important. Recent research has shown that wide greenways with forested corridors 100 meters (~300 feet) wide can provide travel corridors for some forest interior species in the area—including the wood thrush. However, other species of conservation concern, such as the ovenbird or black and white warbler, require forested corridors at least 300 meters (~1000 feet) wide.¹⁸

The best available science suggests that the following stream buffer widths will provide minimum needed protections for wildlife:

- o **250 foot stream buffers to conserve stream salamander habitat,**¹⁹
- o **200 foot buffers around perennial streams (and 100 foot buffers around intermittent streams) are needed to conserve federally endangered fish and mussels, and**
- o **100 foot buffers around remaining perennial streams, and 50 foot buffers around remaining intermittent streams are adequate for conserving non-endangered fish and mussels**²⁰

Recent research also suggests that upland buffer zones of ~500 feet are needed around wetlands to protect core habitat for the entire range of semi-aquatic reptiles and amphibians using

wetlands in North Carolina,²¹ Although, some species will persist with smaller upland buffers.

Finally, management of protected lands is crucial to maintaining the biological integrity of ecosystems. One common management tool is prescribed burning—a method of controlling invasive plant species and reducing the likelihood of catastrophic wildfires. Prescribed burns are carried out regularly on Game Lands. When infrastructure is built within the ½ mile smoke management buffer, it poses risks associated with smoke, and also makes it increasingly difficult to conduct these needed burns, increasing the potential for catastrophic fires.



Figure 16: Upland wetland areas, such as this one located on the Preston properties should be protected with buffers

E. Wildlife Habitat: Findings

Findings

Development in the Southwest Shore area will inevitably fragment and reduce the quality of existing habitat. In addition to eliminating habitat on privately owned land, development will have negative secondary and cumulative impacts on habitats found on public lands around Jordan Lake. Built areas, roads, and utility and powerline clearings will open Jordan Lake's managed forests to invasion by "edge predators" like the brown-headed cowbird (*Molothrus ater*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and the housecat. These edge predators can displace less common species—such as the scarlet tanager or spotted salamander—that are listed as priorities for conservation in the State's Wildlife Action Plan.

In addition, forest fragmentation will increase the susceptibility of Jordan Lake's natural areas to invasive, exotic plants. Invasive, exotic plants are species that do not naturally occur in North Carolina, but have been introduced by people. Many introduced plants pose no threat, but some grow out of control since the natural controls that keep them in check in their homelands do not exist here. Common invasive plants in North Carolina include Kudzu (*Pueraria montana*), Japanese Grass (*Microstegium vimineum*), and Multiflora Rose (*Rosa multiflora*). Invasive species can cause significant and costly damage to ecosystems, habitats, and native species.

If proper steps are taken, negative impacts to wildlife can be minimized, and important wildlife habitats can be conserved in the Southwestern Shore area. To do so, conservation must be strategic, based on science, and involve active habitat management over the long term.

Recommendations

Several suggestions for accomplishing sound conservation are provided below.

E. 1: Designate and conserve a connected habitat network, and connect core natural areas with wildlife corridors

- ***Preserve a contiguous open space network within the Preston development project, (ideally 50% of developable land or more), and connect it to important wildlife areas outside of the development. To conserve wildlife habitat, the open space network will need to consist of large core areas of un-fragmented habitat that are connected by wildlife corridors.***
- ***Design wildlife core areas and corridors to preserve the highest quality wildlife habitats in the area, which include any vernal pools, wetlands, rock outcrops, mature hardwood forests, lands adjacent to existing protected areas, or other unique sites identified in the Natural Heritage Inventory report.***
 - o ***Design wildlife core areas to be as large as possible (200+ acres) and to maximize interior area, while minimizing edge.²²***

- o *Design wildlife corridors so they are as wide as possible, trail widths are minimized, the canopy cover is maintained, and layers of shrubs and groundcover are maintained.* ²³

E.2: Design development sites to minimize impacts on important habitats and species

- *When designing development sites, establish appropriate buffers around all streams, springs, seeps, and wetlands to conserve the full range of wildlife species that use these aquatic and semi-aquatic habitat types.*
- *Protect the full extent of the 100-year floodplain of all creeks and streams.*
- *Manage stormwater on site, preferably with green roofs as well as rain gardens that contain wildlife-friendly landscaping materials (such as native plants). Incorporate native plants that are beneficial to wildlife into the design of built infrastructure. See <http://www.ncsu.edu/goingnative/> for detailed instructions.*
- *Cluster developed areas as close to existing roads and Pittsboro as possible and away from ecologically important areas, such as areas designated by the natural heritage program as significant.*
- *Prescribed burning and timber management that presently occurs in the study area should continue. To avoid conflicts between current management activities and future residents of the Preston Development, limit built structures within ½ mile of areas where large scale prescribed burning occurs.*
- *Locate all permanently inhabited structures outside the recommended 150 yard hunting safety buffer external to Game Land boundaries. Doing so will help prevent conflicts between hunters and future residents.*
- *Keep all utility lines out of Game Lands and other protected lands.*

E.3: Actively manage natural areas within the habitat network over the long term

- *Without active management, habitat quality will decline. Open spaces and protected natural areas on the Southwest Shore should be actively managed using upland habitat management techniques, including: burning, thinning, reforestation, exotic plant control, feral cat control, snag creations and canopy gap creations.*
- *Create a natural resource management plan for the preserved open space network within Preston Development that includes the habitat management techniques listed above.*

E. Wildlife Habitat: Recommendations

- *Create a long term funding mechanism to implement goals and objectives of the natural resource management plan, such as collecting fees from future businesses and the HOA that will become part of the Preston Development.*
- *Hire a qualified conservation land manager to implement the management plan, oversee all resource management activities, and organize environmental education programs for future residents. See the “conservation director” position in the Harmony, Florida development as an example (<http://www.harmonyfl.com/harmonypreserve.html>).*

E. 4: Enroll development projects in the wildlife-friendly development certification program

- *The North Carolina Wildlife Resources Commission, in partnership with other organizations, is in the process of developing a wildlife-friendly development certification program. Enrolling development projects—such as Preston—in this program will help conserve habitats alongside developed areas on the Southwest Shore.*



Figure 17: Pictures of the Harmony development. The Harmony development near Orlando, Florida employs a full time conservation director who is responsible for the wildlife habitat management, best development practices and resident conservation education programs for the 11,000-acre development which contains a 7,700 acre network of protected habitat.



F: Working Lands

Working Lands

Agriculture is an important part of Chatham County's economic and employment base. Agriculture is the county's number one industry, and the county is home to many family operated large and small scale farms. Chatham also has one of the largest growing segments of small and locally produced agriculture in the state of North Carolina. The pastoral landscapes are key identifying traits of the county and provide multiple economic, scenic and environmental benefits.

Farm and forest land make up a significant portion of the land use in the county, with approximately 65% of the land in forests and about 27% of the land in agriculture.

Across the nation, small farm operations are being integrated into new subdivisions. This runs counter to the conventional notion that farmers and homeowners do not mix well. Incorporating small farms into residential developments provides multiple benefits to everyone living in the community and adds value to the development. Benefits can include:

- Conservation of important soils and open space
- Land restoration (e.g. organic farms)
- Reduced reliance on food transported from distant sources
- Increased neighborhood community through use of common amenity
- Increased land values

For example, the highly successful Prairie Crossing, a development north of Chicago, incorporated a 100 acre organic farm into its 677 acre subdivision.²⁴ The 100 acres is part of a larger parcel of land, (470 acres, or about 70% of the property) set aside for conservation. The land is leased to farmers who run a Community Supported Agriculture (CSA) program and an on-site farmers' market in addition to regular sales. The farm has become an integral part of the development and a major marketing attribute. Table 3 lists several other developments which have incorporated working farms.

Findings

Due to its large size, proximity to Pittsboro, and projected future population, the study area contains several ideal sites for small scale farming operations and markets. The area was traditionally composed of many small subsistence farms and has several areas with prime soils that could become small farm operation sites. Small farm sites (approximately ten acres each) could be donated to a qualifying non-profit conservation organization that could then make the land available for very long term leases to qualifying farmers, thus allowing for capital investment by the farmer in farm operations rather than land.



Figure 18: The Prairie Crossing Farm located in a development outside of Chicago supplies organic produce to a local farmer's market within the development and operates a farm learning center. Based at an old farmstead with several houses, barns and outbuildings, the farm consists of about ninety acres.

F. Working Lands: Recommendations

Table 3: Developments with working farms ²⁵

Name/Location	House Price	Comment
Bundoran Farm Albermarle County, near Charlottesville, VA	\$400,000 to over \$1 million for home sites	The community has 2,300 acres, riding trails, two ponds and a farm with over 100 cattle.
South Village South Burlington, VT	High \$200,000s to around \$600,000	Under development. Homes will surround a 40-acre farm that will grow corn and other organic produce.
Babcock Ranch Southwest FL, near Ft. Myers	\$200,000 - \$1 million plus.	Under development. The 17,000-acre community is surrounded by 73,000 acres that include a nature preserve
Tryon Farm Michigan City, Indiana, about an hour east of Chicago	\$168-000 - \$488,000	Many of the homes are contemporary in style; the farm produces feed crops like alfalfa and has goats, chickens, pheasants and guinea hens.

The study area also has the potential for other complementary agricultural uses in addition to working farms. Spray irrigation of sewage effluent has become a common practice for eastern Chatham County developments due to the poor drainage characteristics of many soils. While not appropriate for produce farms, spray irrigation could be very beneficial for crops not used for direct human consumption, such as hay and biofuel crops, thus providing dependable plant growth in an area frequently subject to drought while recycling or reusing valuable water resources.

Recommendations

F.1. Set aside land for small produce farm lease areas on prime soils.

F.2. Set aside larger areas of land for biofuel crops, native plant nurseries, and/or hayfields. These areas could be used for spray irrigation of effluent.

F.3. Incorporate a local farmer's market into development plans.

G: Recreation

Recreation

Recreation, trail, and parks facilities improve the quality of life for Chatham County citizens. Existing facilities are well known and used by both local and regional communities. For example, Jordan Lake, a state operated recreational facility, serves people from North Carolina and beyond. The Haw and Deep Rivers draw white water enthusiasts and more leisurely paddlers and fishermen from Chatham and surrounding counties. Additionally, future state and county parks and natural areas along these rivers will provide prime recreational opportunities and heighten the attractiveness of Chatham County for residents and businesses. This assessment addresses passive recreation needs that could be incorporated into a network of conservation lands, particularly, trail corridors and greenways.

In a survey conducted by Chatham County for their parks and recreation master plan update, walking, hiking, biking, and open space ranked the highest out of approximately 40 potential future facility options²⁶ (see Figure 19). Hiking trails and open space/natural areas received the highest number of priority votes with approximately 116 and 106 votes from citizens. Additionally 89% of survey respondents indicated that they would support a greenway system.

*Chatham County, North Carolina
Comprehensive Parks and Recreation Master Plan, 2007-2017
Section 4: Recreation Needs Assessment*

Total number of priority votes (1 though 10) received for each facility

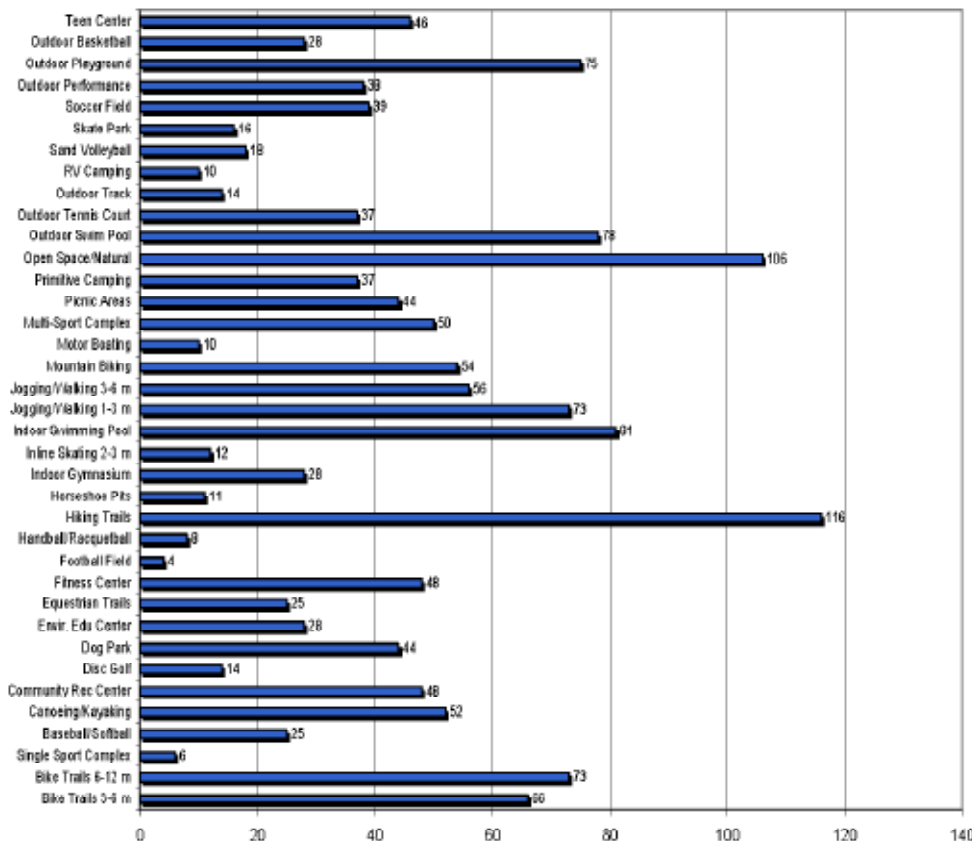


Figure 19: Recreation Needs Assessment from Chatham County's comprehensive parks and recreation master plan. Hiking Trails and open space/ natural areas received the highest rankings.

G. Recreation: Findings

A recreational trail system within the Southwest Shore area would help meet the recreation needs of existing and future citizens. Additionally the system could provide key connections which could serve economic, environmental, recreation, and transportation needs.

Several national and local studies have shown that access to recreational trails increases property values.

- In Salem, OR, land adjacent to a greenbelt was found to be worth about \$1,200 an acre more than land only 1000 feet away.
- In Seattle, WA, homes bordering the 12-mile Burke-Gilman trail sold for 6 percent more than other houses of comparable size.
- In Brown County, WI, lots adjacent to the Mountain Bay Trail sold faster for an average of 9 percent more than similar property not located next to the trail²⁷

Additionally, there are a multitude of environmental benefits from trails and greenways that help protect the essential functions performed by natural ecosystems.

Trails and greenways can:

- Protect and link fragmented habitats and create valuable wildlife corridors,
- Help reduce air pollution by providing alternative transportation corridors and areas of vegetation that create oxygen and filter air pollutants, and
- Improve water quality by creating a natural buffer zone that filters runoff and pollution into streams and water bodies.

These are just a few of the benefits that a trail recreation system could provide in the Southwest Shore area. In particular a trail system in this area could link key wildlife and recreational hubs in the Triangle Area. Hubs in this sense mean the larger contiguous areas of preserved land.



Developments in the area should provide recreational corridors which link the Deep (bottom) and Haw River (top) paddle and walking trail initiatives

The State already has several key recreation hubs in the study area including:

1) The Lower Haw River State Natural Area

The Lower Haw River State Natural Area is a corridor ranging along both sides of the river in Chatham County just north of the Jordan Lake State Recreation Area, and is approximately 1,000 acres in size. (http://www.ncparks.gov/About/plans/new/loha_main.php)

This area has long been popular with hikers and canoeists, and is remarkable for its steep slopes and rock outcrops. Preservation of the natural area will aid in protecting the water quality of the Haw, a major tributary of the Cape Fear River.

2) Deep River State Trail

The Deep River State Trail, a new unit in North Carolina's state park system, will eventually be a network of conservation lands and recreation amenities stretching along the river corridor from its headwaters in Guildford County through Randolph, Chatham and Moore counties to the confluence of the Deep and Haw Rivers in Lee County.

Long popular with paddlers and anglers, the Deep River offers a corridor with a tremendous potential for linking conservation lands, cultural resources and recreation opportunities. This state trail presents an opportunity to build destination tourism in a five-county region.

3) Haw River Trail

The Haw River corridor has long been a popular recreation draw for paddlers and hikers, with informal agreements for access and use. In 2006, nine local governments in central North Carolina and the N.C. Department of Environment and Natural Resources signed a Memorandum of Understanding that will work to build consensus for management, project priorities, increased funding opportunities, safety standards and infrastructure for a multi-use trail within a 1,000-foot-wide corridor. The 70-mile trail— with state parks anchoring each end – provides conservation, recreation and opportunities for ecotourism.

The section of the Haw River Trail from its headwaters to Cane Creek is also part of the primary route of the statewide Mountains To Sea Trail. The rest of the river, from Cane Creek south to Jordan Lake, is a secondary, or alternative, section of the Mountains To Sea Trail.

G. Recreation: Recommendations

Large developments in the Southwest Shore Wilderness area have the opportunity to add to all of these recreational areas as well as create new core hub areas. These areas will provide opportunities for both wildlife and passive recreation. For example, the Hemlock Bluffs Nature Preserve in Cary has provided a 150 acre nature oasis that is well visited by both wildlife and human neighbors from the rapidly urbanizing neighborhoods.

Recommendations

Based on the existing recreation resources and planned growth in Chatham County, this assessment recommends the following:

- G.1. Develop a trail system that connects the proposed development to key cultural and natural features including Stinking Creek and Robeson Creek riparian corridors, Jordan Lake, The Lower Haw State Natural Area, and the Town of Pittsboro.***
- G.2 Plan for and set aside land to develop a trail system that could help establish and eventually connect the Haw River Corridor to the Deep River along the western shore of Jordan Lake.***
- G.3 Incorporate natural and stone trail surfaces in order to limit the impact of impervious surfaces on trails and trail facilities***
- G.4 Avoid sensitive environmental areas (e.g., steep slopes, wetlands, or habitat for rare or endangered species) in selecting routes for trails.***
- G.5 Place trails outside of a 50 ft riparian buffer along streams and water bodies.***
- G.6 Incorporate wide riparian corridors (150 + ft) in order to provide room for trails, riparian buffers, and wildlife.***
- G.7 Incorporate mountain biking and horseback riding trails on less sensitive environmental areas.***
- G.8 Provide passive recreation sites (200 + acres) with walking trails and nature observation areas***
- G.9. Co-locate active and passive recreation facilities with active recreation on less sensitive ecological areas***

H: Scenic Viewsheds

Scenic Viewsheds

Chatham County is well known for its scenic vistas. The rolling hills, fields, forests, rivers, and reservoirs provide a scenic backdrop as one traverses the county on foot, bike, boat, or automobile. Some of the most scenic panoramas in the county are seen as one enters the county from the east along highway 64. Jordan Lake and the Haw River provide a sharp contrast to the more urban areas of Wake County. The higher elevation hills in the study area provide a backdrop or viewpoint to many of these natural amenities as well of the major corridors entering the Town of Pittsboro. The scenic qualities of many of the roads in the study area can be attributed to narrow width and relatively low traffic flow as



the roads wind through fields, forests and farms. Although new roads are likely, design should take into account the unique scenic qualities of the existing road infrastructure and site lines and distant views that frame it.

Findings:

Throughout the assessment, TLC and volunteers drove many of the roads in the Southwest Shore Wilderness area and documented some of the more notable viewpoints. For

example, as one exists onto business 64 from the bypass, a panoramic view of the distant hills can be seen from the road. These viewpoints were entered into a 3D GIS analysis in order to determine specific areas which contributed to the viewshed from the major road corridors in the study area. This analysis identified several prominent ridgetops that can be seen from multiple vantage points throughout the county.

Recommendations

In order to preserve the unique views in the study area, this assessment recommends that:

H.1. Prominent hills in the study area be set aside as conservation areas.

H.2 Limit development to areas with slopes less than 15%.

H.3 Road design should incorporate the existing tree canopies and natural views.

H.4 New development should be respectful of the rural nature of the County and Town Entrances

IV. Summary of findings and recommendations

SUMMARY OF FINDINGS

Culture/History

The Southwest Shore area was home to many small subsistence farms. It also was crossed by many old roads and trading paths that brought travelers across New Hope Creek and the Haw River and into Pittsboro. Unfortunately, most of the historical significance of the study area is not known.

Natural Heritage

The area adjacent to the Lower Haw River State Natural Area, as well as the area buffering the Robeson Creek Ravine and the 50 foot riparian buffer along Robeson Creek, are of good to excellent quality, although some of these areas are overrun by the exotic plants. Much of the ravine area along northern tributaries to Stinking Creek has been recently logged with only a few areas having retained their original canopies.

Several smaller communities of mature Dry-Mesic Oak-Hickory Forest are located in the tracts inventoried in the southern portion of the study area. This area seems to have fewer contiguous tracts of mature natural communities, but contains a few notable areas that offer high conservation potential.

Jordan Lake State Recreation Area and Gamelands are a source of recreation for residents and also provide drinking water to the region. These areas also provide habitat for one of the largest summer concentrations of bald eagles in the Eastern United States.

Water Quality

The only section of Robeson Creek that is not impaired lies within study area and borders much of Preston Development Company's land holdings. Jordan Lake and Robeson Creek already suffer from excess nutrient levels. Development in the study area will have a significant impact on the watersheds that feed into the lake, including the Robeson Creek watershed.

Riparian Corridors

This section of Robeson Creek and its riparian area are mostly intact with mature bottomland forests comprising the majority of the floodplain. The area provides excellent habitat, both aquatic and terrestrial, although exotic invasive plants, especially autumn olive, are pervasive throughout.

SUMMARY OF FINDINGS

Wildlife Habitat

Development in the Southwest Shore Wilderness area will inevitably fragment and reduce the quality of existing habitat. In addition to eliminating habitat on privately owned land, development will have negative secondary and cumulative impacts on habitats found on public lands around Jordan Lake. Forest fragmentation will increase the susceptibility of Jordan Lake's natural areas to invasive, exotic plants, which can cause significant and costly damage to ecosystems, habitats, and native species.

Working Lands

Due to its large size, proximity to Pittsboro, and projected future population, the Southwest Shore Wilderness area contains several ideal sites for small scale farming operations and markets. The area could also support complementary agricultural uses such as spray irrigation of sewage effluent for crops that are not used for direct human consumption, such as hay and biofuel crops.

Recreation

A recreational trail and greenway system within the Southwest Shore Wilderness area would help meet the recreation needs of the area as well as link fragmented habitats and create valuable wildlife corridors. In addition, a trail and greenway system could help reduce air pollution by providing alternative transportation corridors and areas of vegetation that create oxygen and filter air pollutants, and improve water quality by creating a natural buffer zone that filters runoff and pollution into streams and water bodies.

Scenic Viewsheds

The Southwest Shore Wilderness Area's rolling hills, fields, forests, rivers, and reservoirs provide a scenic backdrop as one traverses the county on foot, bike, boat, or by car. Some of the most scenic panoramas in the area are seen as one enters the county from the east along highway 64. The hills in the study area provide a backdrop or viewpoint to many of the natural amenities as well of the major corridors entering the Town of Pittsboro.

IV. Summary of Recommendations

SUMMARY OF RECOMMENDATIONS

The recommendations that follow stem from the findings of each section of the report. They are meant to serve as a guide to development of the Southwest Shore Wilderness in order to protect and even enhance the most important features of the site, based on the inventories that were conducted as part of the study. The inventories, however, were not comprehensive, but focused on particular areas such as Robeson Creek and Haw River Levees and Bluffs. Thus, one of the key recommendations of the report is to conduct additional inventories to identify and assess the key historic, cultural and natural features of the study area. This inventory will help inform the design of the project and ensure that the most sensitive areas are conserved.

The recommendations should not be viewed in isolation: some overlap and most are mutually reinforcing. For example, preserving riparian corridors not only helps protect wildlife habitat and linkages but provides opportunities for recreational trails as well. Avoiding sensitive areas such as steep slopes can protect water quality and scenic views. Conservation developments help redefine the standards for appropriate land-use on vacant land rich with natural resources. Throughout the country, conservation oriented developments have helped protect land and produced highly marketable communities. Throughout this section, several of these developments are highlighted in the side bars.

Overall, we recommend that the developers in this area use the following recommendations as a guide to development of the site.

Prairie Crossing



Prairie Crossing is a “conservation community” located 40 miles northwest of Chicago, and an hour south of Milwaukee, in the town of Grayslake, Illinois. Based on a set of ten guiding principles the community strikes a balance between preserving the natural landscape, providing energy efficient homes of Midwestern vernacular, and presenting a variety of opportunities for resident involvement.

Ten guiding principles

1. Environmental protection and enhancement.
2. A healthy lifestyle.
3. A sense of place.
4. A sense of community.
5. Economic and racial diversity.
6. Convenient and efficient transportation.
7. Energy conservation.
8. Lifelong learning and education.
9. Aesthetic design and high-quality construction.
10. Economic viability

Over 60 percent of the 677-acre site is protected open space. The development includes a managed prairie and local farm

<http://www.prairiecrossing.com/>

1. Preserve Areas of Cultural or Historic Significance

- Conduct a full, on-the-ground, historical inventory of the site before development occurs. The study area's unique history should be preserved and incorporated into development plans for the site.
- Investigate the potential historic significance of the man-made rock wall and ditch that borders the south-side Robeson Creek on Preston property across from Allen Phillips land.

2. Identify and Preserve Landscape Linkages

- Conserve areas adjacent to the Lower Haw River Corridor, Robeson Creek, and Jordan Lake. In particular, the area adjacent to the Haw River Slopes State Natural Area should be added to the Haw River Slopes State Natural Area. At a minimum, the eastern portion of this area--the missing gap between the Lower Haw River State Natural Area tracts--should be added to the Park unit.
- Develop a trail system that connects the proposed development to key cultural and natural features including Stinking Creek and Robeson Creek riparian corridors, Jordan Lake, the Lower Haw State Natural Area, and the Town of Pittsboro.
- Design and conserve an integrated network of habitats and corridors, connecting core natural areas with wildlife corridors inside and outside of the study area. To conserve wildlife habitat, the network will need to consist of large core areas of un-fragmented habitat that are connected by wildlife corridors.
- Design wildlife core areas to be large enough (200+ acres) to discourage edge-dwelling species. Design wildlife corridors so they are as wide as possible, trail widths are minimized, the canopy cover is maintained, and layers of shrubs and groundcover are maintained.

3. Protect Sensitive Natural Areas

- Conserve lands adjacent to US Army Corps of Engineers Jordan Lake Lands, particularly the areas adjacent to the Robeson Creek Significant Heritage Area, as well as of areas of steep and dissected lands.
- Protect and enhance wetlands, floodplains and seeps, such as those along Robeson Creek. This not only diversifies terrestrial and aquatic habitat, but also filters water, thereby improving water quality of the creek as well as Jordan Lake.
- Avoid development on areas with slopes greater than 15%.

IV. Summary of Recommendations

4. Minimize Development Footprint

- Cluster development to preserve large contiguous forested areas, particularly those areas adjacent to existing protected lands and areas identified as important for recreation or wildlife habitat. In addition, cluster developed areas as close to existing roads and Pittsboro as possible and away from ecologically important areas. Utilize the Department of Environment and Natural Resources' Comprehensive Planning Tool to plan for conservation, restoration, and site development (www.conservision-nc.net).
- During site design, incorporate recommendations from the NC Wildlife Resources Commission's "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality" (August 2002) found at http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf.

5. Protect and Restore Riparian Corridors

- Preserve 300 foot wildlife corridors along both sides of the Haw River, Robeson Creek, Stinking Creek, and US Army Corps of Engineers lands. Robeson Creek is a major floodplain--a wide buffer would accommodate more floodwater storage. The corridor could be used for a narrow trail to connect historic Pittsboro and Preston development to Robeson Creek Boat Ramp on land under the jurisdiction of the Army Corp of Engineers.
- Follow Chatham County Riparian Buffer Ordinance for protecting streams, as well as wetlands, seeps and springs throughout the property. This would protect perennial streams with 100 foot buffers, intermittent streams and wetlands with 50 foot buffers, and ephemeral streams, seeps and springs with 30 foot buffers. Ephemeral and intermittent streams funnel water to larger order streams and thus merit protection. Plant native vegetation in the buffer to enhance habitat and stabilize stream banks. Tree and shrub planting is recommended.
- Maintain upland buffers along riparian areas as well in order to minimize erosion and help prevent runoff from entering the riparian buffer. Maintaining buffers is crucial to protecting the health of creeks in the study area, particularly Robeson Creek, and could help prevent this and other creeks from becoming listed for biological impairment.
- Conduct a riparian corridor assessment on Stinking Creek and other major tributaries in the study area, since only Robeson Creek was assessed as part of the inventory.

6. Protect Water Quality

- Minimize new stream crossings by roads and utilities, and avoid alteration to natural stream flow.
- Develop and implement a local stormwater ordinance to minimize stormwater runoff. Implement alternative building techniques to limit impervious surfaces, for example, green roofs, rain gardens, and pervious pavement.
- Implement and develop infrastructure systems that can support the use of reclaimed water. For example, reclaimed water can be used for irrigation of landscaped areas.
- Revise subdivision ordinances to allow for the implementation of Low Impact Development practices
- Use native, drought tolerant species for landscaping.

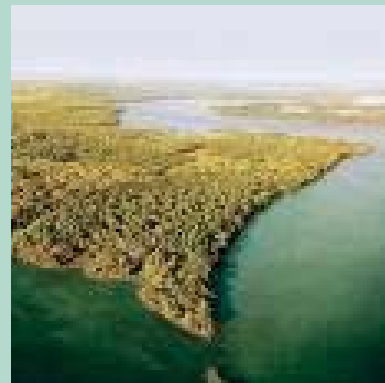
Palmetto Bluffs, SC

Palmetto Bluffs is located in the Town of Bluffton, Beaufort County, SC, and situated in the Lowcountry, between Charleston, SC, and Savannah, GA. Palmetto Bluffs extends from the headwaters of the scenic May River along the shores of the Town of Bluffton, skirts Bull and Daufuskie Islands along the Cooper River to the east and gives way to the salt and freshwater marshlands of the New River to the south.

The development has a 6,500-acre Managed Forest and 394 acres in conservation easements.

Input for the development was gathered through educational workshops, lecture series, cultural events, and extensive scientific and environmental studies by numerous professional engineers, biologists, ecologists, land planners and architects.

Over \$10,500,000 was invested by the development in natural and cultural research. The development incorporates a the Palmetto Conservancy, a not for profit organization, funded by a real estate transfer fee associated with lot and home sales.



IV. Summary of recommendations

7. Protect and Enhance Wildlife Habitat

- Design wildlife core areas and corridors to preserve the highest quality wildlife habitats in the area, which include any vernal pools, wetlands, rock outcrops, mature hardwood forests, lands adjacent to existing protected areas, or other unique sites identified in the Natural Heritage Inventory report.
- Incorporate wildlife-friendly landscaping materials into the design of built infrastructure. See <http://www.ncsu.edu/goingnative/> for detailed instructions.
- Allow prescribed burning and timber management in the study area to continue. To avoid conflicts between current management activities and future residents of the Preston Development, limit built structures within ½ mile of areas where large scale prescribed burning occurs.
- Locate all permanently inhabited structures outside the recommended 150 yard hunting safety buffer external to Game Land boundaries. Doing so will help prevent conflicts between hunters and future residents.
- Keep all utility lines out of Game Lands and other protected lands.
- The North Carolina Wildlife Resources Commission, in partnership with other organizations, is in the process of developing a wildlife-friendly development certification program. Enrolling development projects—such as Preston—in this program will help conserve habitats alongside developed areas on the Southwest Shore.

Harmony, FL



Harmony, a development in Florida incorporates several outstanding components of nature-friendly design.

- Over half of the development has been set aside as a nature preserve (~7,700 acres), which is actively managed for preservation and enhancement of wildlife habitat.
- Harmony has on staff a well qualified “Conservation Director,” who guides conservation and management activities in this planned community.
- The development uses “Dark Sky” streetlights to minimize the negative effects of artificial night lighting on wildlife. See this website for more information: <http://www.harmonyfl.com/harmonypreserve.html>
- Partnership with the University of Florida’s School of Natural Resources during the design phase, and to develop an environmental education website and outreach programs for residents. See <http://www.wec.ufl.edu/extension/gc/harmony/index.htm> for more information.

8. Protect Working Lands

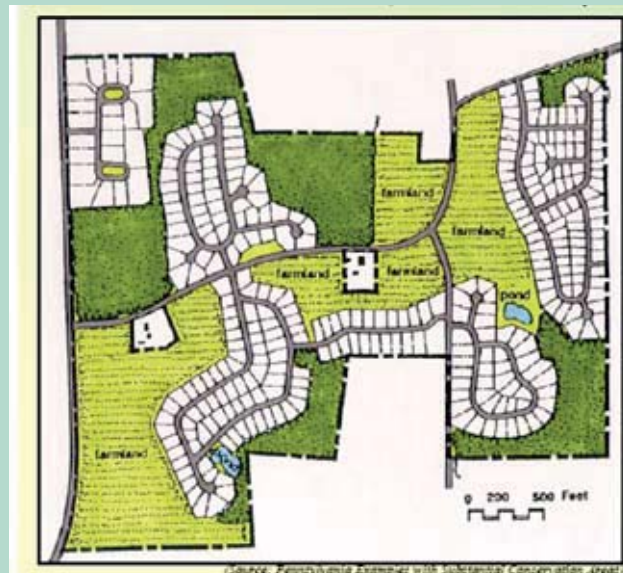
- Set aside land for small produce farm lease areas on prime soils. Set aside larger areas of land for biofuel crops, native plant nurseries, and/or hayfields. These areas could be used for spray irrigation of effluent.
- Incorporate a local farmer's market into development plans.

9. Develop a Network of Open Space and Trails

- Plan for and set aside land to develop a trail system that could help establish and eventually connect the Haw River Corridor to the Deep River along the western shore of Jordan Lake. Provide passive recreation hub sites (200 + acres) with walking trails and nature observation areas.
- Incorporate natural and stone trail surfaces in order to limit the impact of impervious surfaces on trails and trail facilities
- Avoid sensitive environmental areas (e.g., steep slopes, wetlands, or habitat for rare or endangered species) in selecting routes for trails. Place trails outside of a 50 ft riparian buffer along streams and water bodies. Incorporate wide riparian corridors (150 + ft) in order to provide room for trails, riparian buffers, and wildlife.
- Place mountain biking and horseback riding trails on less sensitive environmental areas.

Farmview, PA

Farmview is a 340 home development located on 430 acres. Smaller lot sizes permitted conservation of more than half the development as permanent farmland or woodlands (30% farmland and 22% woodlands). Built according to Lower Makefield's "Farmland Cluster Ordinance," the tillable land (which is leased to 2 local farmers) is separated from residence rear yards by a buffer of vegetation. In order to maintain "rural" views, the lots are mostly located away from pre-existing town roads. All lots are served by public water and sewer. By reducing the developable land area and lot width, Farmview had savings in construction costs and promises lower, long-term public maintenance costs.



IV. Summary of recommendations

10. Protect Scenic Viewsheds

- Set aside prominent hills and scenic views in the study area as conservation areas.
- Incorporate the existing tree canopies and natural views into road design.
- New development should be respectful of the rural nature of the county and town entrances

11. Develop and Implement a Long-term Conservation and Management Plan

- Develop a plan, based on the findings and recommendations of this report, to conserve and manage sensitive or unique natural resources such as riparian corridors, wetlands, steep slopes, and wildlife habitat.
- Control and reduce invasive species throughout the study area. Several areas are overrun by invasive species. For example, much of area adjacent to the Lower Haw River Corridor is heavily overrun by the exotic autumn olive. The construction of roads and utility rights-of-way will only exacerbate this problem.
- Create a long term funding mechanism to implement goals and objectives of the conservation and management plan, such as collecting fees from future businesses and the HOA that will become part of the Preston Development.
- Hire a qualified conservation land manager to implement the plan, oversee all resource management activities, and organize environmental education programs for future residents. See the “conservation director” position in the Harmony, Florida development as an example (<http://www.harmonyfl.com/harmonypreserve.html>).
- Actively manage open spaces and protected natural areas on the Southwest Shore. Use habitat management techniques such as burning, thinning, reforestation, exotic plant control, feral cat control, snag creations and canopy gap creations. Without active management, habitat quality will decline.

Drovers Rd, NC

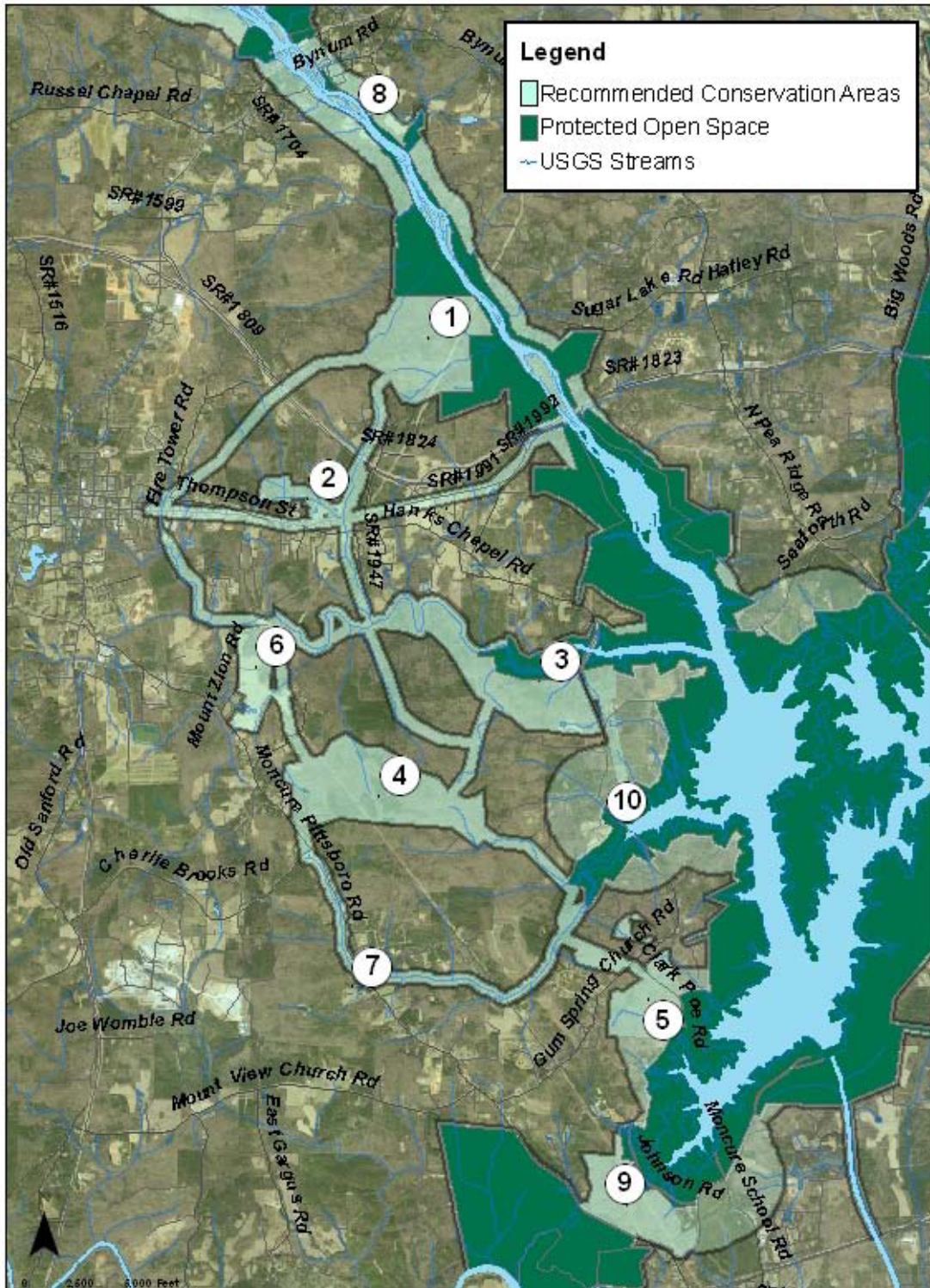
The Drovers Road Preserve easement, developed by Equinox Environmental, protects 110 acres, allowing specified development on the other 76 acres. The preserve provides easy access to miles of hiking and equestrian trails. The easement permanently protects a majority of the forested, mountainous terrain from all future development. It is held by the Southern Appalachian Highlands Conservancy and registered in Buncombe County.



V: Recommendations for conservation areas

Based on the previous findings, recommendations and inventories, and existing data resources (see appendix C for support maps) the following key conservation areas and corridors are recommended for conservation. These areas were chosen based on stakeholder input, field assessments, natural features of the site (e.g., elevation, slope, land cover), conservation value or potential, and recreation opportunities.

Figure 20 provides an overview of these areas, they are described in greater detail in the rest of this section.



1. Haw River Slopes/ State Natural Area Connector
2. U.S. 64 Wetlands Complex
3. Robeson Creek Conservation Area
4. Chatham Ridgeline Conservation Area
5. Jordan Lake Wildlife Conservation Area
6. Working Lands Conservation Area
7. Trail Corridors
8. Haw River Corridor
9. Deep River Connection
10. Army Corps of Engineer Game Lands

Figure 20: Overview of Recommended conservation areas along the southwest shore of Jordan Lake

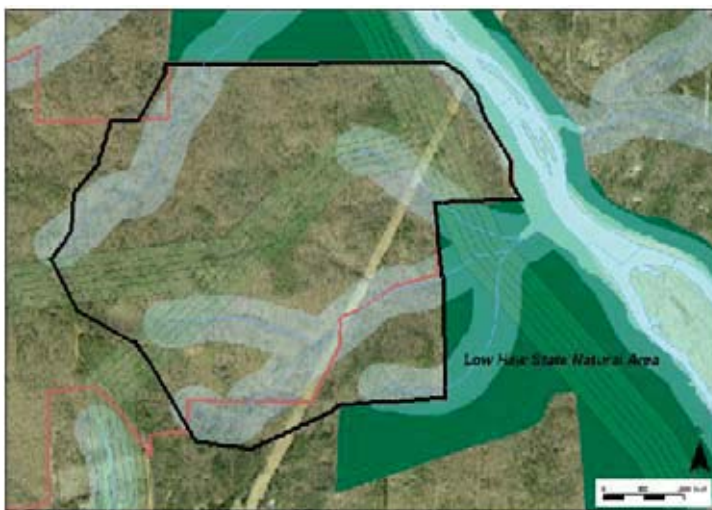
V. Conservation Areas

1) Haw River Slopes/ State Natural Area Connector (Figure 21)

This 400 + acre site connects the existing area of the Lower Haw State Natural Area. The area contains some of the steepest topography in study areas with many areas having 15% or greater slopes. It also contains one of the largest contiguous, high quality, Dry-Mesic Oak-Hickory Forests in the uplands and excellent quality Mesic Mixed

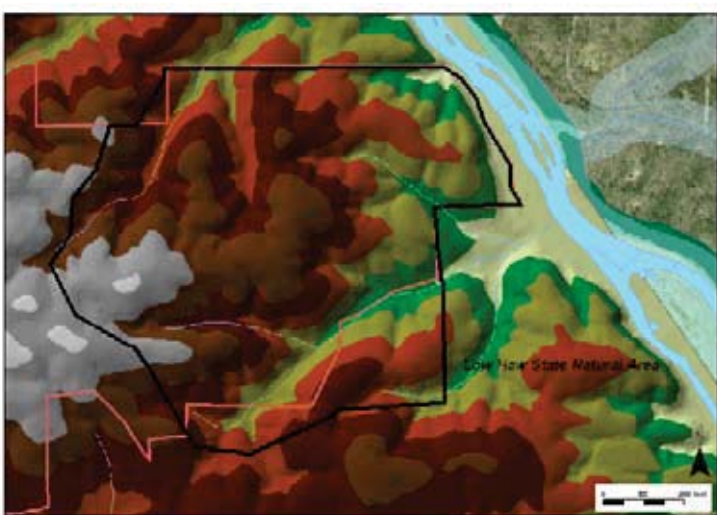
Hardwood Forest along the ravines (see pg. for further details). Much of the area consists of mature forest, although the area is crossed by a power line.

Recommendation: *This area should be protected and added to the Lower Haw State Natural Area. The North Carolina State Parks system is interested in this connection.*



Legend

- Proposed Conservation Area
- Preston Property Boundary
- Potential Trail Corridor (300 ft buffer)
- 300ft stream buffer
- 100 year floodplain
- Protected Open Space
- Wetlands (NWI)
- USGS Streams



Characteristics:

- ✓ ~ 450 Acres (375 PDC*)
- ✓ Adjacent to USACE Lands
- ✓ Along Haw River Corridor
- ✓ Mostly Hardwood Forest: Dry- Mesic Oak-Hickory
- ✓ Steep Slopes: ~60% of area is greater than 15% slope
- ✓ Streams: ~7500 ft
- ✓ Significant Natural Heritage Area: Entire area is classified

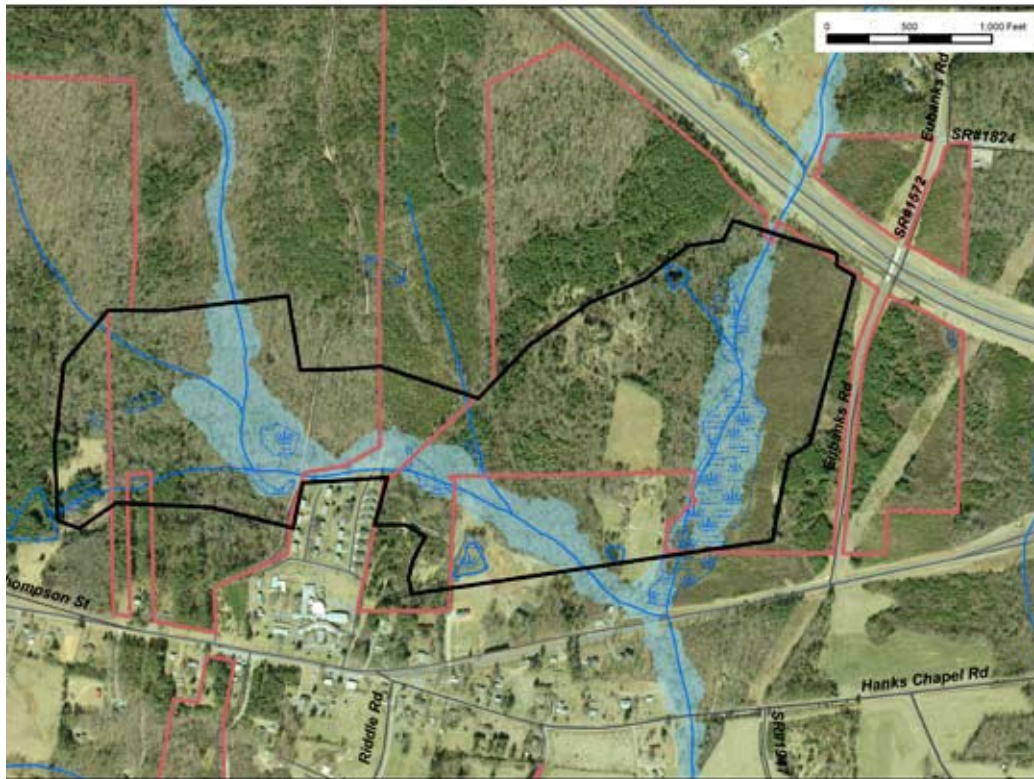
**At time of report Preston Development Company (PDC) owned approximately this many acres of the conservation area*

Figure 21: The proposed Haw River Slopes Conservation Area, the top map shows the 2007 aerial, the bottom map shows the topography

2) U.S. 64 Wetlands Complex (Figure 22)

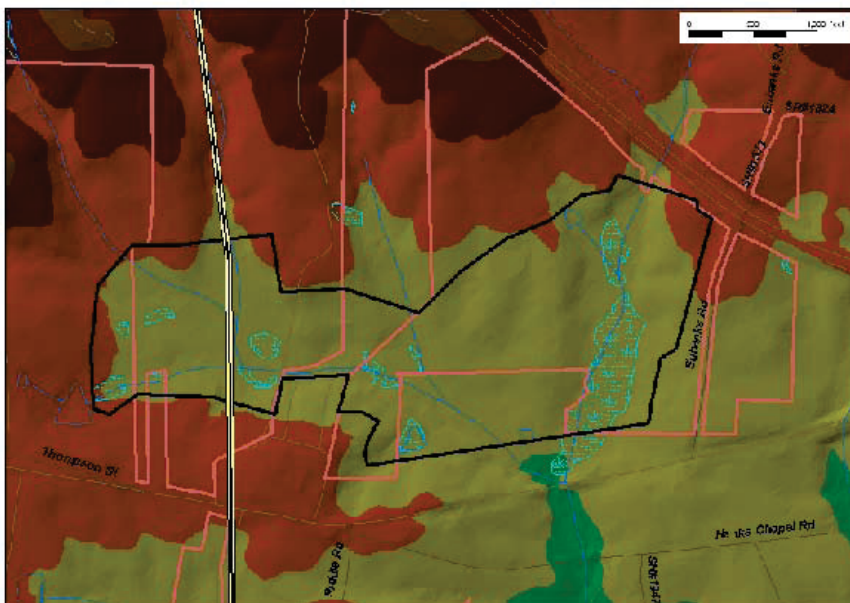
This 150 acre area just north of business 64 contains a large floodplain and wetland complex. The area is mostly hardwood forest and contains several headwater streams of Jordan Lake.

Recommendation: *The area should be protected as a linear park/natural preserve along a north-south greenway corridor.*



Characteristics:

- ✓ ~150 Acres (110 PDC*)
- ✓ Mostly mixed hardwood forest
- ✓ Streams: Over 10,000 ft
- ✓ Wetlands: About 15 acres
- ✓ Floodplain: ~40 acres



Legend

— USGS Streams

TIN

Elevation

572 - 616

527 - 572

483 - 527

438 - 483

394 - 438

349 - 394

305 - 349

260 - 305

216 - 260

Figure 22: U.S. 64 Wetlands Complex and legend for topographic maps

V. Conservation Areas

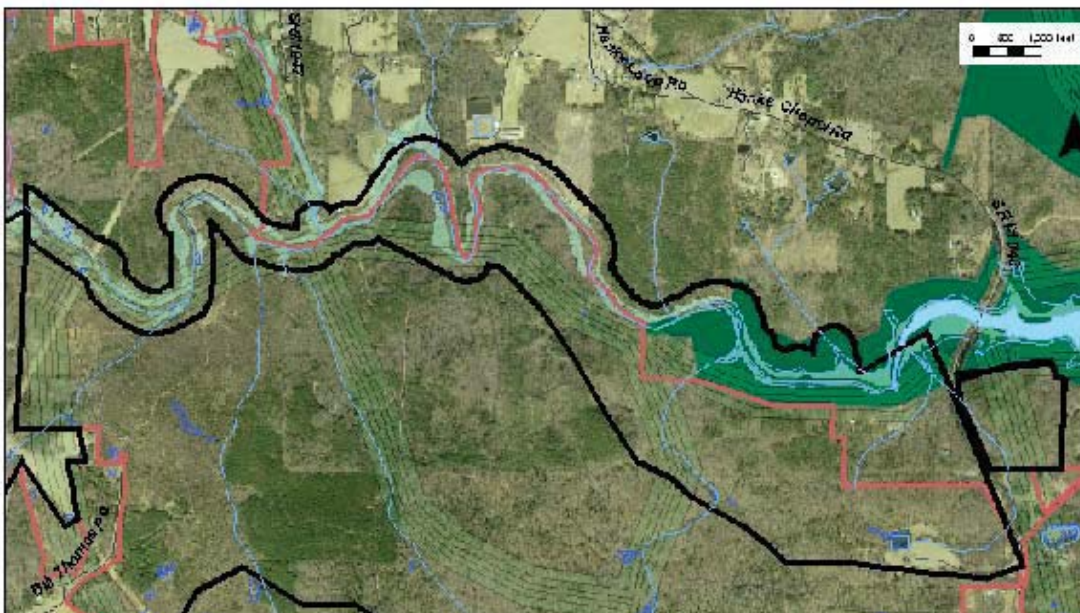
3) Robeson Creek Conservation Area (Figure 23)

This 675 acre area is adjacent to Robeson Creek and land managed by the Army Corps of Engineers. Most of the area consists of the riparian area along the main stem of Robeson Creek .

Recommendation: The riparian area of Robeson Creek should be placed in conservation to help maintain the creek's water quality and to prevent this section of the creek from becoming listed for biological impairment. The conservation area, suggested min. 300 + feet on each side, would also create a wildlife corridor and could potentially be used for a trail to connect historic Pittsboro and Preston development to Robeson Creek Boat Ramp on USACE land.

On the eastern side of the creek, near Hanks Chapel Road, the conservation area widens to about 3000 ft. This area contains several high quality uplands and dramatic topography with many areas with 15% or greater slopes. The uplands of this area buffering the Robeson Creek ravine are in good to excellent condition. The ridge tops observed generally contained stands of Dry Oak-Hickory Forest where many trees are found with widths of 20dbh or greater. Additionally, several of the unique species present in the adjacent Robeson Creek ravine were found in the areas buffering the existing significant natural heritage area.

The southeastern portion of this tract contains a small pond and hay field. This part might make an ideal park site that could act as a book-end to the Robeson Creek trail. The area across Hanks Chapel Road has a deep ravine adjacent to the road and several areas of mature Oak-Hickory forest of the eastern side. This land is directly adjacent to Army Corps Land and could provide potential recreational access.



Characteristics:

- ✓ ~900 Acres (450PDC*)
- ✓ Adjacent to USACE Land
- ✓ Mature bottomland and upland hardwood forests
- ✓ Streams: Over 30,000 ft
- ✓ Wetlands: Several small wetland areas
- ✓ Many steep slopes in eastern section (~250 acres)
- ✓ Steep slopes along creek

Figure 23: Robeson Creek Conservation Area

4) Chatham Ridgeline Conservation Area (Figure 24)

The highest hills south of business 64 (~540 ft) are found in this area. The ridge line can be seen from multiple viewpoints throughout the county and stands out as one drives east on U.S. 64 to Pittsboro. The area contains several old home sites, large groves of Black walnut (*Juglans nigra*) trees, and two identified unique natural communities: (1) on the western side, a 40 acre tract of mature Dry-Mesic Oak-Hickory, and (2) on the eastern side, an upland area with a good quality Mesic Oak-Hickory Forest and numerous eastern red cedar trees. This area also contains a unique Upland Depression Swamp Forest and signs of an old spring and home site.

Recommendation: *Protect these areas as open space for passive recreation (e.g., hiking) and wildlife. The area should be incorporated into the development as open space.*

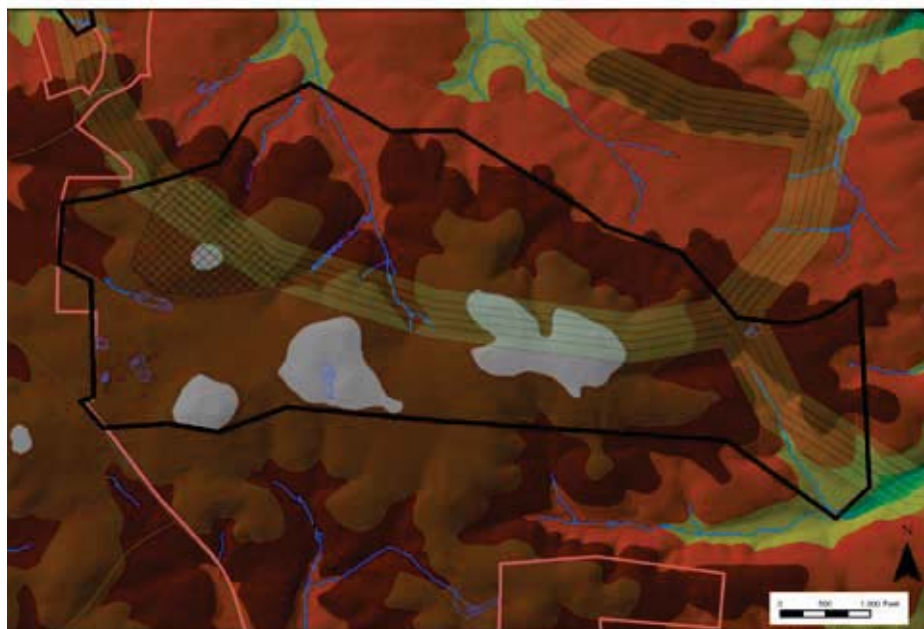


Figure 24: Chatham Ridgeline Conservation Area

Characteristics:

- ✓ ~550 Acres (550PDC*)
- ✓ High ridgeline that can be seen from multiple vantage points
- ✓ Mixed hardwoods and conifers
- ✓ Streams: ~6500
- ✓ Wetlands: Several small upland wetland areas
- ✓ Significant Natural Heritage Area: Mature Dry-Mesic Oak-Hickory Site, Black Walnut Grove, Eastern Red Cedar Grove
- ✓ Old home site

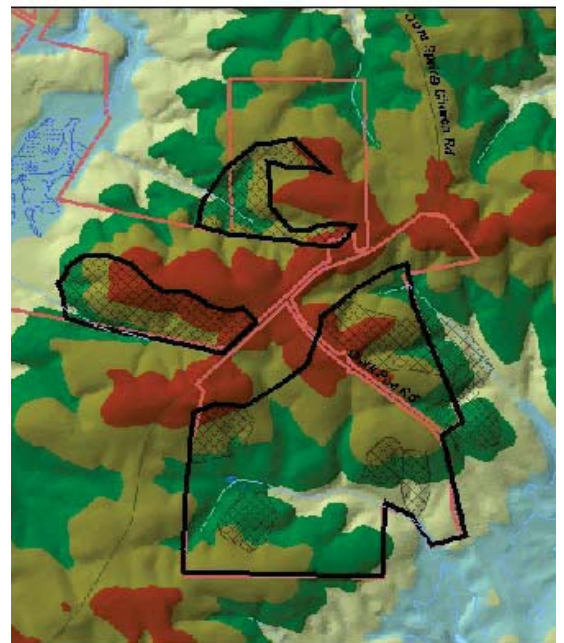
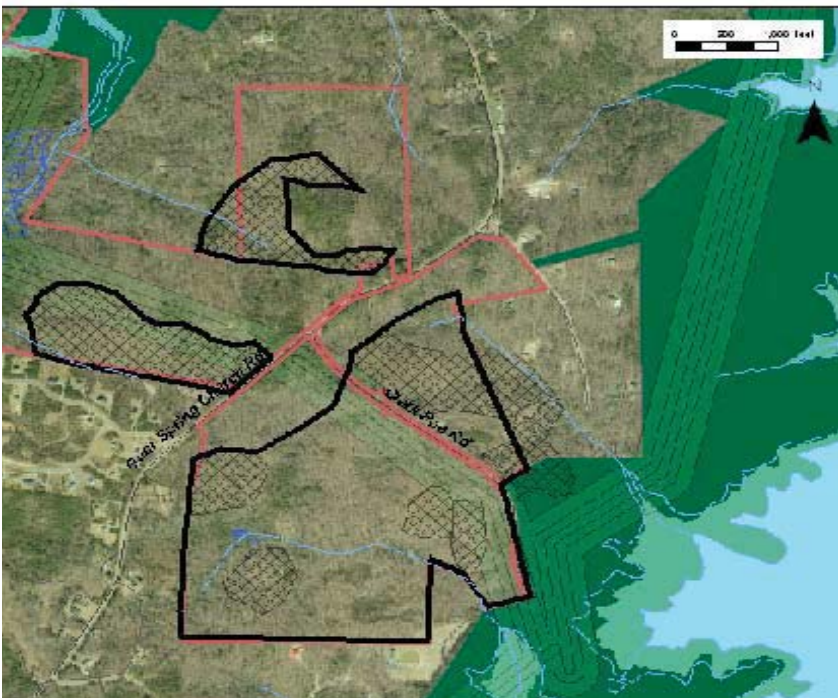
 Natural Heritage Identified Community

V. Conservation Areas

5) Jordan Lake Wildlife Conservation Area (Figure 25)

This eastern section of this area lies adjacent to Army Corps of Engineers Jordan Lake Lands. Currently, this land is managed as Jordan Lake Gamelands by the Wildlife Resources Commission, and has traditionally been used by hunters. Areas adjacent to the southeast part of the site are burned by WRC. A buffer would be ideal in order to continue current wildlife management practices and avoid conflict with burn areas. The area would provide an ideal wildlife conservation area. It features several mature forest communities as well as relatively steep topography--much of the land contains slopes of 15% or greater. On the northwest side of Gum Springs Road lies two high quality, dry-mesic oak hickory forests.

Recommendation: These areas should be protected and incorporated into the development as open space or added to the Jordan Lake Gamelands area.




 Natural Heritage Identified Community

Figure 25: Jordan Lake Wildlife Conservation Area. The cross hatch indicates areas identified by the North Carolina Natural Heritage Program as significant.

Characteristics:

- ✓ ~260 Acres (260 PDC)
- ✓ Adjacent to WRC managed lands
- ✓ Steep slopes and ravines
- ✓ Mature Hardwood Forest
- ✓ Over 100 acres of natural Heritage Area identified

6) Working Lands Conservation Area (Figure 26)

This 175 acre property off of Moncure Pittsboro Road is one of the only active agricultural sites in the study area. The site is relatively flat and is composed of prime soils of the Goreville family, which are very deep, well drained upland soils. The area sits south of Robeson Creek just over a mile from downtown Pittsboro. Its good soils, flat topography and proximity to downtown make it an ideal site for community based farms.

Recommendation: Consider using the land for several small organic farms, horticulture, biofuels and or feed crop production. It would also be an ideal site for a community farmers market that could be connected to the surrounding area by future greenways. Portions of non-edible farming areas (feed crops, horticulture, or biofuels) are potential sites for spray irrigation.

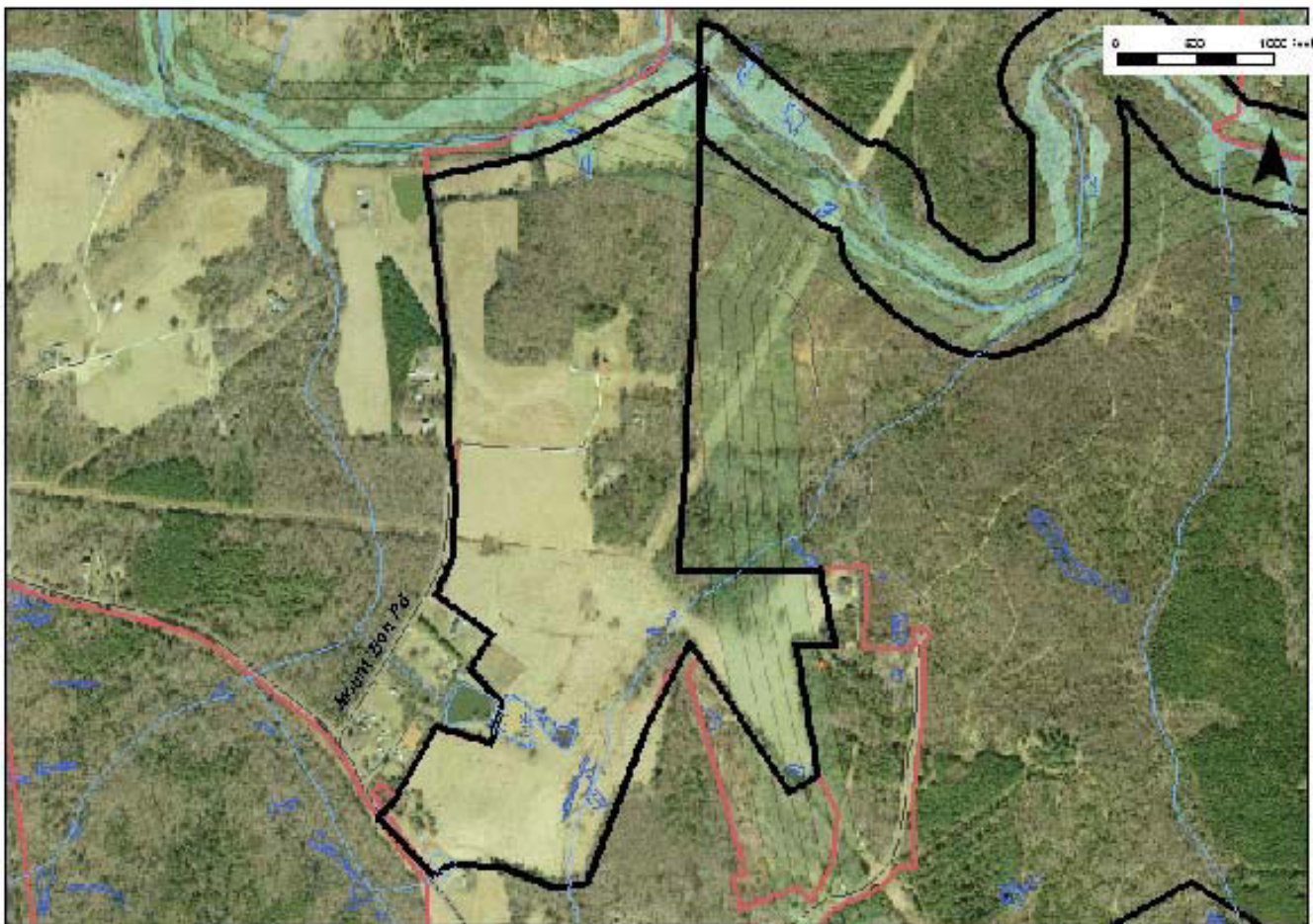


Figure 26: Agricultural Conservation Area

Characteristics:

- ✓ ~175 Acres (175 PDC)
- ✓ Adjacent to Robeson Creek
- ✓ Flat topography
- ✓ About 95% of the property is prime farmland soils

V. Conservation Areas

7) Trail Corridors (Figure 27)

The trail corridors are shown as 300ft buffers connecting conservation nodes, the Town of Pittsboro, and the surrounding community. The corridors are approximate locations and represent conceptual connections throughout the study area. Four main east/west corridors connect the Town to Jordan Lake via 64, Robeson Creek, and Stinking Creek. Two other major corridors run north/south: one runs through the middle of the study area, the other runs parallel through Army Corps of Engineers Land. The latter trail could eventually connect the Deep River Corridor and State Parks Land to the Haw River State natural Area.

Recommendation: Establish buffers (300 feet) along these trail corridors in order to meet both wildlife and recreational needs.

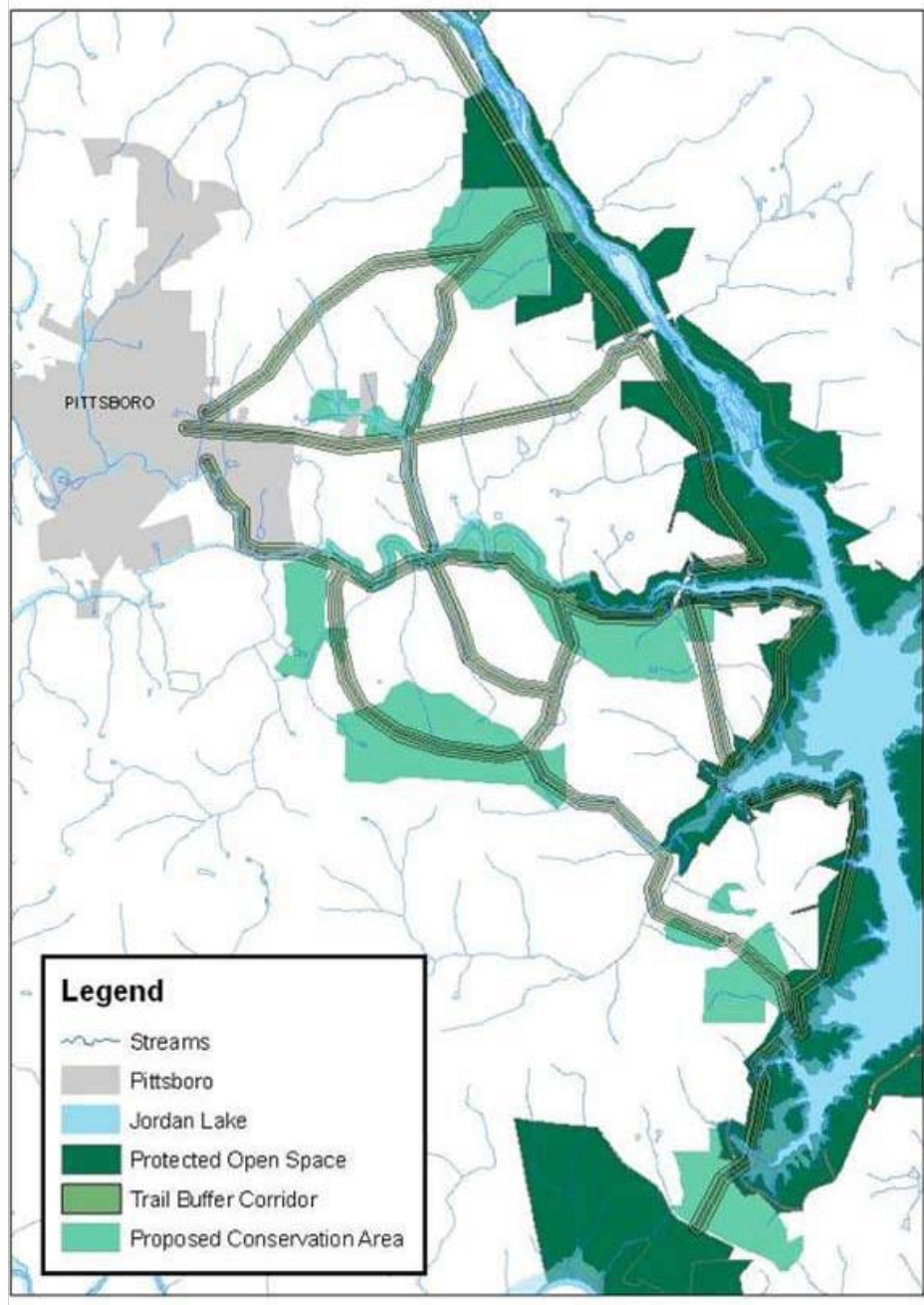
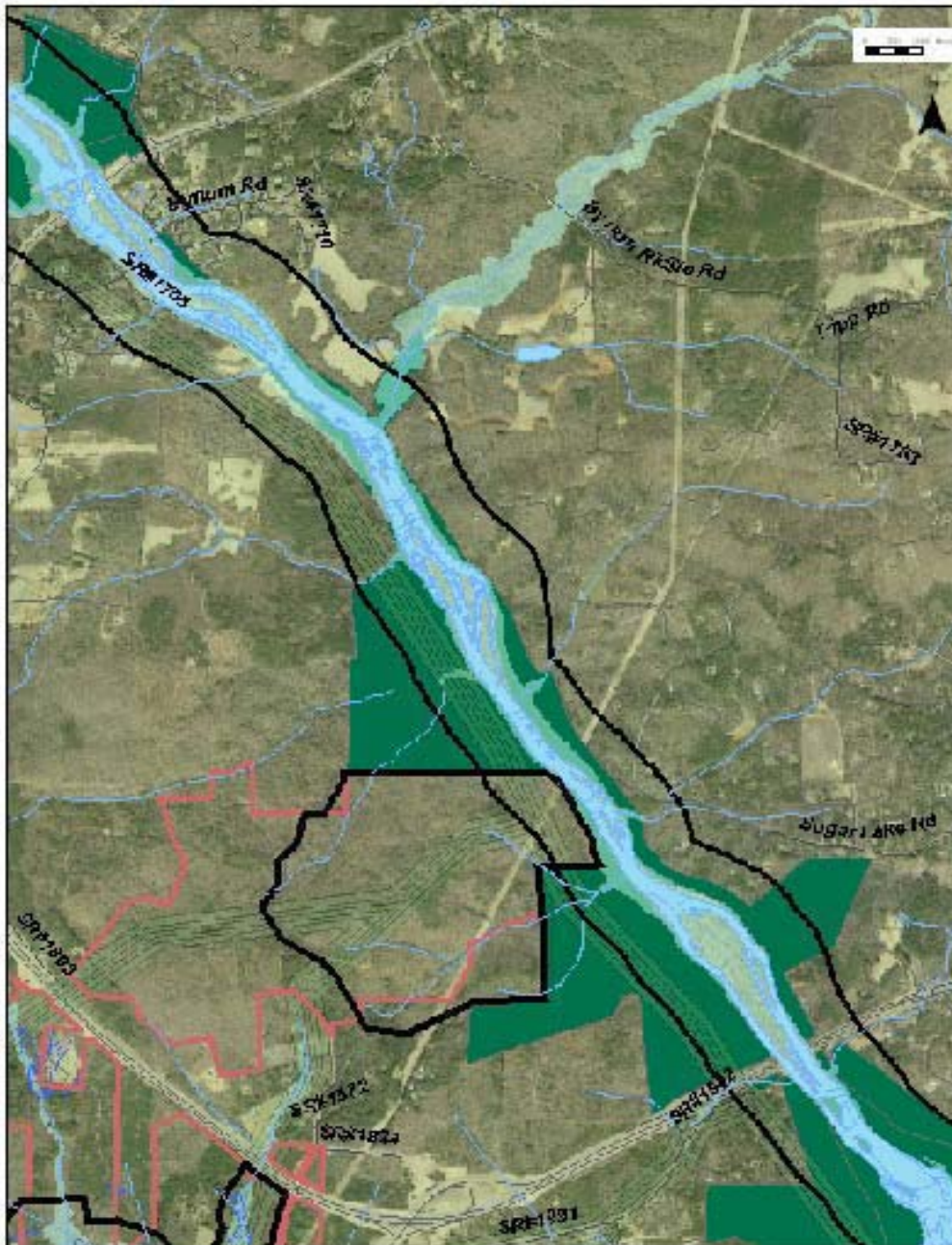


Figure 27: Trail corridor conservation areas

8) Haw River Corridor (Figure 28)

A 1000 ft buffer on both sides of the Haw River has been identified as a key conservation area. The lower haw river is bordered by the new Lower Haw River State Natural Area. This area was included in the State park system because of outstanding features that include scenic whitewater rapids, granite outcroppings and high bluffs that support mountain laurel and other special plant communities. The aquatic community in the river is nationally significant for its collection of rare animals that includes the globally rare Cape Fear Shiner, Septima Clubtail and rare and endangered mussel species.



The land purchased by the state from Duke Forest with help from TLC is of great variability in its width along the river. In some places the park property is so narrow you almost have to step in the water not to be off park property. The state would like to increase this buffer along the river.

Recommendation: Protect a buffer of at least 1000 ft along the Haw River in order to enhance the biological, water quality, and recreational benefits of the Lower Haw State Natural Area.

Figure 28: Haw River conservation area

V. Conservation Areas

9) Deep River Connection (Figure 29)

The approximately 300 acre Deep River conservation area is one of the top conservation priorities in the Triangle area. The area connects the Haw River/ Jordan Lake Public Lands to the Deep River corridor and links two of the most significant habitat areas in the Triangle. Acquisition of this tract would create a continuous overland connection.

Characteristics:

- ✓ ~300 acres
- ✓ Adjacent to Deep River State Parks Lands and USACE Land
- ✓ Would provide overland connection for wildlife connecting over 34,000 acres of open space

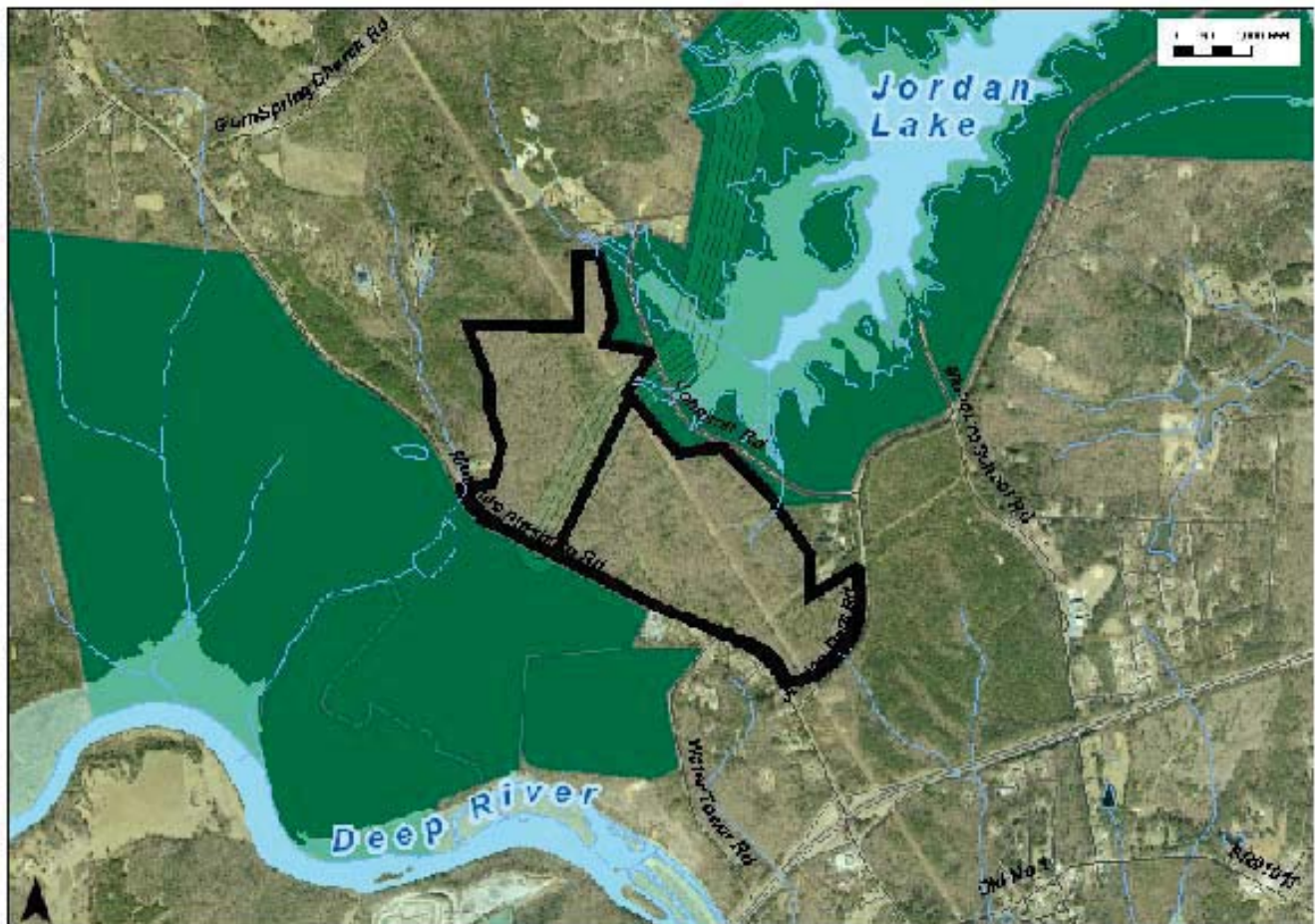


Figure 29: Overland connector of the Deep River and Jordan Lake

Recommendation: Work with land owners to conserve this connector

10) Army Corps of Engineer Game Lands (Figure 30)

A minimum 100 ft buffer along Army Corps of Engineers Lands and larger buffers around existing WRC burn areas would help maintain existing wildlife corridors and enable sound management of these resources. The buffer also would help limit landowner interactions with management practices such as prescribed burns and forest management.

Recommendation:

All new developments should work to set aside a 100ft buffer adjacent to Army Corps of Engineers lands and locate built structures at least 1/2 mile away from existing prescribed burn area managed by WRC.

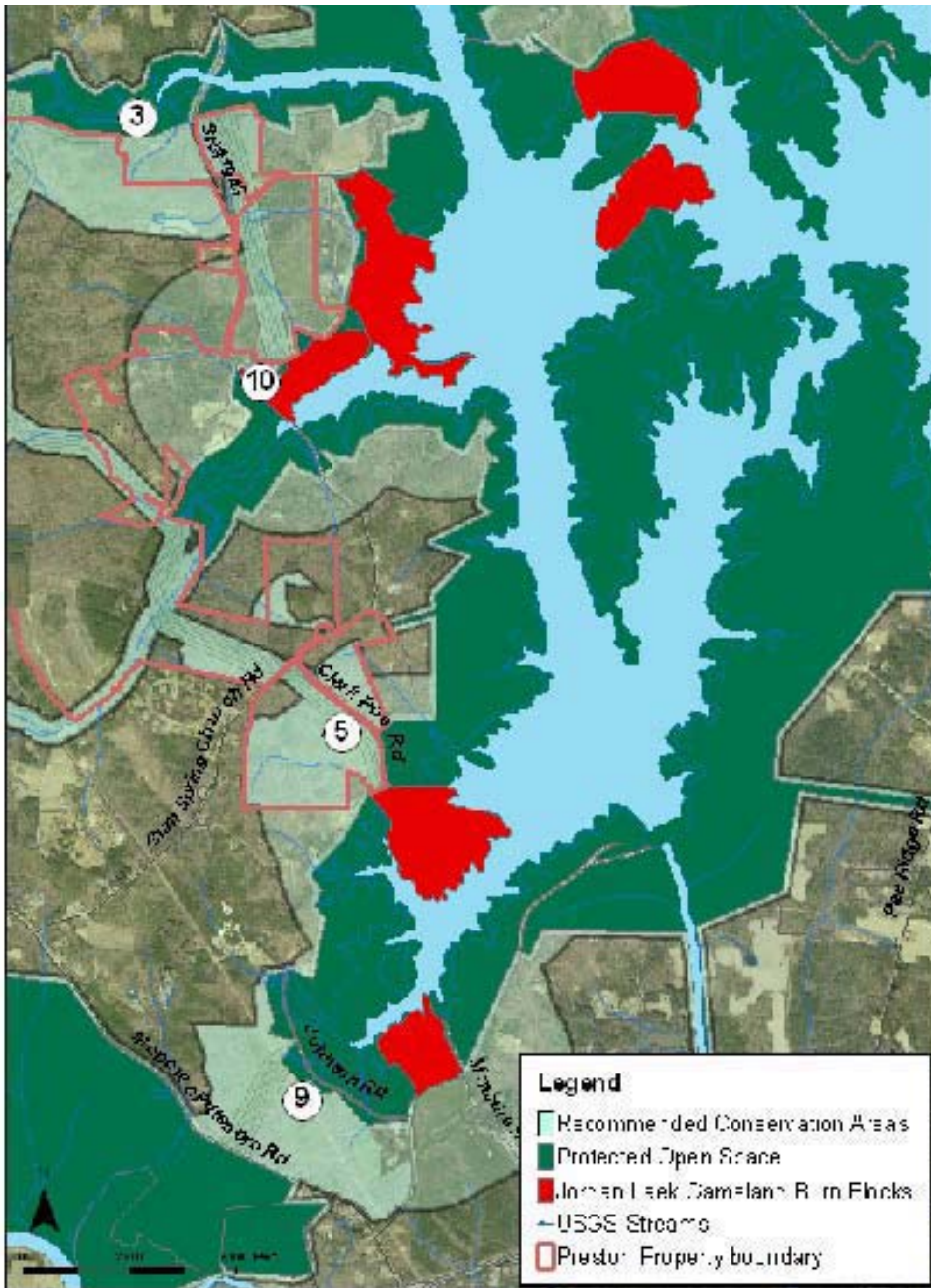
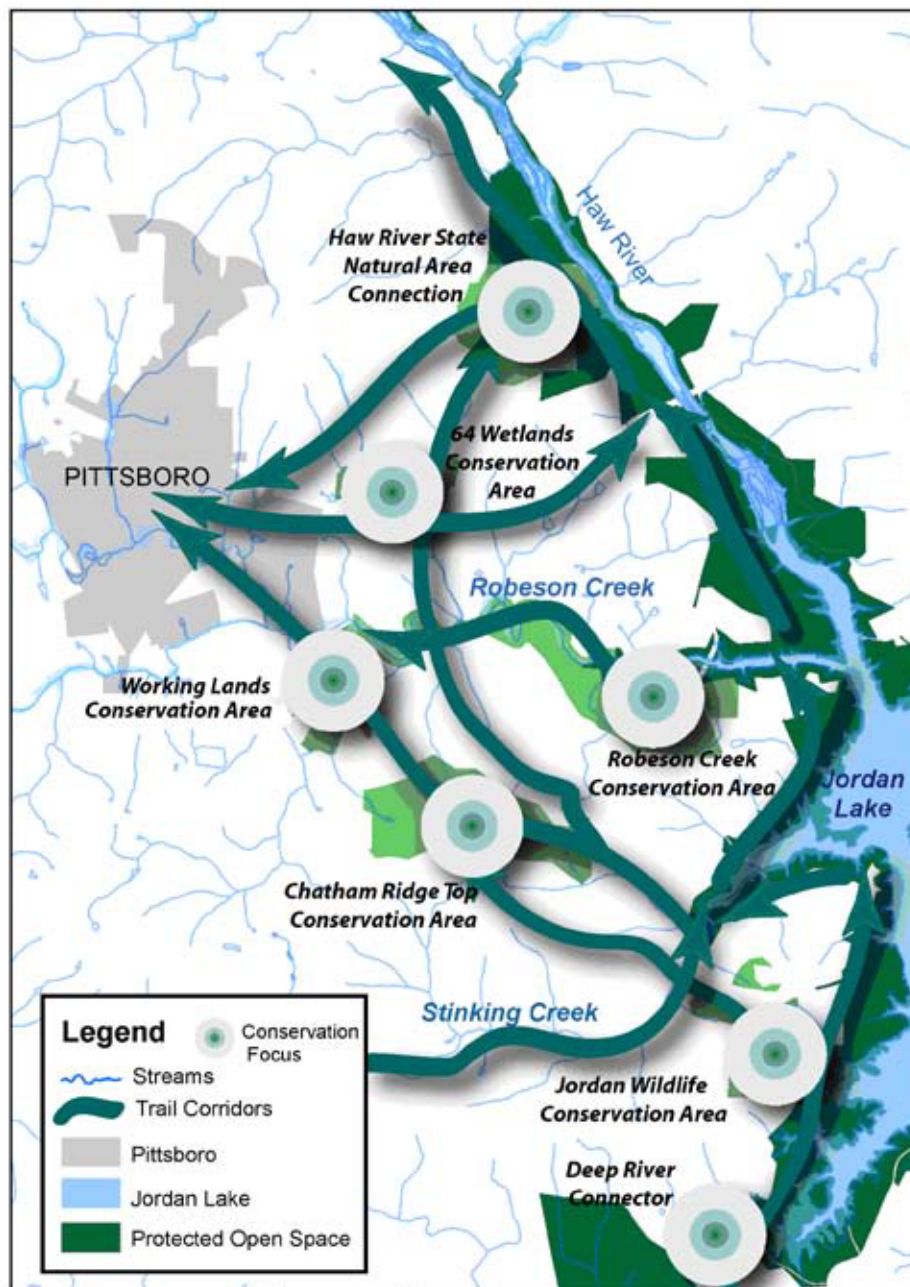


Figure 30: Game Land Conservation Areas

VI. Summary

In Summary: This report has examined the important open space features on the southwest shore area with particular emphases on the landholdings of Preston Development Company. As mentioned previously one of the major significances of this tract is its contiguous nature of its unfragmented habitat. The top conservation scenario would preserve this contiguous wildlife habitat as an undeveloped natural area. However, the conservation of this entire area is highly unlikely. Therefore this conservation assessment recommends a series of conservation hubs and corridors that will protect most of the significant natural areas in the southwest shore and allow for wildlife passage. These areas have been outlined in detail in the previous section. A conceptual diagram of these areas is shown in figure 31.

Figure 31: Conceptual Open Space Plan



Various strategies can be used to protect these lands including acquisition by North Carolina State Parks, conservation easements, public and private trail corridors, county or municipal parkland, and or private conservation areas managed by homeowners and future developments.

Although this assessment has looked at potential conservation lands, it has not focused on the built environment. In order to truly develop an innovative “green community” the protection of water quality, natural communities, wildlife, working lands, cultural resources, and recreation areas needs to be extended to the site design on individual buildings and their interiors. By no means is this assessment meant to be a comprehensive guide to “green development.” A few built environment strategies are noted below, it is our hope that as development progresses in this area it will build on these strategies and truly be a model of innovative sustainable development.

Sustainable Development Strategies

- Minimize the footprint of development impact
- Design for minimal impervious surface
- Implement LID (Low Impact Development) techniques during the site design process
- Avoid building or disturbing land with 15% or greater slopes
- Protect stream, floodplain, and wetland areas with buffers
- Design built areas to protect and incorporate unique natural communities
- Connect new development to community amenities such as parks, the Town of Pittsboro, trails, schools, and community centers
- Provide for stringent erosion control during construction.
- Cluster development to limit infrastructure disturbance, minimize habitat fragmentation, and increase the amount of protected open space
- Adopt environmental building standards for development such as LEED or North Carolina Healthy Build
- Incorporate sustainable food sources into the development such as small farms and local markets
- Design transportation corridors to be oriented to pedestrians and cyclists by providing bike lanes, sidewalks, narrow street widths and tight curb radii
- Provide a variety of housing opportunities to support local affordable housing needs and minimize trips of residents
- Implement sustainable water use and reuse techniques
- Landscape areas with native and drought tolerant species and protect the existing vegetation by preserving large diameter trees (12 + dbh) and conduct a plant rescue before land disturbance begins (see North Carolina Native Plant Society <http://www.ncwildflower.org/rescues/rescues.htm>)
- Minimize construction waste; look for opportunities to recycle.

VII. References

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VII. GIS Data Resources

Provided by NC Center for Information and analysis:

National Wetlands Inventory

GAP Land Cover Data (2001)

USGS (United States Geological Survey) NC Stream Coverage

Division of Water Quality- Water Supply Watersheds, 303D Streams

Wildlife Resources Commission Burn Areas

Audubon Important Bird Areas

Major Waterbodies

State Managed Lands

Provided by Chatham County GIS Department:

Cadastral Information

2 ft Contour Data

Aerial Photos (2007)

Chatham Roads

Chatham County Floodplain Areas

Soil Survey of Chatham County (2005)

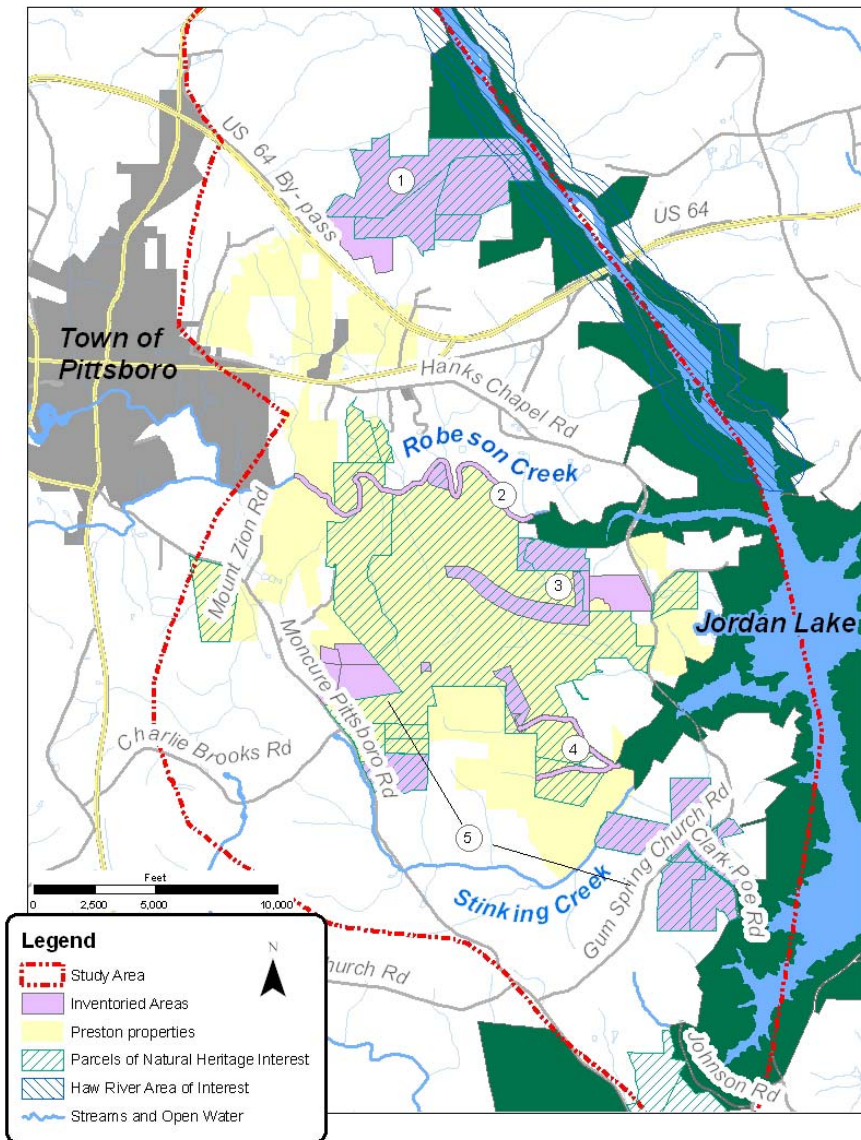
North Carolina Natural Heritage Program:

Significant Natural Heritage Areas (June 2008)

Appendix

Appendix A:

This appendix includes the site inventories reports drafted by the North Carolina Natural Heritage Program and the Triangle Land Conservancy. The site inventories cover the Tracts North of 64 (area 1 in figure below), the area south of Robeson Creek (area 3), the tributaries of Stinking Creek (area 4), and the upland areas in the southern section of the site (area 5).



SITE NAME: Preston tracts – north of US 64 and west of the Haw River

PARTICIPANTS: Harry LeGrand and Sarah McRae (N.C. Natural Heritage Program), Ed Corey (N.C. Division of Parks and Recreation), and Bill Oestereich (Preston Development Company)

DATE: April 2, 2008

LOCATION: Chatham County; the eastern half of the Preston holdings north of US 64. Access is from a jeep road north off of Eubanks Road, which crosses over US 64 By-pass. The tracts visited extend from this north-south jeep road northeastward to the Haw River.

PURPOSE OF VISIT: To look at the quality and condition of the Preston tracts in this vicinity, especially in relation to potential acquisition by the N.C. Division of Parks and Recreation for addition to the Haw River Slopes State Natural Area, which lies on both sides of the Haw River (and along the eastern boundary of some of the Preston holdings).

BACKGROUND INFORMATION: The Preston Development Company has been acquiring tracts in eastern Chatham County, west of Jordan Lake. Their tracts total at least 6,000 acres, in two large sections – one north of US 64 and a larger one south of this highway. Triangle Land Conservancy has been working with Preston to have some amount of biological survey work done on the tracts to identify any portions that might be suitable for conservation acquisition. A meeting was held by TLC a month ago among several agencies to discuss this matter and to arrange some survey work, especially by staff of the Natural Heritage Program. The intent is to identify the most significant portions of the tracts, especially as it seems possible if not likely that areas adjacent to the existing State Park lands could be acquired and added to Haw River Slopes SNA.

OBSERVATIONS: (letter refer to map)

The four of us met at the intersection of Eubanks Drive and US 64 Business (A), drove in three 4WD vehicles along Eubanks, and turned left (north) onto a dirt jeep road (B). The road was muddy and rutted, and it dipped down to a very muddy area (C). The slope to the north contains a scenic, mature hardwood stand (D) with much eastern red cedar (*Juniperus virginiana*) and rocks on the surface; however, we drove past this spot and did not stop to take notes. We stopped at a 4-way intersection of dirt tracks (E), where there is a picnic table on the west side.

We walked from here, taking the north fork, which quickly turned to the northeast, following a ridge (F). The forest along this section is fairly nice, with reasonably mature loblolly pines (*Pinus taeda*) mixed with hardwoods such as red maple (*Acer rubrum*), white oak (*Quercus alba*), and tuliptree (*Liriodendron tulipifera*). Flowering dogwood (*Cornus florida*) and redbud (*Cercis canadensis*) are in the understory. A ravine lies to the north. We then took a left onto a northward heading jeep track (G), which followed another ridge. The forest along this first portion is only of fair quality. However, we reached a knoll (H), where the forest is quite scenic and mature hardwoods (Dry-Mesic Oak-Hickory Forest). White oak dominates, and we saw trees of 12" and 18" dbh. Scattered herbs were in bloom along the margin of the road, such as arrowhead violet (*Viola sagittata*) and common bluets (*Houstonia caerulea*).

The forest continues in excellent condition to the northern end of the ridge (I), where we headed

downslope to the west to work along a stream (J). The NW-facing slope is a typical Mesic Mixed Hardwood Forest, with American beech (*Fagus grandifolia*) and northern red oak (*Q. rubra*) present; painted buckeye (*Aesculus sylvatica*) is the dominant shrub. Herbs include wild geranium (*Geranium maculatum*), Christmas fern (*Polystichum acrostichoides*), windflower (*Thalictrum thalictroides*), and giant chickweed (*Stellaria pubera*).

We saw flagging and a few State Park signs in this area, so we followed them eastward, over the toe of the ridge, to another north-flowing creek (K). We noted a few black cohosh (*Cimicifuga racemosa*) leaves here, along with downy rattlesnake plantain (*Goodyera pubescens*). The next ridge to the east is quite steep, and is very scenic, with hardwoods of 1' dbh. Beech and northern red oak dominate, and American holly (*Ilex opaca*) is widespread. There is a portion of a chimney of an old house still standing (L). White oak and post oak (*Q. stellata*) are present near the structure, and we saw a few young plants of the "mafic" yellow pimpernel (*Taenidia integerrima*), a scarce plant in the region. We then continued east and descended into another ravine, with a dry creek-bed (M). American holly is very dense just to the east, on the upslope. The ridge to the east (N) is fairly mature, with 9-12" dbh trees, but there are many saplings, making it less scenic than the previous ridge to the west.

Following the State Park property line to the east, we hit an east-facing ravine (O). The moisture level of the area increases here, likely with moisture coming up from the Haw River. Buckeyes are abundant in the ravine. Beech trees are common, and a northern red oak measured about 3' dbh. Slender toothwort (*Cardamine angustata*) carpets the ground, mayapple (*Podophyllum peltatum*) is present, as is windflower; coralberry (*Symphoricarpos orbiculatus*) is scattered. The fairly steep north-facing bank (P) has bluets, windflower, foamflower (*Tiarella cordifolia*), and early bluegrass (*Poa cuspidata*). Although we had seen the invasive exotic autumn olive (*Elaeagnus umbellata*) scattered over a number of slopes on our walk to this point, it is quite common on the slopes to the south of the ravine, close to the river. At the base of the ravine (Q), as it merges with the Haw River floodplain, the ground is carpeted with herbs, a mix of native and exotic. Natives include slender toothwort, common blue violet (*Viola sororia*), baby-blue-eyes (*Nemophila microcalyx*), and spreading chervil (*Chaerophyllum procumbens*). Exotics include common chickweed (*Stellaria media*) and a small amount of *Microstegium vimineum*. Some buttercup phacelia (*Phacelia covillei*), Significantly Rare, is present in the floodplain of the Haw, just north of the powerline clearing (R).

We crossed the powerline clearing, which was fairly recently mowed, and ate lunch in the floodplain just to the south. In this area (S), cane (*Arundinaria gigantea*) is quite dense, and a few leaves of wild ginger (*Asarum canadense*) are present. Both *Nemophila* and *Phacelia* are abundant. However, they must compete with exotics: common chickweed, purple deadnettle (*Lamium purpureum*), ivy-leaf speedwell (*Veronica hederifolia*), and ground-ivy (*Glechoma hederacea*). Cherrybark oak (*Q. pagoda*) is a canopy tree here, along with sycamore (*Platanus occidentalis*) and sugarberry (*Celtis laevigata*), among others. This is probably a Levee Forest community.

A very steep ENE-facing slope (T) flanks the floodplain on the west. Buckeye is the dominant shrub, though a few privet (*Ligustrum sinense*) shrubs are present. Cutleaf toothwort

(*Cardamine concatenata*) is abundant on the slope, which suggests circumneutral soil and a Basic Mesic Forest community. Sweet-cicely (*Osmorhiza longistylis*) also grows on the slope. The floodplain (U) to the east is in excellent quality, and much or most is on State Park property. Not far to the south are two or three linear (NNW-SSE) Floodplain Pools (V), with considerable water in them. This is presumably an old channel. Spicebush (*Lindera benzoin*) is very common in the floodplain, but we saw no pawpaw. The slope to the west becomes more acidic about midway down to the south (W), with a dense stand of American holly, though buckeye and cutleaf toothwort remain abundant.

The southern end of the slope (X), however, contains very dense stands of autumn olive, and the adjacent floodplain (Y) is a bit weedier also. These areas would best be considered as a Secondary Area of the overall natural area. We followed a narrow cut up the autumn olive slope, which is the State Park boundary. Oddly, in the cut is a single leaf of the uncommon puttyroot [orchid] (*Aplectrum hyemale*). A jeep track is picked up near the top of the slope, and we followed the track (Z) along a ridge northwestward. The ridge is a nice hardwood forest with red cedar being fairly common. Shortly thereafter, the powerline clearing (R) is hit again, but we decided to stay on the track and followed the ridge westward across the powerline (as it had been recently bush-hogged and contained no plants to see).

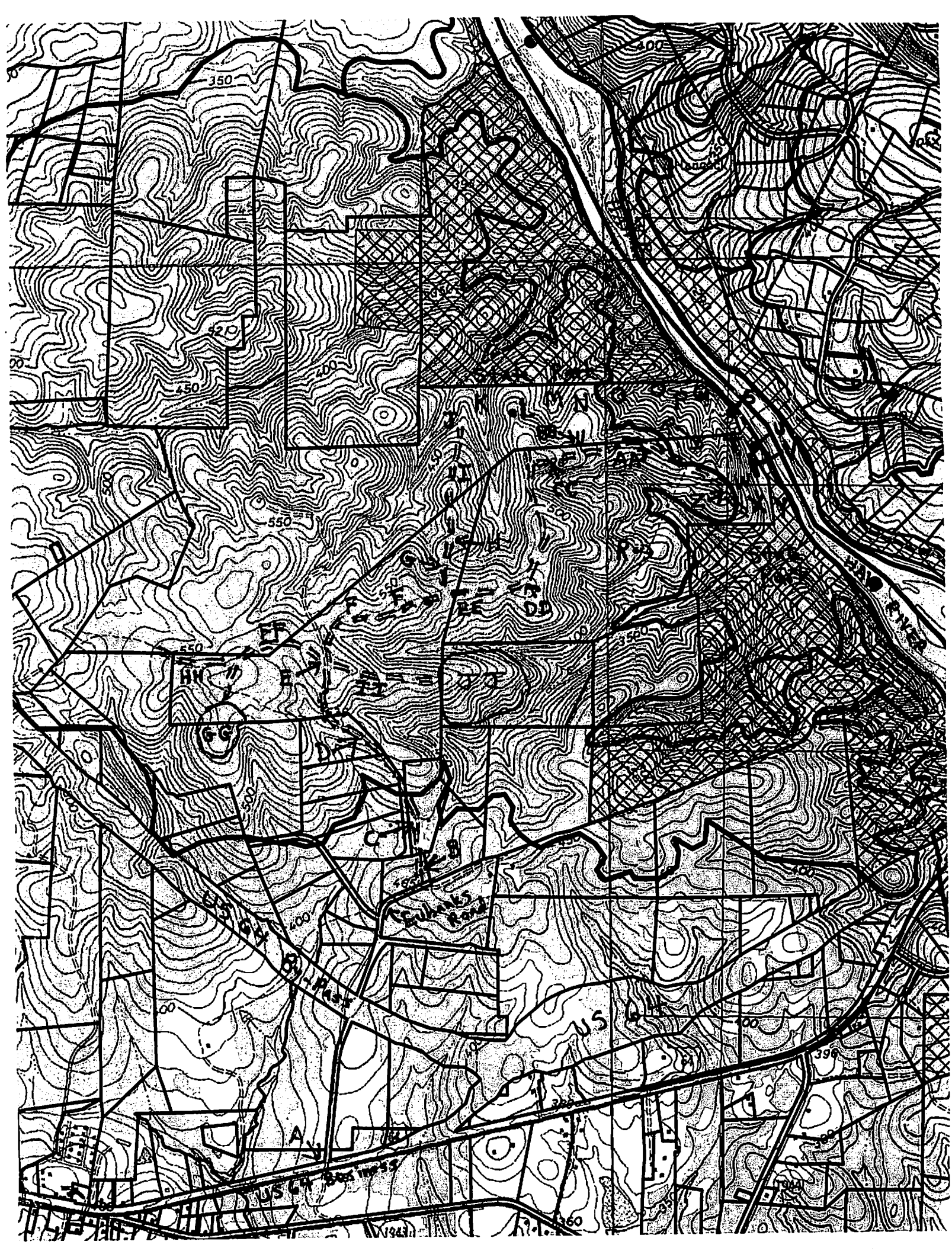
West of the powerline, the ridge hits a dense stand of young loblolly pines (AA), though some exposed rocks are visible south of the track. The track meets with another track (BB) heading off to the right (north) that runs along the easternmost of the three N-S ridges that we crossed earlier. The forest at this confluence is in excellent condition, as well as along the northward road. However, just to the west the main track passes through another dense stand of young pines (CC). The track bends to the south, following a narrow N-S ridge, where the forest is reasonably good (few pines); however, the track hits more young pines (DD) where it bends back to the west. The track heads straight (EE) from here, in a W-WSW direction, back to where we branched off earlier.

We wanted to see some of the “flats” to the west and northwest of the main intersection, so we took the western track (FF). We took few notes, as the track contained enough dragonflies and butterflies to divert our attention from the forest. However, the forest here is mixed pine/hardwood and is not of high quality. This track curves to the left, and one branch goes to a fairly recent clearcut (GG); we continued on a western branch (HH), but the forest was of only middle-age and not worth our survey. We then returned to the 4-way intersection, taking the east track (II). The forest along it is of moderate quality, but not good. After a few hundred yards, it ends in a large, recent clearcut (JJ). At least, it provided a good vista for several miles to the east, as the clearcut was on an E-facing slope.

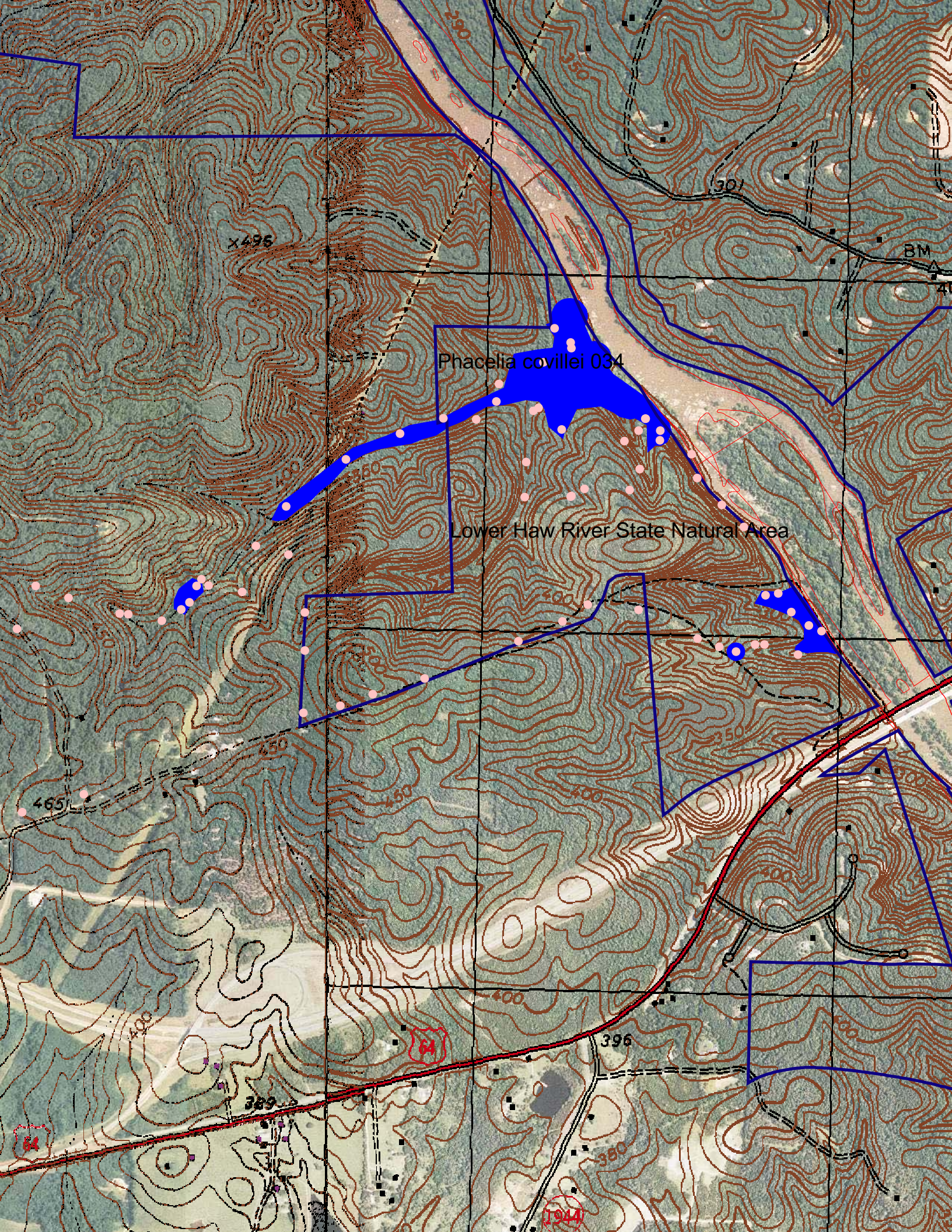
CONCLUSIONS:

Most of the area surveyed northeast of the interesection/picnic table is good to excellent quality forest, mostly Dry-Mesic Oak-Hickory Forest, but with Mesic Mixed Hardwood Forest along the ravines. This portion would be worth protecting as an addition to Haw River Slopes State Natural Area. At a minimum, the eastern portion of this area – the missing gap between the Park tracts, should be added to the Park unit. On the negative side, much of this section is heavily overrun by the exotic autumn olive, and it is quite thick on portions of the steeper slopes close to the river. Some hand-cutting and spraying, or other techniques for eradication, are strongly encouraged.

Harry E. LeGrand, Jr.
N.C. Natural Heritage Program
April 8, 2008







Phacelia covillei 034

Lower Haw River State Natural Area

64

1944

PLANTS NOTED -- April 2 & 8, 2008	Preston	Parks
compiled by Ed Corey, Harry LeGrand, & Misty Buchanan		
Acer floridanum		x
Acer negundo		x
Acer rubrum	x	x
Aesculus sylvatica	x	x
Ailanthus altissima	x	
Allium vineale	x	x
Andropogon virginicus	x	
Antennaria parlinii ssp. parlinii	x	
Antennaria plantaginifolia	x	
Aplectrum hyemale	x	
Arisaema triphyllum	x	
Arundinaria gigantea		x
Asarum canadense		x
Asplenium platyneuron	x	
Athyrium asplenioides	x	
Betula nigra	x	
Bignonia capreolata	x	x
Botrychium virginianum	x	
Cardamine angustata	x	x
Cardamine concatenata	x	x
Cardamine hirsuta		x
Carex spp.	x	x
Carpinus caroliniana	x	x
Carya alba	x	
Carya cordiformis		x
Carya glabra	x	
Carya ovalis	x	
Celtis laevigata		x
Cercis canadensis	x	
Chaerophyllum procumbens	x	
Chasmanthium latifolium		x
Chimaphila maculata	x	
Cimicifuga racemosa	x	
Cirsium (horridulum)	x	
Claytonia virginica		x
Cornus florida	x	x
Corydalis flavula		x
Elaeagnus umbellata	x	x
Elymus sp.		x
Epifagus virginiana	x	
Erythronium		x
Euonymus americanus	x	x
Fabaceae (mystery pea collected - Lathyrus venosus)		x
Fagus grandifolia	x	x
Fraxinus americana	x	
Fraxinus pennsylvanica	x	
Galium aparine	x	x
Galium circaezens	x	
Galium tinctorium	x	

Gelsemium sempervirens	x	x
Geranium carolinianum	x	
Geranium maculatum	x	
Geum (canadense?)	x	
Glecoma hederacea		x
Goodyera pubescens	x	
Hamamelis virginiana	x	
Hepatica americana	x	x
Hexastylis arifolia	x	
Hieracium venosum	x	
Houstonia caerulea	x	x
Hypericum stragalum	x	
Hystrix sp.	x	
Ilex opaca	x	x
Iris cristata	x	
Juglans nigra	x	x
Juniperus virginianus	x	x
Kalmia latifolia		x
Lamium purpureum		x
Lespedeza cuneata		x
Ligustrum sinense		x
Lindera benzoin		x
Liquidambar styraciflua	x	x
Liriodendron tulipifera	x	x
Lonicera japonica	x	x
Lonicera sempervirens	x	x
Luzula sp.	x	x
Maianthemum racemosa	x	
Microstegium vimineum	x	x
Myosotis sp.	x	
Narcissus pseudonarcissus	x	
Nemophila microcalyx (=N. aphylla)	x	x
Nyssa sylvatica	x	
Onoclea sensibilis		x
Osmorhiza longistylis	x	x
Ostrya virginiana	x	x
Oxalis sp.	x	
Oxydendrum arboreum	x	
Packera anonyma	x	
Paulownia tomentosa	x	
Perilla frutescens	x	
Phacelia covillei	x	x
Phlox nivalis var. nivalis	x	
Phoradendron leucarpum	x	
Pinus echinata	x	x
Pinus taeda	x	x
Platanus occidentalis	x	x
Poa cuspidata	x	x
Podophyllum peltatum	x	x
Polygonatum biflorum	x	
Polystichum acrostichoides	x	x
Potentilla canadensis	x	

Prenanthes sp.	x	x
Prunus serotina	x	
Quercus alba	x	x
Quercus coccinea	x	
Quercus falcata	x	
Quercus pagoda		x
Quercus rubra	x	x
Quercus stellata	x	x
Quercus velutina	x	
Ranunculus abortivus		x
Rhododendron periclymenoides		x
Rhus copallina	x	
Rubus sp.	x	
Salvia lyrata	x	
Saxifraga virginiana		x
Sisyrinchium mucronatum	x	
Smilax glauca	x	
Smilax rotundifolia	x	x
Stellaria media	x	
Stellaria pubera	x	
Symphoricarpos orbiculatus	x	x
Taenidia integerrima	x	
Taraxacum officinale	x	
Thalictrum thalictroides (=Anemonella tha	x	
Tiarella cordiformis	x	
Tipularia discolor	x	x
Toxicodendron radicans	x	x
Ulmus americana		x
Uvularia sessilifolia	x	
Vaccinium pallidum	x	
Veronica hederifolia		x
Viburnum dentatum		x
Viburnum prunifolium	x	
Vicia sativa		x
Viola affinis	x	
Viola sagittata	x	
Viola sororia	x	x
Vitis rotundifolia	x	
Zizia aurea	x	
Fungus		
Black Knot Fungus		x
Morel		x

ANIMALS NOTED -- April 2, 2008; compiled by Ed Corey			Preston	Parks
Mammals				
Common Raccoon		Mammal	x	
Coyote		Mammal	x	
Eastern Chipmunk (chewed nuts on a rock)		Mammal	x	
Gray Fox		Mammal	x	
Virginia Opossum		Mammal	x	
White-tailed Deer		Mammal		x
American Beaver				
Birds				
American Crow		Bird		x
American Goldfinch		Bird	x	x
American Robin		Bird	x	
Belted Kingfisher		Bird		x
Black-and-white Warbler		Bird	x	
Blue-gray Gnatcatcher		Bird	x	x
Canada Goose		Bird		x
Carolina Chickadee		Bird	x	
Carolina Wren		Bird	x	x
Eastern Phoebe		Bird	x	
Eastern Towhee		Bird	x	
Field Sparrow		Bird	x	
Fish Crow		Bird	x	
Hairy Woodpecker		Bird	x	
Hermit Thrush		Bird	x	
Louisiana Waterthrush		Bird	x	x
Northern Cardinal		Bird	x	
Northern Parula		Bird		x
Osprey		Bird		x
Ovenbird		Bird		x
Pileated Woodpecker		Bird	x	
Red-bellied Woodpecker		Bird		x
Red-shouldered Hawk		Bird	x	
Red-tailed Hawk		Bird	x	
Ruby-crowned Kinglet		Bird	x	x
Tufted Titmouse		Bird	x	x
Turkey Vulture		Bird	x	
White-breasted Nuthatch		Bird	x	
Winter Wren		Bird		x
Wood Duck		Bird		x
Yellow-bellied Sapsucker		Bird	x	x
Yellow-rumped Warbler		Bird	x	
Yellow-throated Vireo		Bird		x
Yellow-throated Warbler		Bird	x	x
Reptiles				
Anolis carolinensis	Green Anole	Reptile	x	
Carphophis amoenus amoenus	Eastern Wormsnake	Reptile	x	

<i>Eumeces fasciatus</i>	Five-lined Skink	Reptile	x	
<i>Scincella lateralis</i>	Ground Skink	Reptile	x	
<i>Terrapene carolina</i>	Eastern Box Turtle	Reptile		x
<i>Thamnophis sirtalis sirtalis</i>	Eastern Garter Snake	Reptile	x	x
Amphibians				
<i>Acris crepitans crepitans</i>	Eastern Cricket Frog	Amphibian	x	
<i>Ambystoma maculatum</i> (eggs)	Spotted Salamander	Amphibian	x	
<i>Bufo americanus</i> (tadpoles)	American Toad	Amphibian	x	
<i>Pseudacris feriarum feriarum</i>	Upland Chorus Frog/Southeastern	Amphibian	x	x
Insects				
American Bird Grasshopper		Insect		x
American Lady		Insect	x	
American Snout		Insect		x
<i>Atlantiscus</i> sp.	A shield-backed katydid	Insect	x	
Blue Corporal		Insect	x	
<i>Cicindela sexguttata</i>	Six-spotted Tiger Beetle	Insect	x	
Common Baskettail		Insect	x	
Eastern Comma		Insect	x	
Eastern Tailed-blue		Insect	x	
Eastern Tiger Swallowtail		Insect	x	x
Falcate Orangetip		Insect	x	x
Fall Webworm		Insect	x	
Gemmed Satyr		Insect	x	x
<i>Gomphus</i> sp. (Ashy/Lancet Clubtail)		Insect	x	
Henry's Elfin		Insect	x	x
Juvenal's Duskywing		Insect	x	x
<i>Lytta polita</i>	Bronzed Blister Beetle	Insect	x	
<i>Odontotaenius disjunctus</i>	Bess Beetle	Insect	x	
Painted Lady		Insect	x	
Pipevine Swallowtail		Insect	x	
Question Mark		Insect	x	
Red-banded Hairstreak		Insect	x	
<i>Schistocerca americana</i>	American Bird Grasshopper	Insect	x	
Six-spotted Tiger Beetle		Insect	x	x
Sleepy Orange		Insect	x	
<i>Solenopsis wagneri</i>	Red Imported Fire Ant	Insect	x	
Spicebush Swallowtail		Insect	x	
Spring Azure (one definite, more possible)		Insect	x	
Stream Cruiser		Insect	x	x
Summer Azure (at least one definite, more possible)		Insect	x	
Tettigideid grasshopper	A pigmy grasshopper	Insect	x	
Tulip-tree Beauty		Insect	x	
Twin-spotted Spiketail		Insect	x	
<i>Xylocopa virginiana</i>	Carpenter Bee	Insect	x	
Snails				
<i>Haplotrema concavum</i>	Gray Lancetooth	Snail	x	

Mesodon thyroideus	A polygyrid (whitelip) snail	Snail	x	
Mesomphix sp.	A zonitid snail	Snail	x	
Triodopsis tridentata	Northern Threetooth	Snail	x	
Arachnids				
Amblyomma americanum	Lone Star Tick	Arachnid	x	
Velvet Mite		Arachnid	x	
Centipede				
Geophilomorph centipede	An earth-loving centipede	Centipede	x	
Scolopocryptops nigridius	A scolopendromorph centipede	Centipede	x	

Site Inventory Area # 3

Preston Tract visit with TLC

Site visited on 8 May 2008

Notes by Brenda Wichmann

Community Classification follows the 4th Approximation (Schafale, NCNHP)

Nomenclature follows Weakley, Draft 2007

Ridge tops observed generally contain stands of **Dry-Oak Hickory Forest (Piedmont Subtype)** which are dominated by large (approx. 30-40 dbh) *Quercus alba* trees. Scattered among the *Q. alba* are *Q. falcata* and *Q. stellata*, but often of smaller dbh. *Oxydendron arboretum* is also common. The herb stratum is sparsely vegetated.

At least one area visited (our first stop) seemed to harbor an example of **Dry Oak-Hickory Forest (Loblolly Pine Subtype)**.

The tributary to Roberson Creek that we visited supports herbs such as *Anemone* [*Hepatica*] *americana*, *Tiarrella cordifolia*, and *Anemonella* [*Thalictrum*] *thalictroides*. Unfortunately, *Eleagnus* sp. is quite common along the tributary. *Hamamelis virginiana* can also be found near the tributary. The north-west slope that we walked leading down to this tributary supports a large number of small (approx. 5-15dbh) *Acer floridanum* [*barbatum*] trees with scattered *Fagus grandifolia* that are approximately 15-30dbh. The presence of these two species suggests that the soils in this area are more basic and potentially support a **Basic Mesic Forest**. The herb layer in this area supports several herbaceous species such as *Endodeca* [*Aristolochia*] *serpentaria*, *Uvularia perfoliata*, *Hexastylis* sp. Also noteworthy is the presence of a flowering *Styrax grandifolius* nearby this slope.

After lunch we walked along a road, passing several ridge tops with large *Quercus alba* that probably support a **Dry-Oak Hickory Forest (Piedmont Subtype)**. Some of the areas we passed were successional and not interesting. It did seem however, that all of the ridge-tops supported mature Oaks. While walking along the road, I did notice several large *Cercis Canadensis* and *Cornus florida*. Also noted were *Carya alba*, *Quercus alba*, *Q. falcata*, *Liriodendron tulipifera*, *Q. rubra*, *Juglans nigra*, *Q. velutina*, and *Morus rubra*. These areas may support a **Dry-Mesic Basic Oak-Hickory Forest (Piedmont Subtype)** or a **Basic Oak Hickory Forest**. A more thorough survey of this area would help to better classify the community type.

At one point we noticed a nice stand of mature *Q. coccinea* which may represent nice **Dry-Mesic Oak-Hickory Forest (Piedmont Subtype)**.

Site Inventory # 5

Preston Tract Visit with TLC

Site visited on 30 May 2008

Notes by Mary Lovell Hall, Leigh Anne Cienek, Katherine Wright, and Tandy Jones
Community Classification follows the 3rd Approximation (Schafale, NCNHP)

Site One: Tributary and Road

Our first stop seemed to be within a good example of a **Dry-Mesic Oak-Hickory Forest**. Lack of post oak (*Quercus stellata*), and presence of acid loving plants such as sourwood (*Oxydendrum arboretum*) and *Vaccinium* spp. may further indicate this community type as opposed to a Basic Oak-Hickory forest community type. There was a fairly thick, typical shrubby understory with plenty of hickories like mockernut hickory (*C. tomentosa*) and shagbark hickory (*C. ovata*), along with red oaks (*Q. rubra* & *Q. falcata*), white oaks (*Q. alba*) and loblolly pines (*P. taeda*) in the canopy.

We hiked along the old logging road to where a tributary of Stinking Creek intersected the road, and along the way saw a stand of medium aged hardwoods and pines with other species such as redbud (*Cercis canadensis*), dogwood (*Cornus florida*), muscadine grape (*Vitis rotundifolia*), northern red oak (*Q. rubra*), sweetgum (*Liquidambar styraciflua*), white oak (*Q. alba*), and plenty of invasives like multiflora rose, lespedeza cuneata, and eleagnus. As we got closer to the creek, species such as painted buckeye (*Aescylus sylvatica*) and Christmas fern (*Polystichum acrostichoides*) were noticed. This appeared to be a **Dry-Mesic Oak-Hickory Forest** as well, although the presence of post oak and buckeye may indicate a **Basic Oak-Hickory** community type.

We followed the dry tributary through a thick understory and observed the following tree, shrub, and vine species: *(All I could ID from memory on site)*

Painted buckeye	Mulberry spp. (<i>Morus spp.</i>)
Alder spp. (<i>Alnus spp.</i>)	Poison ivy (<i>Toxicodendron radicans</i>)
Virginia creeper (<i>Parthenocissus quinquefolia</i>)	Wax myrtle (<i>Myrica cerifera</i>)
Witch hazel (<i>Hamemalis virginiana</i>)	Water oak (<i>Quercus nigra</i>)
Sweetgum	Black cherry (<i>Prunus serotina</i>)
Crossvine (<i>Bignonia capreolata</i>)	Eleagnus spp.
Japanese honeysuckle (<i>Jonicera laponica</i>)	Christmas fern
Elm spp. (<i>Ulnus spp.</i>)	Smilax spp.
Multiflora rose (<i>Rosa multiflora</i>)	Blackberry (<i>Rubus argutus</i>)
Beech (<i>Fagus grandifolia</i>)	
Eastern red cedar (<i>Juniperus virginiana</i>)	
Tulip poplar (<i>Liriodendron tulipifera</i>)	
Tree of heaven (<i>Ailanthus altissima</i>)	
Japanese stiltgrass (<i>Microstegium vimineum</i>)	

This suggests a **Piedmont / Low Mountain Alluvial Forest** community type along the tributary. Once we reached the creek there were northern facing bluffs on the southern side of the creek that contained what appeared to be a **Mesic Mixed Hardwood Forest** containing good sized beech trees and an open understory. Just beyond the slope at the top of the ridge however, seemed to be thick young pine stands.

Site Two: Upland Swamp

We then hiked NNW back up the tributary and headed back east down the trail, soon turning left and hiking NNW along an old road. The surroundings began as a young loblolly pine stand and soon turned into an open **Dry-Mesic Oak-Hickory Forest** with numerous eastern red cedar trees. Continuing to follow the barely noticeable old road to the NW, we eventually came upon several man-made ponds and an **Upland Depression Swamp Forest**. Some species included laurel oak (*Q. lyrata*), elm spp., smilax, sweetgum, tulip poplar, and white ash (*Fraxinus americana*). To the west of the swamp, the old road dead ended into a thick stand of young loblolly pine.

We exited the forest and connected to the trail at a large southern red oak (*Q. falcata*), and followed the trail back east to where the cars were.

Site Three: Walnut Grove

The group then drove the cars west back down the trail and stopped at a fork in the road for lunch where many mature black walnut (*Juglans nigra*) trees dominated the canopy along with hickories. The walnuts had probably been planted as they were out of place and clumped together; we saw the remains of old buildings and metal parts scattered throughout the open understory as well.

Site Four: Robeson Creek Floodplain

Heading northeast in the cars, we stopped and hiked into the Robeson Creek floodplain walking through what could have been a **Mesic Mixed Hardwood Forest** until reaching a **Sand and Mud Bar** in the floodplain of Robeson Creek. Hiking further to the creek we walked through what could have been either **Piedmont / Mountain Bottomland Forest or Piedmont / Low Mountain Alluvial Forest** (or both). Plenty of mature sycamore (*Plantanus occidentalis*), (*Celtis laevigata*), tulip poplar, and buckeye among others in a closed canopy with an open understory covered with microstegium and eleagnus.

Site Five: Robeson Creek Buffer

Finally, we drove to an area in the Robeson Creek buffer that was past the fields and near the road. This area was beautiful but had many standing dead trees; some trees were uprooted and appeared to have been a result of Hurricane Fran. Mature oaks, hickories, and pines with an open understory, sparse herb layer (due to shade?) and a basically

closed canopy. Noticed American holly (*Ilex opaca*) in the understory so it is probably a **Dry-Mesic Oak Hickory** community type.

Summary:

Plenty of **Dry-Mesic Oak- Hickory** community but could possibly contain **Basic Oak – Hickory** examples as well due to the large amount of hickories and buckeye. Researching a soil survey of the area and a more thorough survey of species is needed. Great example of an **Upland Depression Swamp Forest** as well as different floodplain community types were also noted. Many loblolly and some shortleaf pines, red and white oaks, and hickories, along with many invasive species including ailanthus, multiflora rose, microstegium, eleagnus, privet spp. (*Ligustrum* spp.), honeysuckle, kudzu, and lespedeza cuneata.

April 1, 2008

Inspecting two tracts at the request of TLC: the Preston Tract, which is a large undeveloped area located between Gum Springs Road and Pittsboro-Moncure road in Chatham County, and the Brumley Tract, which is located across (S) of the Eno Division of Duke Forest in Orange County. Today's site visits will concentrate on looking for redback and four-toed salamanders.

Preston Tract. The area we will be searching consists of two ravines with north-facing slopes, located on tributaries of Stinking Creek. These sites are only a few miles south of the redback salamander population at Roberson Creek, and like that site, represent steep ravines cut into the Triassic Basin's western escarpment. Neither of these two ravines, however, is as steep or as extensive as the one on Roberson Creek.

0916 I'm here with Kristen Sinclair and Bill Oestereich at the proposed Preston development in Chatham County. It's currently overcast and it's been raining for the past two days. Forecast is for showers with heavy thunderstorms this afternoon. Temperature is in the 70s. Showering on and off, but not heavily – good sampling conditions for salamanders.

We entered the area via a small, new development located off of Gum Springs Road; parked at a gate at the end of Overlook Drive. Only a few houses have been built so far, but this development, plus the proposed Preston development and others may close off this area from the Core Lands around Jordan Lake. After passing through the gate, we are walking down an old logging road, which appears to be now used mainly for horseback riding (several hoof prints seen). A map provided by Bill Oestereich indicates that these trails penetrate through most of the Preston Tract. All of the area we have been walking through is second growth, although primarily hardwoods.

Mammals: rabbit and deer footprints at the top of the hill off of Overlook Drive.

Birds: Carolina wren, tufted titmouse, northern cardinal, American crow. Purple finch -- saw one male in breeding plumage.

Mammals: golden mouse nest right here at the top of the hill in a honeysuckle vine growing on a pine tree on the edge of the woods.

Birds: singing black-and-white warbler in the ravine we are now walking along. Carolina chickadee.

Frogs: few chorus frogs still singing down towards the west of where we are walking.

Birds: Pine warbler. Seeing a lot of turkey vultures flying overhead; must have a roost somewhere close by.

Mammals: possible coyote scat on the road, composed of hair and bone but disintegrated; quite a few large bone fragments. No fruit.

Butterflies: several eastern tailed blues

0933 We've reached the entrance into the the northern most ravine. It's been recently cut, probably within the last 10 to 15 years. Choked with young saplings and shrubs; some buckeye right at the entrance, but there's also a lot of Eleagnus. Not impenetrable, but the whole north-facing slope appears to have been cut, from the floodplain to the top of the ridge. Not too promising for salamanders!

Snails: saw an old Mesodon thyroideus shell, one partially decayed Haplotrema, and Kristen found a young Mesomphix cupreus up on the slope.

Mammals: Kristen found the skull of a raccoon sized animal.

Birds: golden-crowned kinglet, another black-and-white. Cowbird overhead.

Preston and Brumley Tracts Survey (TLC)

April 1, 2008

0953 We're now giving up on this slope. It's cut-over the whole length we've been walking, although there have been a few areas with less disturbance than others, but we haven't found any salamanders at all and only a few species of snails (*Mesomphix* appears pretty common, however, WP 21-22). The base the slope did not look like it had any seeps, although we did not explore it all the way up to the streamhead.

1001 We've come down to the creek in the same ravine; the top of the ridge was too cut-over to walk through. The stream at the bottom of this ravine has a good deal of flow right at the moment. It's about 7 or 8 feet across, with a rocky bottom. No silt and looks pretty clean. This area has been cut too, however. There are some remnant taller trees, but most the canopy has been removed. Some buckeye and redbud down in the bottom but also several red cedars.

1008 I've been working down a side channel that is mostly dry and running parallel to the main channel. There was one point where there was a little series of pools with moss clumps along them, but I didn't find any sign of *Hemidactylium*. I've now come down to a bigger pool with moss clumps along it, but it has a water coming into it from the main stem. It's not isolated enough for pool salamanders – didn't see any larvae or egg masses. In general, there isn't enough of a floodplain terrace to hold much promise in this area.

1036 We're now up on a north-facing slope, although we are still apparently walking out of the first ravine. This part is not as cut over as the previous section we explored. There are still some canopy trees down along the slope, although the top of the ridge is still covered in young saplings and *Eleagnus*. Lot of fallen logs here, which looks more promising for salamanders.

Snails: Collected a possible *Inflectarius* WP 26

Lizards: Bill found a ground skink under a log; has a regenerating tail.

Birds: seen several turkey scrapes along the slope we are walking along now.

Crustaceans: Kristen found a crayfish exuvium, which we will take back for Judy or Sarah

We're now rounding the bend to the next ravine, and headed east generally. This slope is in much better shape; much more open and still has a canopy. The turkeys appear to like it better -- more mast -- and we are also seeing more snails.

Snails: collected an empty *Neohelix* shell; also found shells of *Mesodon thyroidus* and are seeing still more *Mesomphix* out on the surface.

1109 We're now walking down an old road back towards the creek; still haven't reached the second ravine.

Butterflies: eastern tailed blue, pearly crescent.

Birds: hearing cowbirds overhead; also more black and whites, which appear to be pretty common today.

Frogs: one or two spring peepers, also down along the main creek. Haven't seen any green frogs, leopard frogs, or pickerel frogs.

We have now come down to a larger road that goes up a gate on Talon Road. This tract is still under negotiation with Preston, but we are now right at the edge of the southern-most ravine.

Salamanders: Bill found a small *Desmognthus fuscus* right at the edge of the creek that runs down this ravine.

Birds: Phoebe

Preston and Brumley Tracts Survey (TLC)

April 1, 2008

The north-facing slope in this ravine is in much better condition than the other one, at least lower down. Up above, it's all been cut-over again, with a thick growth of saplings. The lower slope still has some trees, however and a lot of the rich herbs: bloodroot, hepatica, probably *Waldsteinia*; lot of buckeye. Seems like a pretty rich area, so we are going to spend some time here. Kristen is taking a waypoint (WP 30)

Salamanders: found a small slimy salamander on the north-facing slope of the ravine.

Lizards: found an anole sticking his nose up from under a log.

Snails: Kristen found another *Mesomphix*; they appear to be abundant in this area, with many individuals out wandering in the rain

1143 We are continuing to walk up this ravine but are now walking at the bottomland. The north-facing slope is covered with saplings and *Eleagnus* again. The bottom lands has also been cut-over, but is in somewhat better shape. Buckeyes are pretty common.

Butterflies: spring azure -- bigger and slower flying than the ETBs

Birds: downy woodpecker.

1203 We're now headed back downstream; giving up on the salamanders, at least the redbacks. Still don't see any raised terraces with isolated pools, no springs, no seeps.

Crustaceans: found some crayfish parts up on a log.

Butterflies orangetip; first one I've seen today.

Birds: gnatcatcher -- I've heard at least a couple. Also heard a yellow-throated warbler up stream.

Butterflies: tiger swallowtail.

Summary of Preston Tract. Most of this area has been fairly recently cut, with only a few areas having retained their canopies and ground cover more-or-less intact. Even common salamanders, like slimys were hard to find, although *Mesomphix cupreus* appeared to be nearly everywhere. Additionally, the two ravines we searched were shorter in length than the bluffs at Roberson Creek and the north-facing slopes were not as steep. No northern or montane plants were found, although we did see *Waldsteinia* in the southern ravine, which also occurs at Roberson Creek. Although montane plants are also missing at Roberson Creek, the topography here does not seem as favorable for redbacks. The lack of elevated floodplain terraces, isolated pools, or seeps also makes this area unlikely to support four-toed salamanders.

Wild turkey appear to be present, at least in the areas where oaks and beech are still mature enough to produce mast. One possible coyote scat was seen but no other predator sign was observed, including raccoons and fox, let alone bobcat. Most of the area we searched, however, is located fairly close to new development along Gum Springs Road. Carnivores still seem likely to occur farther back within this very large tract.

Preston and Brumley Tracts Survey (TLC)

Element Occurrence ReportEO ID 25952 Scientific Name *Dry oak--hickory forest*

EO Number 117

Summary

ELCODE	CCTER00170	Principal EO	Global Rank	G5	State Rank	S4
<u>FOURTH_APPROX_NAME</u>			<u>STD_ELCODE</u>	<u>SIG</u>	<u>EXCEL</u>	<u>SYSTEM</u>
					<u>CONFID</u>	

Locators/Directions

USGS Quad Name	Margin Num	County Name	Watershed
Merry Oaks		Chatham (NC)	03030002 - Haw

Latitude 353937N Longitude 0790533W

Site Name	Survey Site
	Gum Springs Church Road Slopes: Between Jordan Lake and SR 1949 (Gum Springs Church Road), south of Clark Poe Road

Directions Gum Springs Church Road Slopes: Between Jordan Lake and SR 1949 (Gum Springs Church Road), south of Clark Poe Road (no route number shown on topo map) (Buchanan 2008).

Survey Information and Description

Survey Date 2008-04-10 First Observation Date 2008-04-10 Last Observation Date 2008-04-10

Surveyor Misty Buchanan, NCNHP

EO Observed Area 6.00 acres Calculated Rep Accur.

Rep Accuracy High Separation Commen

Basic EO Rank C - Fair estimated viability EO Rank Date 2008-04-10 Survey

Condition A

Size D 6 acres

Context B

EO Rank Comment Very mature, but the size is small (Buchanan 2008).

EO Data

Very mature forest with trees averaging 18-20" DBH (many trees reaching 21-23") observed by Buchanan, McRae, Cienek, and Oestereich 10 April 2008. Canopy dominated by *Quercus alba* with *Carya alba* and *C. glabra*. The understory and shrub strata are very sparse. Some low *Ilex opaca*, *Juniperus virginiana*, and *Vaccinium pallidum* are present in the shrub zone. Herbs are sparse, with several patches of *Scleria* sp. This community grades into Dry-Mesic Oak--Hickory Forest on the east (Buchanan 2008).

General Description

Min. Elevation 350 feet Max. Elevation 400 feet

SOIL TYPE SOIL TAXONOMY**EO Species****Natural Disturbance****Anthropogenic Disturbance**

Data Sensitive Element N

Monitoring Needs Comments**Research Needs Comments**

Additional Inventory Needed N Comments Southern boundary needs to be verified (Buchanan 2008).

General Comments:**Ownership/Protection**Managed Area Name CONTAINED_CD**OWNER NAME**Preston OWNER NOTE**Owner Comments**

More Land Y More Protection More Management

Management Comments**Protection Comments****Documentation/Version**

Reference Code	Citation
F08BUC01NCUS	Buchanan, M. F. 2008. Field notebook for site visits conducted during 2008 for NC Natural Heritage Program, Raleigh, NC.

Element Occurrence Report

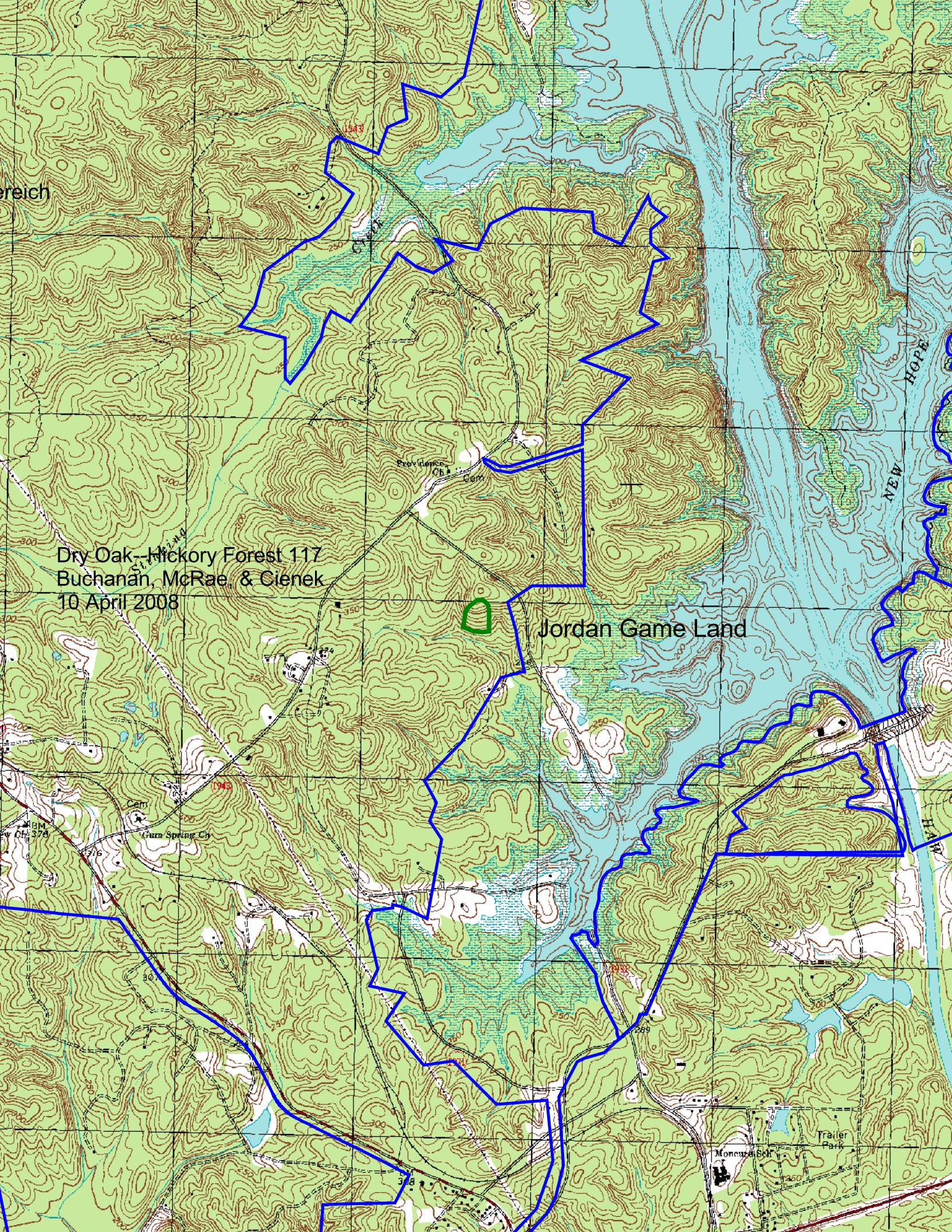
EO ID	25952	Scientific Name	<i>Dry oak--hickory forest</i>	EO Number	117
Lead Responsibility	USNCHP	Version Date	2008-04-11	Transcription Date	2008-04-11
Version Author	M. Buchanan			Transcribed By	M. Buchanan

reich

Dry Oak-Hickory Forest 117
Buchanan, McRae, & Cienek
10 April 2008



Jordan Game Land



Element Occurrence Report

EO ID 25950	Scientific Name <i>Dry-mesic oak--hickory forest</i>	EO Number 149
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Summary

ELCODE CCTER00175	Principal EO	Global Rank G5	State Rank S5
<u>FOURTH_APPROX_NAME</u>		<u>STD_ELCODE</u> <u>SIG</u>	<u>EXCEL</u> <u>SYSTEM</u> <u>CONFID</u>

Locators/Directions

USGS Quad Name	Margin Num	County Name	Watershed
Merry Oaks		Chatham (NC)	03030002 - Haw

Latitude 353948N	Longitude 0790519W
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Site Name	Survey Site
	East of Gum Springs Church Road and north of Clark Poe Road, west of Jordan Lake.

Directions Gum Springs Church Road Slopes: Along the west side of Jordan Lake, east of Stinking Creek. The site is easement of Gum Springs Church Road, north of Clark Poe Road, and south of an unnamed tributary to Jordan Lake. The eastern part of this occurrence is located on Jordan Game Land, but most of the occurrence is on private land adjacent to the game land (Buchanan 2008).

Survey Information and Description

Survey Date 2008-04-10	First Observation Date 2008-04-10	Last Observation Date 2008-04-10
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Surveyor Misty Buchanan, NCNHP

EO Observed Area 44.00 acres	Calculated Rep Accur.
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Rep Accuracy High	Separation Comment
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Basic EO Rank A - Excellent estimated viability	EO Rank Date 2008-04-10	Survey
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Condition A	Very high quality - the most mature, intact upland forest seen by Buchanan in Chatham county.
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Size C	44 acres
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Context B	Bounded on the east by Jordan Game Land. Other sides are in residential development or planned for development (2008).
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EO Rank Comment**EO Data**

Very high quality forest dominated by mature trees averaging 14-18" DBH observed by Buchanan, McRae, and Cienek 10 April 2008. Some younger trees are mixed throughout, especially in natural canopy gaps due to tree fall. The canopy is mostly mature *Quercus alba*, with many trees 20-22" DBH, and some up to 31" DBH. Other common species are *Carya alba*, *C. glabra*, *Pinus echinata*, *Quercus rubra*, and *Q. falcata*. *Liriodendron tulipifera* and *Carya ovata* are also present in some areas. *Cornus florida* and *Cercis canadensis* are present in the understory. Shrubs are relatively sparse, with *Euonymus americana*, *Ilex decidua*, *I. opaca*, and *Symphoricarpos orbiculatus*. Vines include *Lonicera sempervirens* and abundant *Vitis rotundifolia*. Herbs are sparse, with *Anemone americana*, *Chimaphila maculata*, *Dennstaedtia punctilobula*, *Hexastylis* sp., *Hieracium venosum*, *Houstonia caerulea*, *Melica mutica* (Buchanan 2008).

General Description

Min. Elevation 270 feet	Max. Elevation 410 feet
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<u>SOIL TYPE</u>	<u>SOIL TAXONOMY</u>
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EO Species

Natural Disturbance	Natural canopies resulting from tree falls (probably during Hurricane Fran).
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Anthropogenic Disturbance

Data Sensitive Element	N
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Monitoring Needs Comments**Research Needs Comments**

Additional Inventory Needed	N	Comments	Eastern boundary of this occurrence needs more survey work - it may extend to the east and north. The south and west boundaries are well-mapped (Buchanan 2008).
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General Comments:**Ownership/Protection****Managed Area Name**

Jordan Game Land

CONTAINED_CD**OWNER NAME**

NC Wildlife Resources Commission

OWNER NOTE

Preston

Owner Comments

More Land	Y
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More Protection

More Management

Management Comments

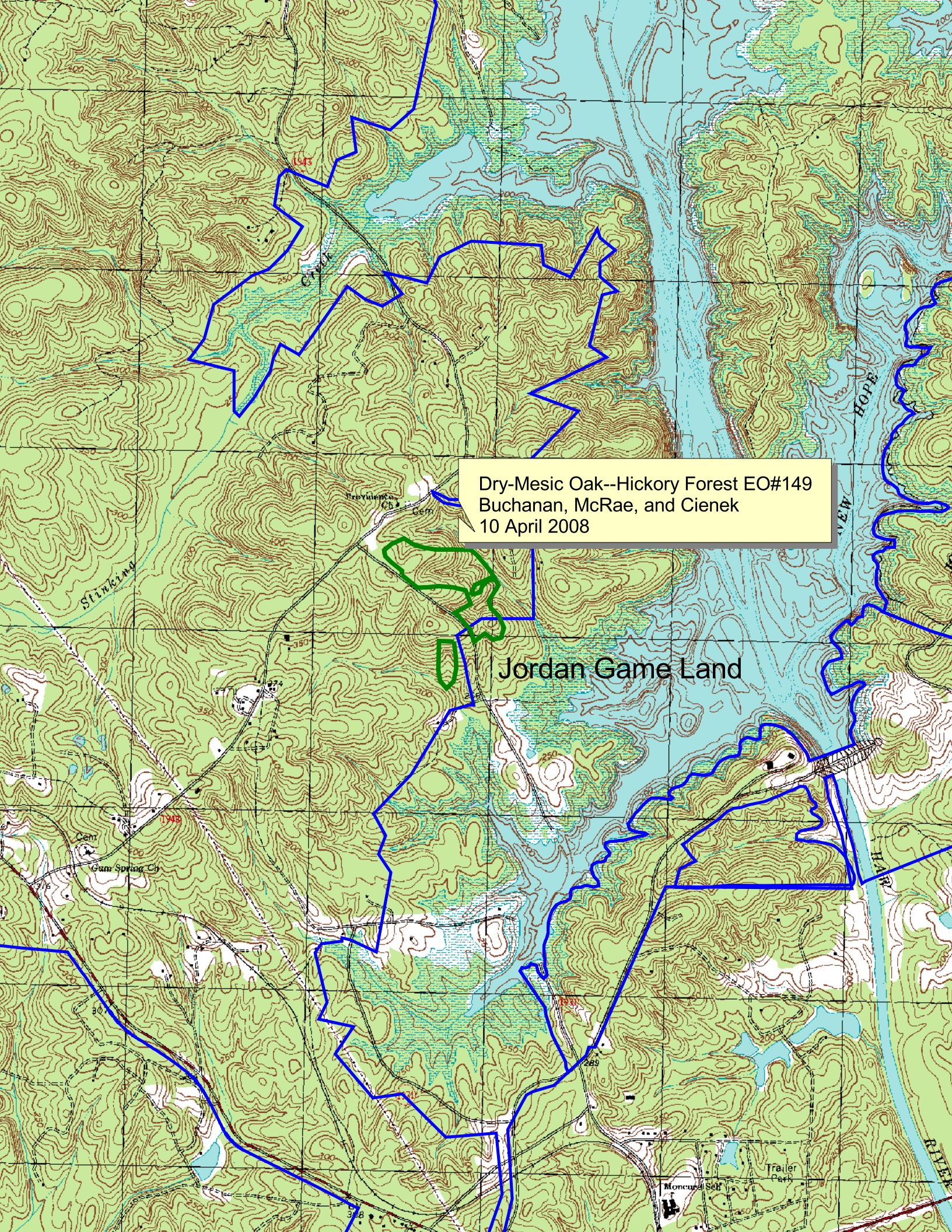
Element Occurrence Report

EO ID	25950	Scientific Name	<i>Dry-mesic oak--hickory forest</i>	EO Number	149
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Protection Comments**Documentation/Version**

Reference Code	Citation
F08BUC01NCUS	Buchanan, M. F. 2008. Field notebook for site visits conducted during 2008 for NC Natural Heritage Program, Raleigh, NC.

Lead Responsibility	USNCHP	Version Date	2008-04-11	Transcription Date	2008-04-11
Version Author	M. Buchanan			Transcribed By	M. Buchanan



Dry-Mesic Oak--Hickory Forest EO#149
Buchanan, McRae, and Cienek
10 April 2008

Jordan Game Land

Municipal Set
Trailer Park

Element Occurrence Report

EO ID	25951	Scientific Name	<i>Dry-mesic oak--hickory forest</i>	EO Number	150
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Summary

ELCODE	CCTER00175	Principal EO	Global Rank	G5	State Rank	S5
<u>FOURTH_APPROX_NAME</u>			<u>STD_ELCODE</u>	<u>SIG</u>	<u>EXCEL</u>	<u>SYSTEM</u>
					<u>CONFID</u>	

Locators/Directions

USGS Quad Name	Margin Num	County Name	Watershed
Merry Oaks		Chatham (NC)	03030002 - Haw
Latitude	353951N	Longitude	0790600W
Site Name		Survey Site	Gum Springs Church Road Slopes

Directions Gum Springs Church Road Slopes: Between Jordan Lake and Stinking Creek. The community occurs in separate patches south and northwest of intersection of SR 1943 (Gum Springs Church Road) and Clark Poe Road (route number not shown on topo map) (Buchanan 2008).

Survey Information and Description

Survey Date	2008-04-10	First Observation Date	2008-04-10	Last Observation Date	2008-04-10
Surveyor	Misty Buchanan, NCNHP				

EO Observed Area	acres	Calculated Rep Accur.
Rep Accuracy	High	Separation Comment
		This occurrence is close enough to EO 149 to be combined, but the quality is lower. I mapped the patches of different quality separately to highlight the best areas (Buchanan 2008).

Basic EO Rank	B - Good estimated viability	EO Rank Date	2008-04-10	Survey
Condition	B	Mature, with little influence from invasive exotic species (Buchanan 2008).		
Size	C	80 acres		
Context	B	Surrounded by patches of sparse residential development and cleared forests (Buchanan 2008).		

EO Rank CommentEO Data

High quality forest dominated by mature trees averaging 12-14" DBH observed by Buchanan, McRae, and Cienek 10 April 2008. The canopy is mostly mature *Quercus alba* and *Q. rubra*, along with some *Carya glabra*, *C. ovata*, *Liriodendron tulipifera*, *Pinus echinata*, *P. taeda*, *P. virginiana*, and *Q. falcata*. Shrubs include *Euonymus americana*, *Ilex opaca*, *Symphoricarpos orbiculatus*, and *Vaccinium* spp. Vines include *Lonicera sempervirens* and abundant *Vitis rotundifolia*. Herbs are sparse, with *Anemone americana*, *Chimaphila maculata*, *Hieracium venosum*, and *Houstonia caerulea* (Buchanan 2008).

General Description

Min. Elevation	feet	Max. Elevation	feet
<u>SOIL_TYPE</u>		<u>SOIL_TAXONOMY</u>	

EO Species

Natural Disturbance Natural canopy gaps resulting from tree falls (probably during Hurricane Fran).

Anthropogenic Disturbance

Data Sensitive Element N

Monitoring Needs CommentsResearch Needs Comments

Additional Inventory Needed N **Comments** Northern boundary west of Gum Springs Church Road needs to be checked- it may extend farther than it is mapped (Buchanan 2008).

General Comments:Ownership/Protection

<u>Managed Area Name</u>	<u>CONTAINED_CD</u>
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OWNER NAME

Preston

OWNER NOTEOwner Comments

More Land	Y	More Protection	More Management
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Management CommentsProtection CommentsDocumentation/Version

Element Occurrence Report

EO ID 25951 **Scientific Name** *Dry-mesic oak--hickory forest* **EO Number** 150

Reference Code**Citation**

F08BUC01NCUS

Buchanan, M. F. 2008. Field notebook for site visits conducted during 2008 for NC Natural Heritage Program, Raleigh, NC.

Lead Responsibility

USNCHP

Version Date

2008-04-11

Transcription Date

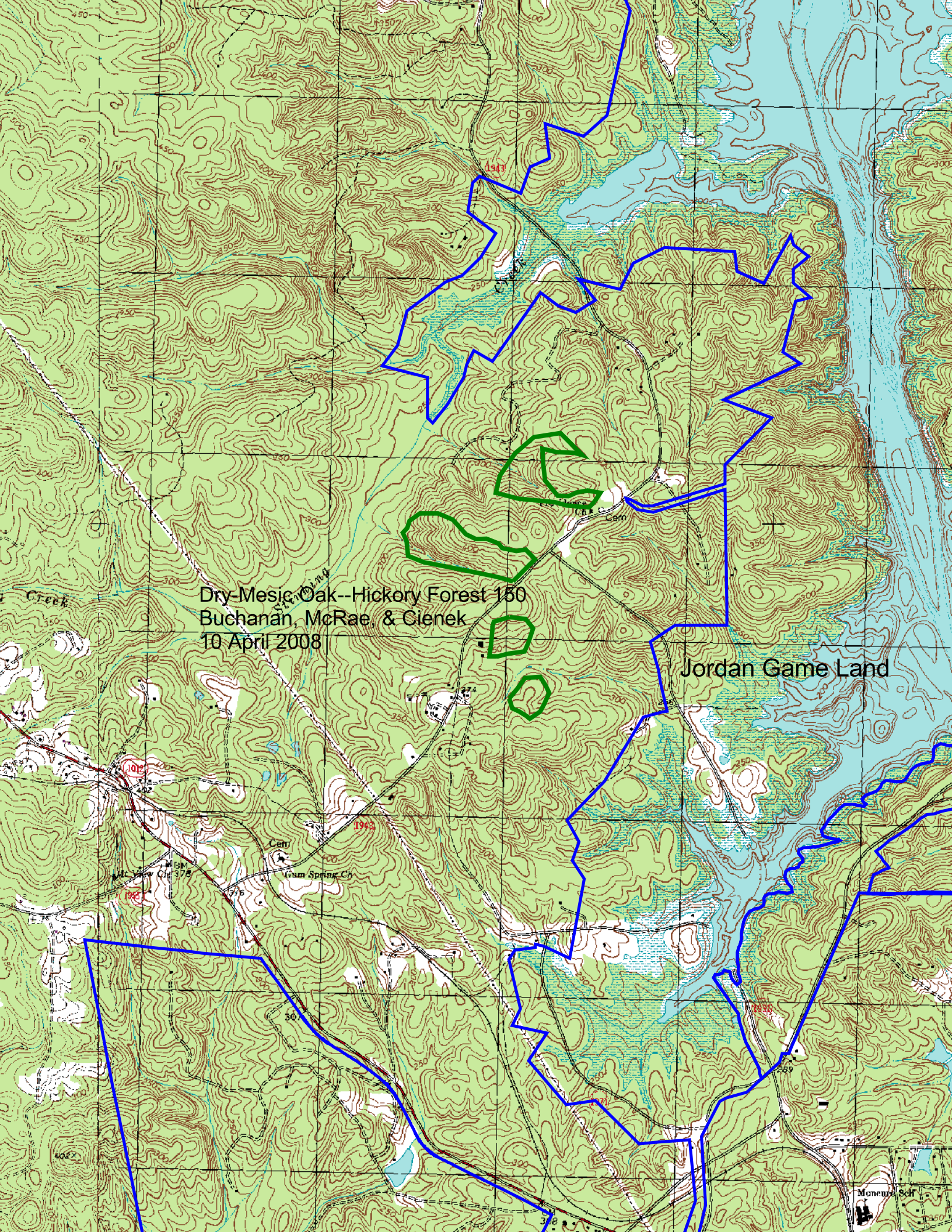
2008-04-11

Version Author

M. Buchanan

Transcribed By

M. Buchanan



Dry-Mesic Oak--Hickory Forest 150
Buchanan, McRae, & Cienek
10 April 2008

Jordan Game Land

Monument Sch

Element Occurrence Report

EO ID	25953	Scientific Name	<i>Dry-mesic oak--hickory forest</i>	EO Number	151
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Summary

ELCODE	CCTER00175	Principal EO		Global Rank	G5	State Rank	S5	
<u>FOURTH_APPROX_NAME</u>				<u>STD_ELCODE</u>	<u>SIG</u>	<u>EXCEL</u>	<u>SYSTEM</u>	<u>CONFID</u>

Locators/Directions

USGS Quad Name		Margin Num		County Name		Watershed	
Pittsboro				Chatham (NC)		03030002 - Haw	
Latitude	354117N	Longitude	0790836W				
Site Name				Survey Site	East of Pittsboro-Moncure Road between Robeson and Stinking Creeks		

Directions East of SR 1012 (Pittsboro-Moncure Road) between Robeson and Stinking Creeks. The natural community occurs in disjunct patches between SR 1012 and a large transmission line, approximately 0.6 mile northeast of intersection of SR 1012 and SR 1969 and 0.4 mile southeast of same intersection (Buchanan 2008).

Survey Information and Description

Survey Date	2008-04-10	First Observation Date	2008-04-10	Last Observation Date	2008-04-10
Surveyor	Misty Buchanan, NCNHP				
EO Observed Area	42.00 acres	Calculated Rep Accur.			
Rep Accuracy	High	Separation Commen			
Basic EO Rank	BC - Good or fair estimated viab	EO Rank Date	2008-04-10	Survey	
Condition	B				
Size	C 42 acres				
Context	C				
EO Rank Comment	Fragmentation prevents the community from being ranked higher (Buchanan 2008).				

EO Data

Good quality forest of mixed age with trees averaging 8-10" DBH (up to 16") observed by Buchanan, McRae, Cienek, and Oestereich 10 April 2008. The canopy is mostly mature *Quercus alba*, *Q. falcata*, *Q. rubra*, and *Acer rubrum*, along with some *Liriodendron tulipifera*, *Pinus echinata*, and *P. taeda*. Shrubs include *Aesculus sylvatica*, *Euonymus americana*, *Ilex opaca*, and *Vaccinium* spp. Vines include *Lonicera sempervirens* and *Vitis rotundifolia*. Herbs are sparse, with *Chimaphila maculata* and *Houstonia caerulea* (Buchanan 2008).

General Description

Min. Elevation	290 feet	Max. Elevation	530 feet
<u>SOIL_TYPE</u>		<u>SOIL_TAXONOMY</u>	

EO Species**Natural Disturbance****Anthropogenic Disturbance****Data Sensitive Element** N**Monitoring Needs Comments****Research Needs Comments**

Additional Inventory Needed	N	Comments	The southern patch may extend farther to the east, beyond the tributary to Stinking Creek. The boundary should be revised after more survey work (Buchanan 2008).
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General Comments:**Ownership/Protection****Managed Area Name****CONTAINED_CD****OWNER_NAME****OWNER_NOTE**

Preston

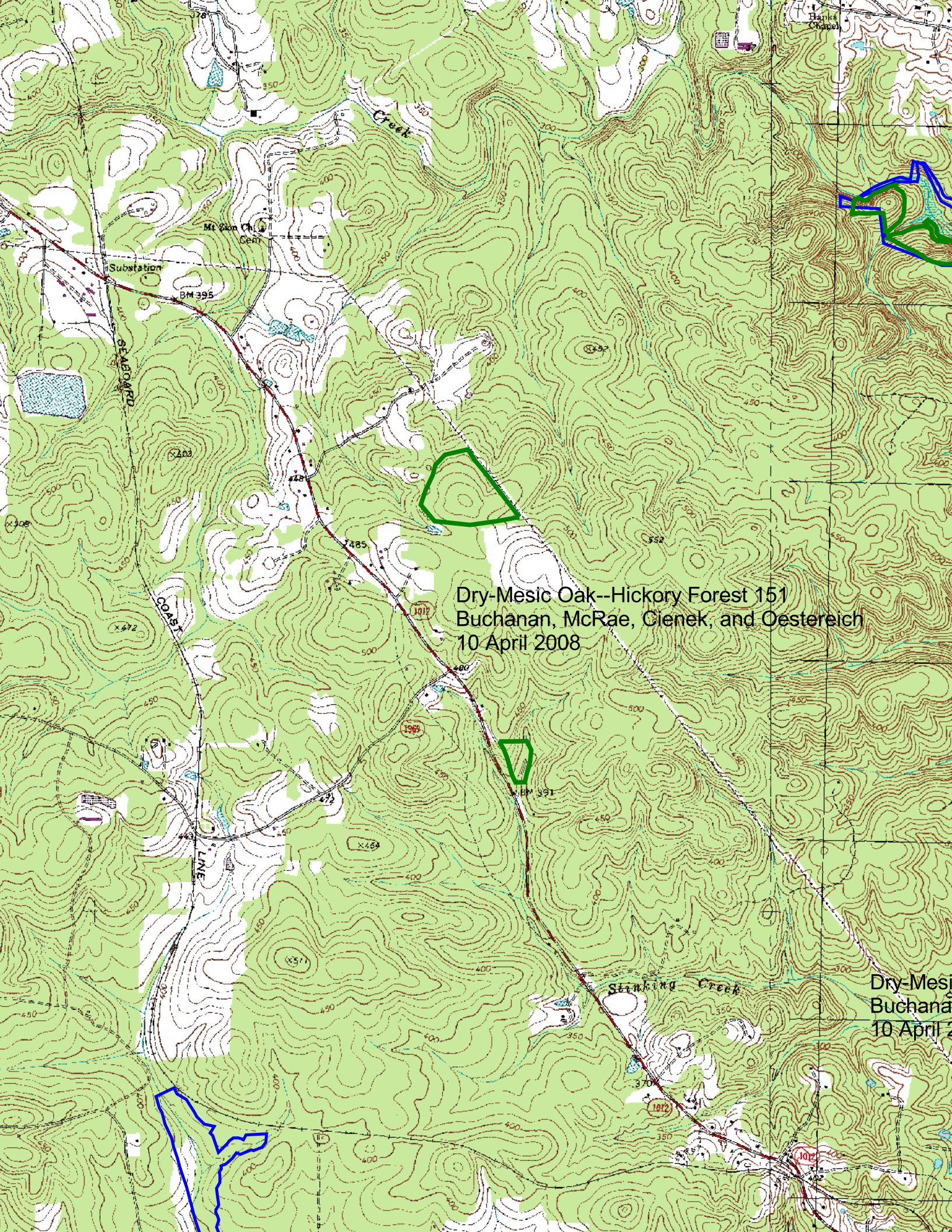
Owner Comments**More Land** Y**More Protection****More Management****Management Comments****Protection Comments****Documentation/Version**

Element Occurrence Report

EO ID 25953 **Scientific Name** *Dry-mesic oak--hickory forest* **EO Number** 151

Reference Code **Citation**
F08BUC01NCUS Buchanan, M. F. 2008. Field notebook for site visits conducted during 2008 for NC Natural Heritage Program, Raleigh, NC.

Lead Responsibility USNCHP **Version Date** 2008-04-11 **Transcription Date** 2008-04-11
Version Author M. Buchanan **Transcribed By** M. Buchanan



Substation

Mt Zion Ch.
Cent.

BM 395

SEASIDE
COAST LINE

Dry-Mesic Oak--Hickory Forest 151
Buchanan, McRae, Cienek, and Oestereich
10 April 2008

LINE

Stinking Creek

Dry-Mesic
Buchanan
10 April 2008

Appendix B

Riparian Assessment of Robeson Creek Summary of Preston Development Parcels

On April 24 and 25 2008, an assessment of the main stem of Robeson Creek was conducted on Preston property by Catherine Deininger of Haw River Assembly and Karen Hall of North Carolina State University. Using maps and GPS, the majority of the stream channel bordering Preston property was quantitatively and qualitatively assessed for riparian buffer quality. A semi-quantitative vegetation assessment guide (beta version) developed by NCSU was used in a series of reaches throughout the stream corridor. The following is a summary of findings of that survey.

- A total of 21 reaches were surveyed for riparian condition along a total of approximately 16,000 linear feet.
- The floodplain is mostly a broad and expansive forest with areas of steep forested terrain that border the stream. The wide floodplain can be generally characterized as a Piedmont bottomland forest.
- A large section of adjacent land appeared to have been logged several years ago leaving an approximate 50-foot wide buffer on the right bank (looking downstream). Some sections were logged even closer to the stream.
- Overall structural complexity of the floodplain was very good with herbaceous, mid-story and canopy layers all present throughout the majority of the riparian area. Shade was persistently present over the majority of the creek with the exception of powerline right-of-ways.
- Root stabilization along the stream banks was average to poor. In general, a few large trees were spaced out at top of bank throughout the entire corridor. The stream has incised and widened through time causing erosion around these trees and they are slowly falling in, leaving the bank exposed to further erosion.
- Terrestrial habitat was varied throughout. A variety of large floodplain tree species such as sycamore and river birch occurred in wide expanses. Understory species included buckeyes, spicebush, and pawpaw. A variety of herbs were scattered throughout and included jack-in-the-pulpit, wood sorrel, and rushes and sedges.

- Invasive species were prevalent in most sections. Chinese privet and silverberry occurred heavily in some areas. Japanese stiltgrass was also present in areas. In many sections, silverberry constituted nearly the entire mid-story canopy.
- Several intermittent and ephemeral streams entered the main channel at different locations. Wetlands were scattered throughout and most were in the form of old, abandoned channels.
- Beaver activity was present throughout. Some sections had more recent occurrences of beavers than others. Deer browse was heavy throughout. Chinese privet was heavily browsed by deer.
- Other wildlife noted included a pair of nesting woodducks, red-shouldered hawks, green herons, great blue herons, and tracks of raccoons and opossums.
- A man-made wall structure was a major feature in the lower section of the creek. At this time, it is unknown what the structure is.

In summary, this section of Robeson Creek and its riparian area are mostly intact with mature bottomland forests comprising the majority of the floodplain. This is providing excellent habitat, both aquatic and terrestrial. The stream is shaded by both buffer vegetation and upland vegetation. The floodplain is diverse with small tributaries, wetland areas, and numerous species of plants. The channel has suffered incision and widening most likely due to upstream inputs, but appears to be compensating well. Exotic invasive plants, especially silverberry, are pervasive throughout; the entire riparian area could benefit from a management plan for this problem vegetation. Additional planting of trees in areas where vegetation is sparse could also be part of an overall management plan to keep this section of Robeson Creek off of the impaired waters list and improve not only habitat, but also water quality.

Semi-Quantitative Riparian Vegetation Assessment Results for Robeson Creek

Using a beta-version of the NCSU SRP Semi-Quantitative Riparian Vegetation Assessment Guide (adjusted for this project), scores were applied to various aspects of the riparian area along the select portions of Robeson Creek surveyed for this project. Each assessment component had 4 possibilities for scoring based on riparian condition. Best scores were given to those areas that were intact, healthy, and functioning well. Maximum score for each possibility was 10, minimum score was 1 (see example sheet for details).

Five components of the riparian area were selected for assessment and are described below.

1. Structural complexity. This portion of the assessment reflects canopy structure within the riparian areas and gives greater scores to a thorough mixture of mature trees, saplings, seedlings, shrubs, and herbaceous cover. Three structural cover classes with greater than 30% cover had to be present in order to receive maximum scoring.
2. Exotics. This referred to invasive non-native vegetation that occurred in the riparian area. Maximum scoring was given to areas that had less than 5% of total cover represented by non-native vegetation.
3. Root stabilization. Scoring was based on presence of deep binding root mass along the stream bank. Maximum scoring was given to areas where root mass was visible or not visible and was clearing stabilizing the stream banks (little to no erosion on banks, dense woody vegetation along banks including large trees and shrubs).
4. Wetland habitat. Maximum scoring was applied to areas where wetlands were present in the riparian area (wetlands being evidence of standing and/or pooling water for extended periods of time). This excluded ephemeral/intermittent streams.
5. Buffer width. The widest areas of the floodplain that were not disturbed by human activity such as logging and powerline right-of-ways were given maximum scores. Zones that were 50 feet or greater received highest scores while areas with zones less than 10 feet were given least scores.

For this particular assessment, a maximum of 60 points could be achieved within each reach on each bank (potential 60 points for left bank and potential 60 points for right bank). Each bank was assessed separately because of differing topography, landowners, human activity, etc. Bank orientation was assigned based on location looking downstream.

Both a straight average and a weighted average of scores was calculated for each bank across all reaches. Both averages were almost the same. The weighted average for the left bank was approximately 30, while the weighted average for the right bank was 29. Out of a possible 60 points, both left and right banks were collectively interpreted as “Average” in terms of functionality, regeneration potential, and habitat quality. It should be pointed out here that this is only a semi-quantitative assessment and professional judgment applied in terms of individual reach evaluation outside the scoring. All segments of the streams or reaches should also receive individual evaluation based on types of potential impacts in those areas.

In general, the entirety of the riparian area along Robeson Creek that was assessed received very high scores for structural complexity. This is due to the mature trees, heavy shrub layer (which in many cases is solely represented by invasive exotic plants), and a good herbaceous covering. Only in areas such as the powerline right-of-way and other areas that were maintained through mowing or grazing were scores lower.

Invasive, non-native vegetation was pervasive throughout. These plants dominated some areas and were scant in others. Scores reflected this varying presence. The majority of the invasive plants were shrubs with a few non-native forbs and graminoids.

Root stabilization scores were average to low. Despite large trees lining the stream, the trees were spaced greater distances apart than desired. Few native shrubs were in the understory, which may also have played a factor in this score. Incision and widening of the stream was a cause of many large trees to fall into the channel. Deer browse and beaver activity may have also been factors in this score. Deer may be limiting saplings from reaching maturity; mature trees help further stabilize banks. Beaver were felling trees of all sizes along the banks. Thus, many factors were likely contributors to this low score.

Wetland habit was predominately absent. A few areas were scattered throughout, especially abandoned channels and a few small shallow depressions. Largely, however, this was an alluvial floodplain absent of any expansive wetlands and lower scores reflected this.

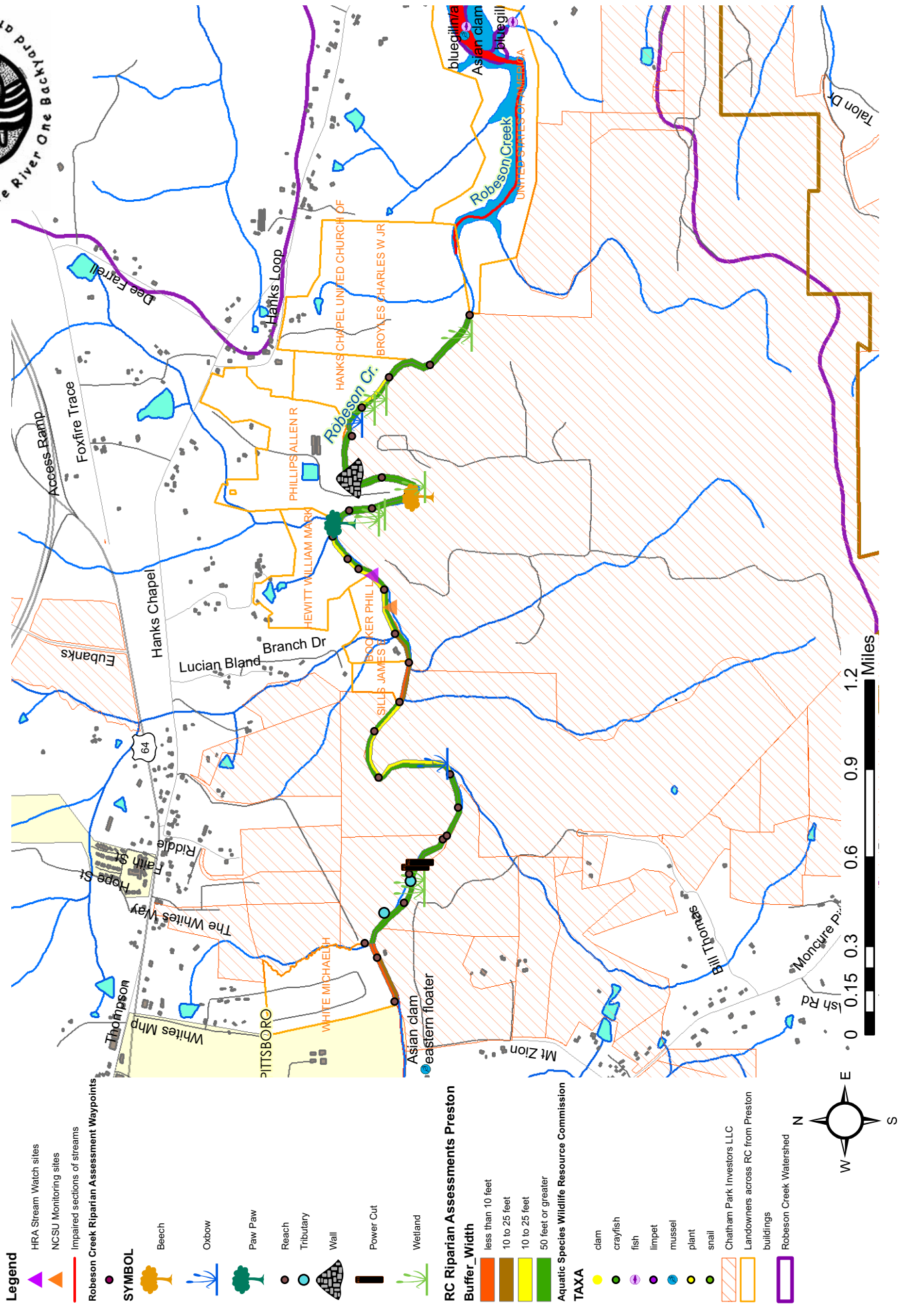
Buffer width scored high throughout except in areas where logging had taken place and powerline right-of-ways occurred. Most areas had buffer widths well in excess of 50 feet.

Active riparian area management can ameliorate some of the deficiencies of this project area, such as control of exotic plants, planting of more native plant species, especially trees, maintenance of browsing, and potential wetland enhancement where possible. Management should also include maintaining the excellent structural integrity of the bottomland forest as well as keeping buffers a wide as possible (both lowland and upland buffers).

Reach	Point Range	Left Bank	Right Bank	Length (ft)
1	85-86	14	20	730
2	86-87	17	17	240
3	87-89	29	29	872
4	89-92	38	23	340
5	92-94	25	29	215
6	94-95	14	14	138
7	95-96	38	29	611
8	96-97	32	32	90
9	97-98	29	29	482
10	98-99	29	29	512
11	99-100	32	23	223
12	100-101	32	23	1009
13	101-102	32	29	773
14	102-103	29	29	623
15	103-104	17	23	603
16	104-105	23	32	504
17	105-107	29	32	1202
18	107-108	29	32	246
19	108-109	29	32	433
20	109-111	32	32	213
21	111-114	29	38	409
22	114-115	26	32	677
23	115-119	35	29	805
24	119-120	32	32	40
25	120-122	38	32	841
26	122-123	39	35	215
27	123-125	35	32	330
28	125-126	32	42	204
29	126-127	20	20	460
30	127-128	33	29	822
31	128-130	39	32	1037
	Average	29.3	28.7	512.9
	Weighted Avg	29.8	28.7	



Riparian Assessment on Robeson Creek - April 24 & 25, 2008

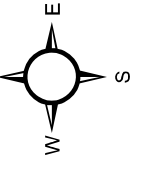


- Legend**
- ▲ HRA Stream Watch sites
 - ▲ NCSU Monitoring sites
 - Impaired sections of streams
 - Robeson Creek Riparian Assessment Waypoints
 - **SYMBOL**

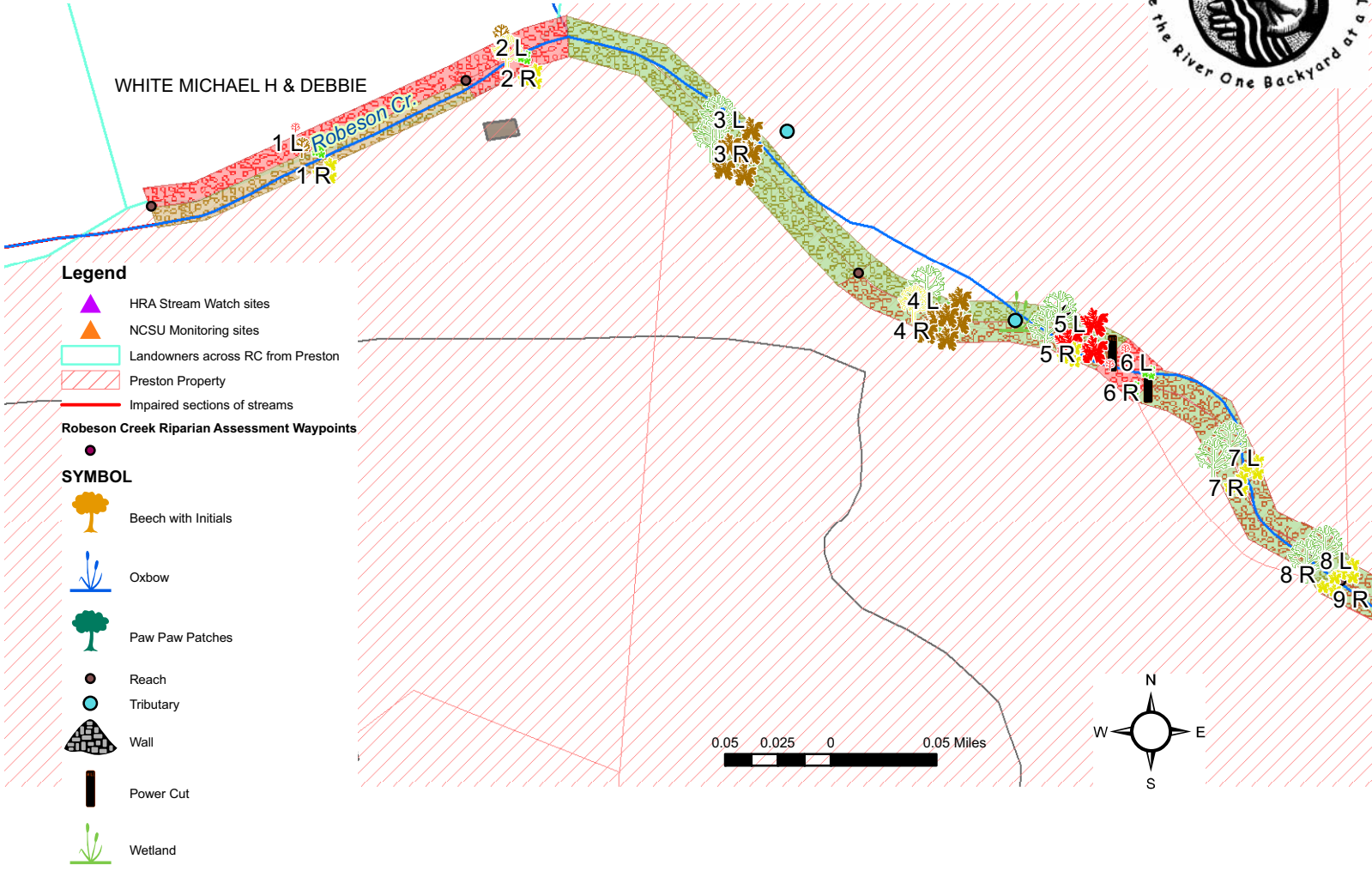
- Beech
- Oxbow
- Paw Paw
- Reach
- Tributary
- Wall
- Power Cut
- Wetland

- RC Riparian Assessments Preston**
- Buffer_Width**
- less than 10 feet
 - 10 to 25 feet
 - 10 to 25 feet
 - 50 feet or greater
- Aquatic Species Wildlife Resource Commission**

- TAXA**
- clam
 - crayfish
 - fish
 - limpet
 - mussel
 - plant
 - snail
 - Chatham Park Investors LLC
 - Landowners across RC from Preston
 - buildings
 - Robeson Creek Watershed



Riparian Assessment on Robeson Creek - April 24 & 25, 2008 - Map 1



Legend

- HRA Stream Watch sites
- NCSU Monitoring sites
- Landowners across RC from Preston
- Preston Property
- Impaired sections of streams
- Robeson Creek Riparian Assessment Waypoints**
- Reach
- Tributary
- Wall
- Power Cut
- Wetland

RC Riparian Assessments Preston

Structural_Complexity

- 1
- 2 - 4
- 5 - 7
- 8 - 10
- <all other values>

Buffer_Width

- 1
- 4
- 7
- 10

Robeson Creek Riparian Assessments Preston

Exotics

- 1
- 4
- 7
- 10
- <all other values>

Root Stabilization

- 1
- 4
- 7
- 10

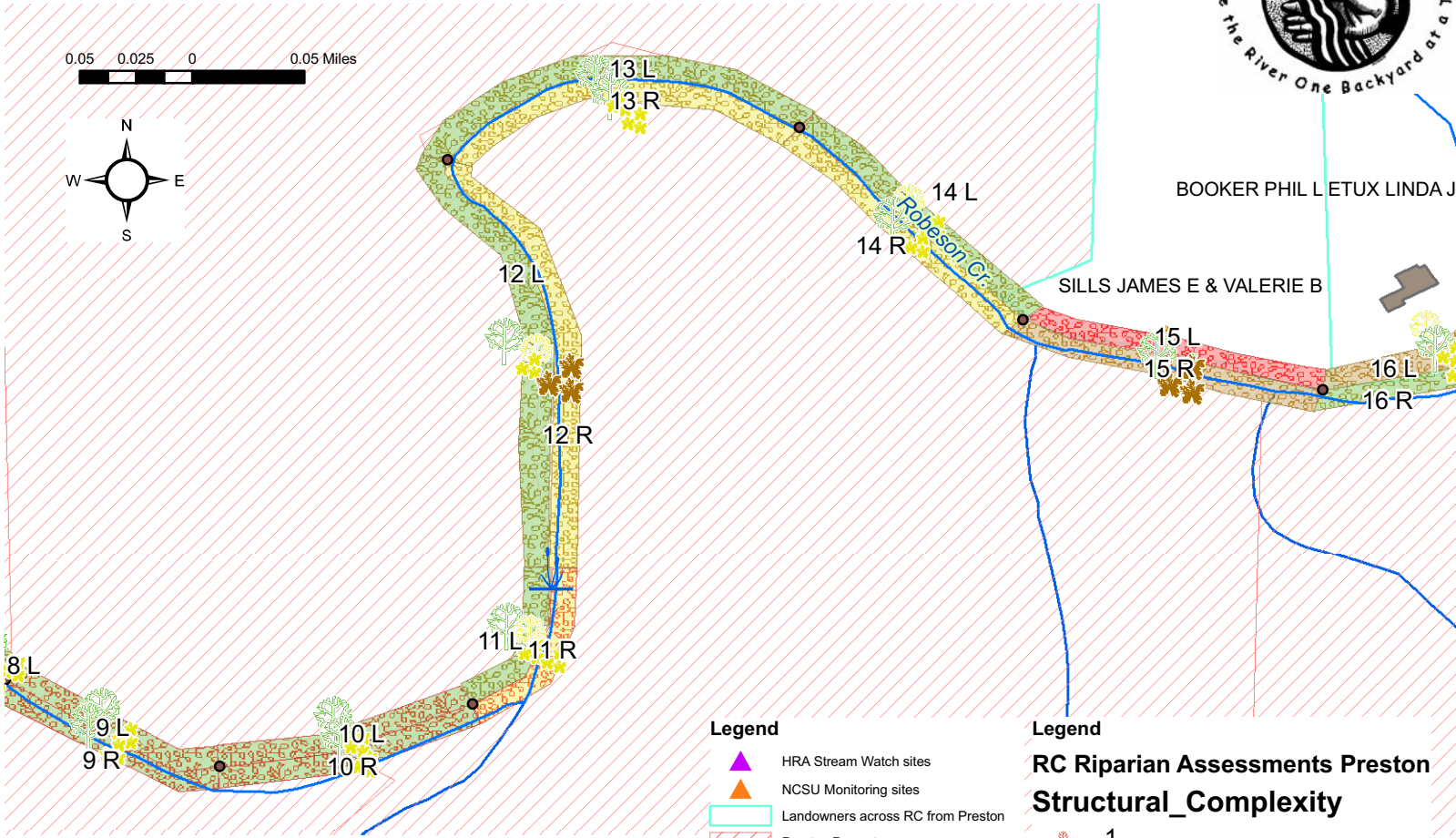
Reach	Structural Complexity	Invasive Exotic Vegetation	Wetland Habitat	Buffer Width	Root Stabilization
1 L	1	10	1	1	1
1 R	4	7	1	4	4
2 L	4	10	1	1	1
2 R	7	7	1	1	1
3 R	10	4	1	10	4
3 L	10	4	1	10	4
4 L	10	4	10	10	4
4 R	7	4	1	10	1
5 L	10	1	1	10	4
5 R	10	7	1	10	1
6 L	1	10	1	1	1
6 R	1	10	1	1	1
7 L	10	7	10	10	1
7 R	10	7	1	10	1
8 L	10	7	1	10	4
8 R	10	7	1	10	4

Riparian Assessment on Robeson Creek - April 24 & 25, 2008 - Map 2



BOOKER PHIL L ETUX LINDA J

SILLS JAMES E & VALERIE B



Legend

- HRA Stream Watch sites
- NCSU Monitoring sites
- Landowners across RC from Preston
- Preston Property
- Impaired sections of streams
- Robeson Creek Riparian Assessment Waypoints

SYMBOL

- Beech with Initials
- Oxbow
- Paw Paw Patches
- Reach
- Tributary
- Wall
- Power Cut
- Wetland

Legend

RC Riparian Assessments Preston Structural_Complexity

- 1
- 2 - 4
- 5 - 7
- 8 - 10

<all other values>

Buffer_Width

- 1
- 4
- 7
- 10

RC Riparian Assessments Preston Exotics

- 1
- 4
- 7
- 10

<all other values>

Root Stabilization

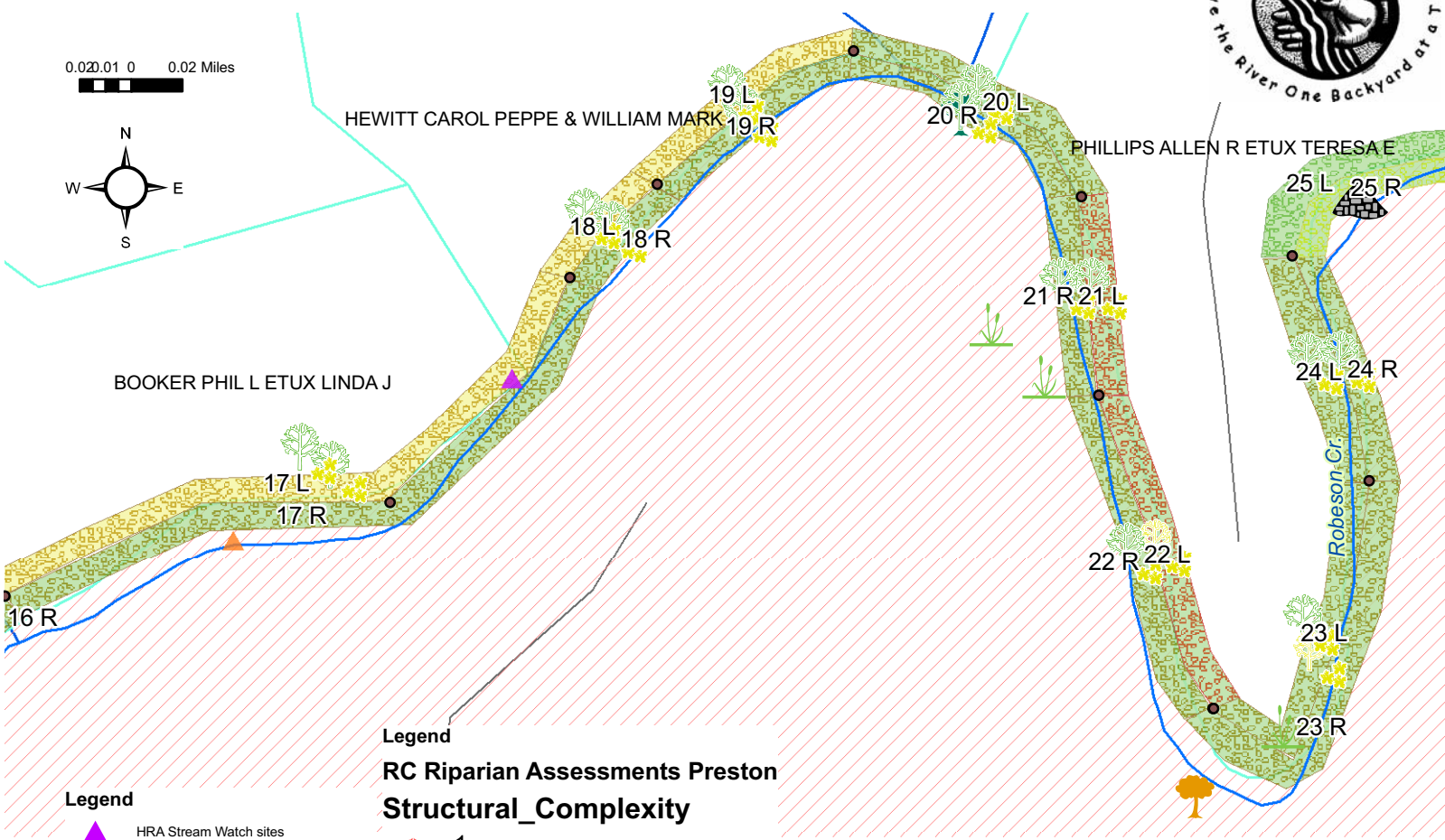
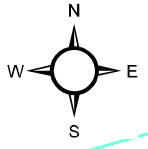
- 1
- 4
- 7
- 10

Reach	Structural Complexity	Invasive Exotic Vegetation	Wetland Habitat	Buffer Width	Root Stabilization
9 L	10	7	1	10	1
9 R	10	7	1	10	1
10 L	10	7	1	10	1
10 R	10	7	1	10	1
11 L	10	7	1	10	4
11 R	7	7	1	7	1
12 L	10	7	1	10	4
12 R	7	4	1	7	4
13 L	10	7	1	10	4
13 R	10	7	1	7	4
14 L	7	7	1	10	4
14 R	10	7	1	7	4
15 L	4	10	1	1	1
15 R	10	4	1	4	4
16 L	7	7	1	4	4
16 R	10	7	1	10	4

Riparian Assessment on Robeson Creek - April 24 & 25, 2008 - Map 3



0.02 0.01 0 0.02 Miles



Legend

- HRA Stream Watch sites
- NCSU Monitoring sites
- Landowners across RC from Preston
- Preston Property
- Impaired sections of streams

Robeson Creek Riparian Assessment Waypoints

SYMBOL

- Beech with Initials
- Oxbow
- Paw Paw Patches
- Reach
- Tributary
- Wall
- Power Cut
- Wetland

Legend

RC Riparian Assessments Preston

Structural_Complexity

- 1
- 2 - 4
- 5 - 7
- 8 - 10
- <all other values>

Buffer_Width

- 1
- 4
- 7
- 10

RC Riparian Assessments Preston

Exotics

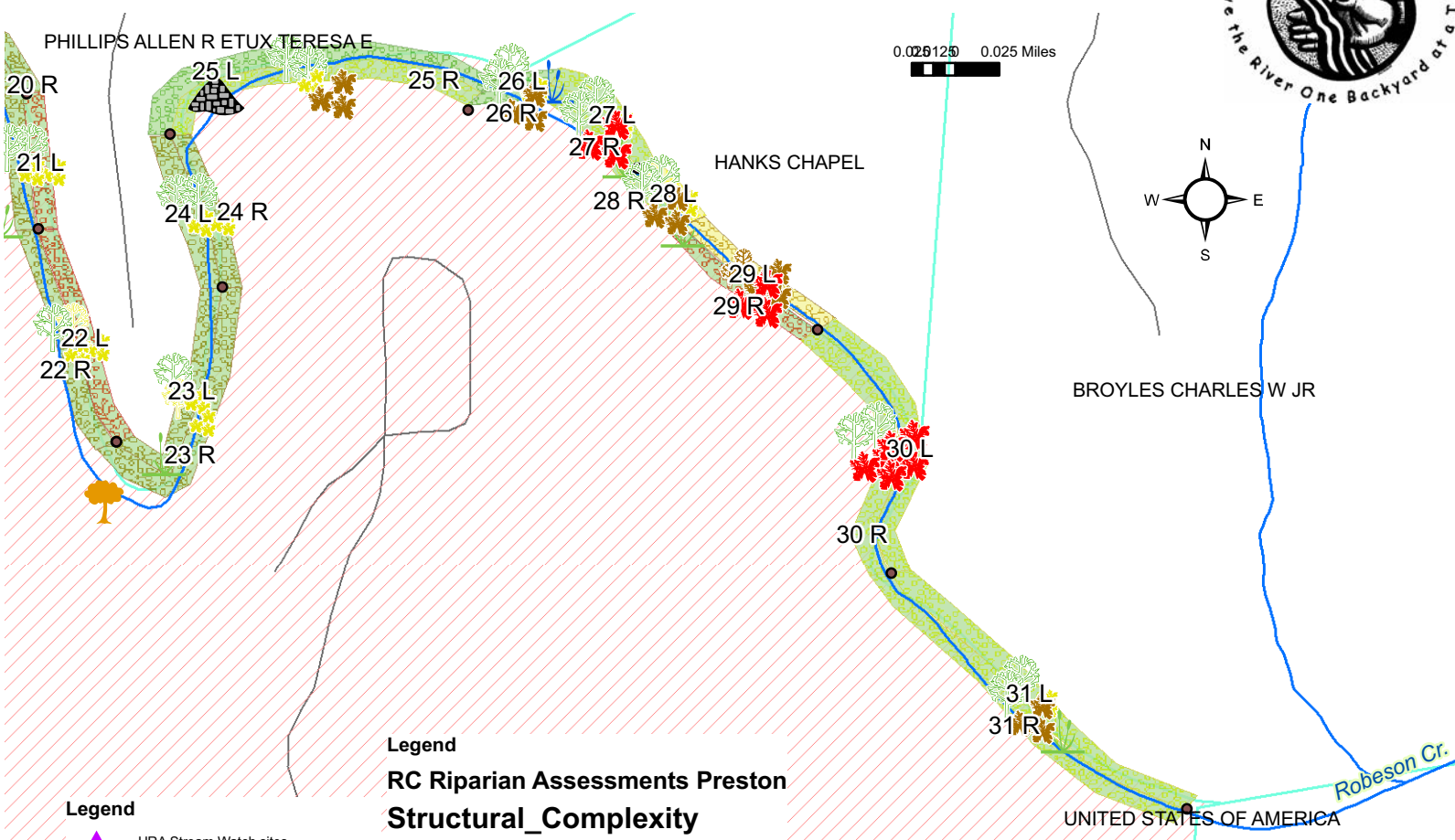
- 1
- 4
- 7
- 10
- <all other values>

Root Stabilization

- 1
- 4
- 7
- 10

Reach	Structural Complexity	Invasive Exotic Vegetation	Wetland Habitat	Buffer Width	Root Stabilization
17 L	10	7	1	7	4
17 R	10	7	1	10	4
18 L	10	7	1	7	4
18 R	10	7	1	10	4
19 L	10	7	1	7	4
19 R	10	7	1	10	4
20 L	10	7	1	10	4
20 R	10	7	1	10	4
21 L	10	7	1	10	1
21 R	10	7	7	10	4
22 L	7	7	1	10	1
22 R	10	7	1	10	4
23 L	10	7	4	10	4
23 R	7	7	1	10	4
24 L	10	7	1	10	4
24 R	10	7	1	10	4

Riparian Assessment on Robeson Creek - April 24 & 25, 2008 - Map 4



- Legend**
- HRA Stream Watch sites
 - NCSU Monitoring sites
 - Landowners across RC from Preston
 - Preston Property
 - Impaired sections of streams
- Robeson Creek Riparian Assessment Waypoints**
- Reach
 - Tributary
 - Wall
 - Power Cut
 - Wetland
- SYMBOL**
- Beech with Initials
 - Oxbow
 - Paw Paw Patches

Legend
RC Riparian Assessments Preston
Structural_Complexity

- 1
- 2 - 4
- 5 - 7
- 8 - 10
- <all other values>

- Buffer_Width**
- 1
 - 4
 - 7
 - 10
 - <all other values>

RC Riparian Assessments Preston
Exotics

- 1
- 4
- 7
- 10
- <all other values>

Root Stabilization

- 1
- 4
- 7
- 10

Reach	Structural Complexity	Invasive Exotic Vegetation	Wetland Habitat	Buffer Width	Root Stabilization
25 L	10	7	1	10	10
25 R	10	4	1	10	7
26 L	10	7	1	10	10
26 R	10	4	1	10	10
27 L	10	7	1	10	7
27 R	10	1	4	10	7
28 L	10	7	1	7	7
28 R	10	4	10	10	7
29 L	4	4	1	7	4
29 R	4	1	4	10	1
30 L	10	1	4	10	7
30 R	10	1	1	10	7
31 L	10	7	4	10	7
31 R	10	4	1	10	7

Appendix C

This appendix contains a series of maps used to help inform the selection of conservation areas.

The Maps include:

2007 Aerial

2001 Land Cover (from the SE GAP Analysis)

Hydrology

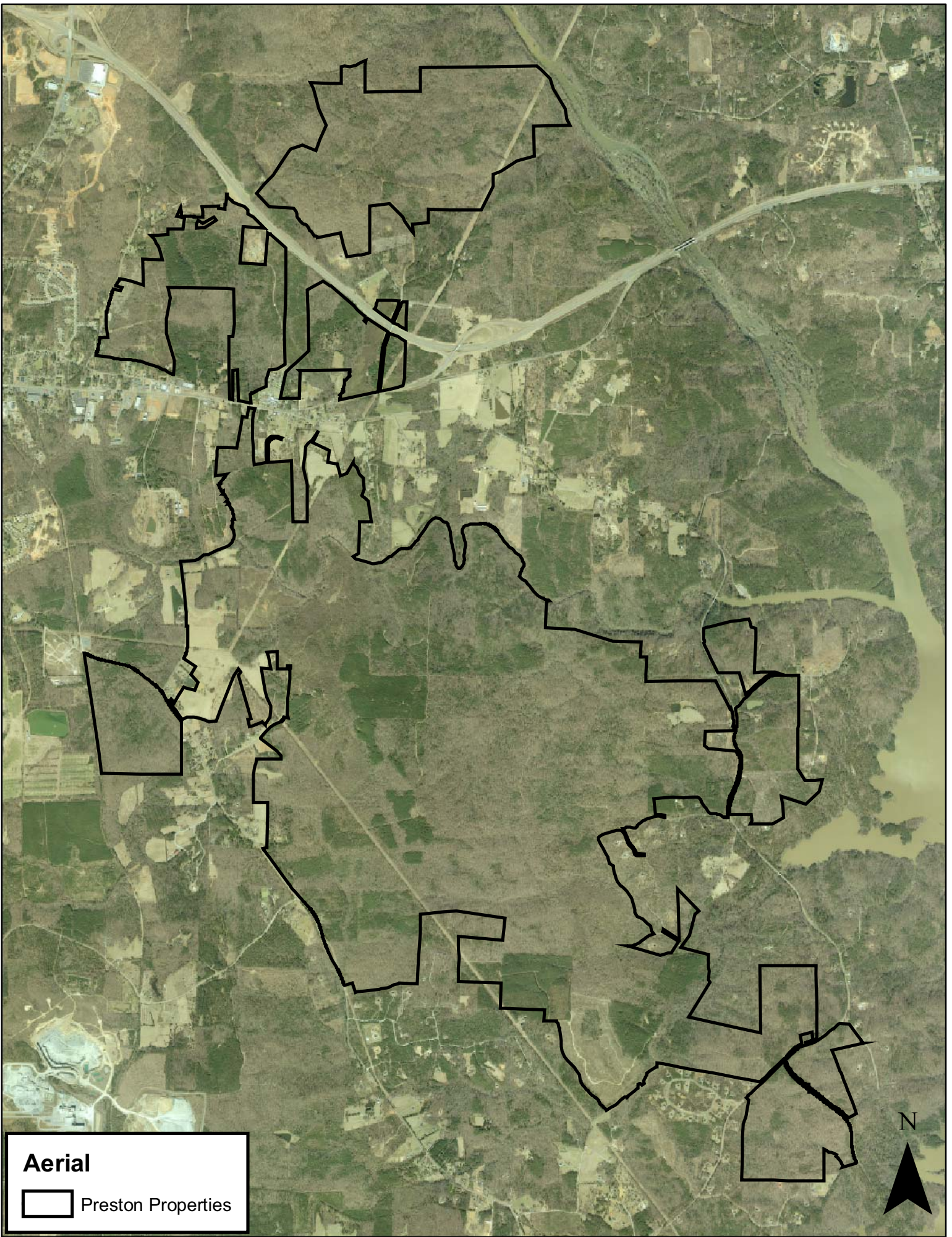
Soil Cover

Prime Soils

Slope

Aspect

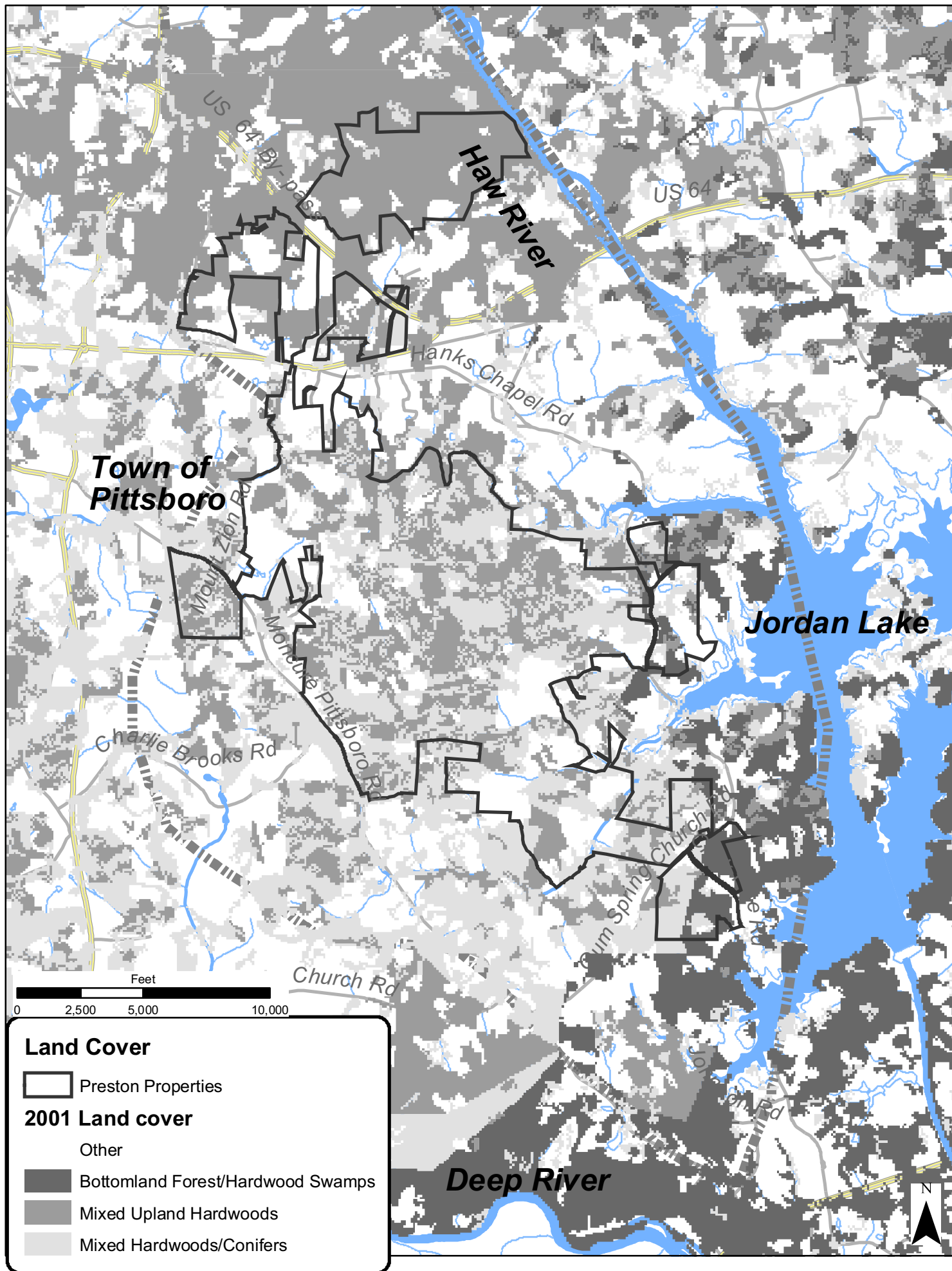
Elevation

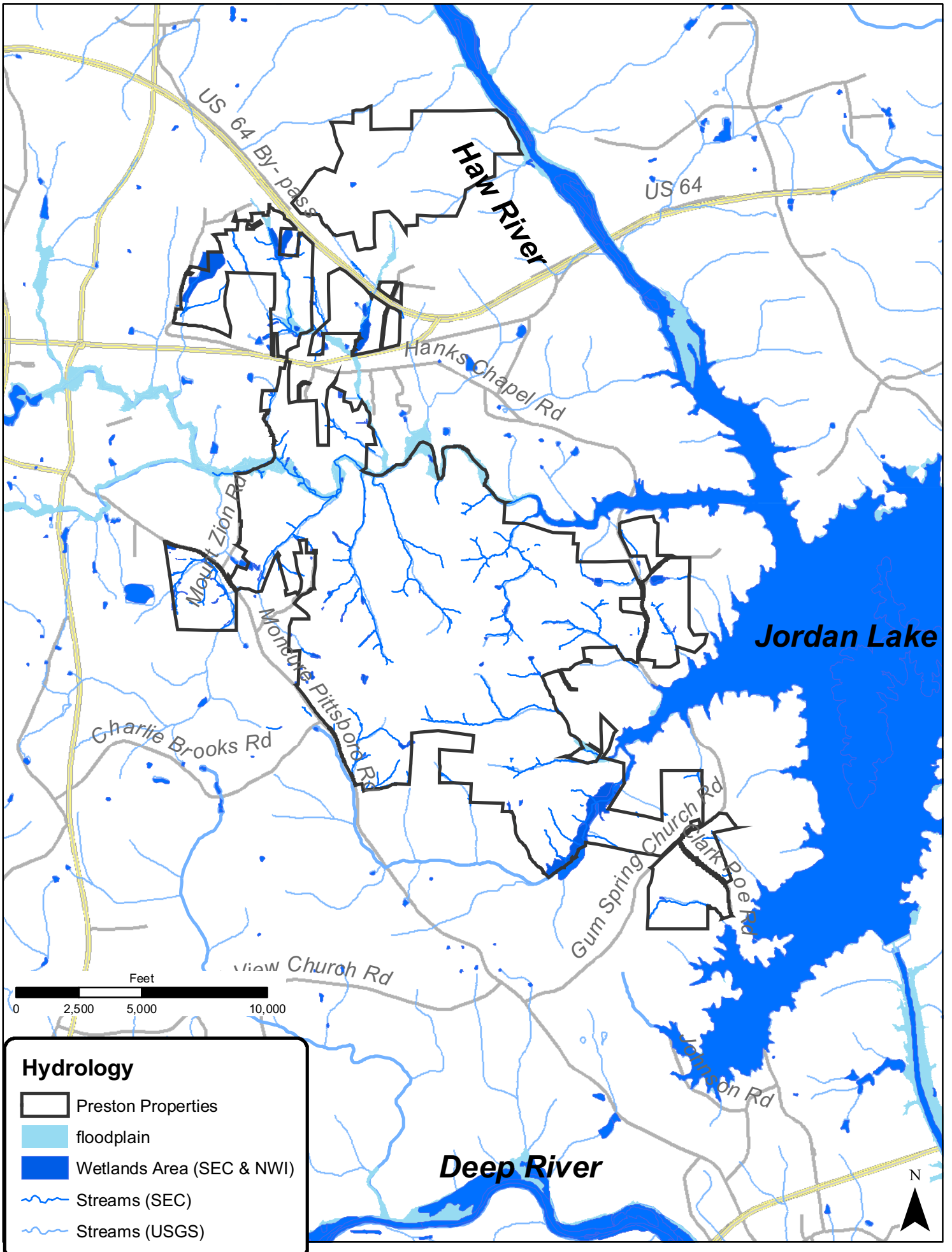


Aerial

 Preston Properties







US 64 Bypass

Haw River

US 64

Hanks Chapel Rd

Mecht Zion Rd

Monrovia Pittsboro Rd

Jordan Lake

Charlie Brooks Rd

Pittsboro Rd

Gum Spring Church Rd

Clark Point Rd






View Church Rd

View Church Rd

Deep River



Hydrology

-  Preston Properties
-  floodplain
-  Wetlands Area (SEC & NWI)
-  Streams (SEC)
-  Streams (USGS)

