Upper Tar Game Land Complex Management Plan

Brinkleyville Game Land
Embro Game Land
Sandy Creek Game Land
Shocco Creek Game Land

(2016-2026)

NC WILDLIFE'S CROWN JEWELS

North Carolina's game land system is based on science-driven management practices and is an exceptional asset for the people of the State of North Carolina. The 2 million acres of NCWRC owned and managed land create HIGH Ecosystem value in flood protection with positive effects on property values and air and water quality, while helping to prevent additional restrictive environmental regulations.

The primary purpose of our game lands is the conservation of North Carolina wildlife species and the provision of public hunting, trapping and fishing opportunities. Our game lands are important players in the preservation of rare, threatened and endangered species. Prescribed burning and early successional habitat management allow for healthy habitats for thriving wildlife. Fields left fallow and disked on alternating years promote natural herbaceous regeneration. Water levels of impounded wetlands are drawn down at appropriate times to create conditions beneficial to waterfowl. Protection of stream buffers ensures that precious fish species are protected and encouraged along with thriving game fishes. Heritage forest land is worked and preserved and rare forestlands are protected.

The game lands also provide broad expanses of public recreational opportunities. North Carolina has more acreage of managed game lands than all states east of the Mississippi, with the exceptions of Florida and Michigan, both of which include lake and ocean frontage as managed land. There is overwhelming public endorsement of conserving the land along with documentation of the economic benefits of doing so. According to the outdoor recreation industry, over $3.3 billion is spent annually on wildlife related recreation in our state alone. As North Carolina transitions from a traditional economy based on tobacco, furniture and textiles to a global economy driven by knowledge-based enterprises, our managed public game lands help preserve our economy and our way of life.

Game lands include:

- A great treasure in the largest intact and least disturbed bottomland forest ecosystem in the mid-Atlantic Region and some of the oldest cypress-tupelo trees on the East Coast, many at least 800 years old;
- One of the largest, most intact remnants of longleaf pine ecosystems in North Carolina, a high priority wildlife habitat in the Lands Management program. Among the species dependent upon this type of habitat are bobwhite quail, a variety of songbirds, fox squirrels and the federally endangered red-cockaded woodpecker;
- The densest populations of black bear, white-tailed deer and turkey, and the highest density of nesting birds in the state. Most of our 32 black bear sanctuaries are on game lands;
- A system of floating waterfowl blinds, 19 public hunting blinds for disabled sportsmen, 32 public boating access areas, 33 public fishing areas, six wildlife observation platforms, four public WRC shooting ranges with plans to build and manage many more as opportunities occur;
- And some of the finest examples of multiple conservation collaborations in the country.

As in the past, it is anticipated that future projected expenditures will be funded by North Carolina's apportionment of Pittman Robertson Federal Assistance in Wildlife Restoration funding and license receipts, as well as from contributions from various conservation partners. The opportunity provided by these managed public game lands to our mission of conserving North Carolina's wildlife and habitat for future generations is priceless.

The North Carolina Wildlife Resources Commission staff has contributed extensively to the development and preparation of this plan through their various fields of professional expertise. All content, management strategies, recommendations, goals, and needs were developed using the best available science and professional working knowledge of the habitats and species of the Upper Tar Game Land Complex. Careful consideration has been given to all input received from external agencies, organizations, and private individuals that have an interest in or use the game land to ensure a that comprehensive management program is administered. The conservation, protection, enhancement, restoration, and accessibility of game land resources are obligatory. The successful implementation of this plan will depend on the continued input and support from all interested parties.

Upper Tar Game Land Complex
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EXECUTIVE SUMMARY

INTRODUCTION

GAME LAND PROGRAM MISSION STATEMENT

Consistent with the original establishment legislation (G.S. 143-239) for the North Carolina Wildlife Resources Commission (NCWRC, WRC, or Commission), the mission of the game lands program is to enhance, facilitate, and augment delivery of comprehensive and sound wildlife conservation programs. Inherent in delivery of a land conservation program consistent with this mission is the feasibility and desirability of multiple uses on lands owned by the state within the system. In addition to hunting, fishing, trapping, and wildlife viewing as primary uses, we recognize the desirability of providing opportunities for other activities on state-owned game lands that are feasible and consistent with the Agency's mission, and compatible with these traditional uses.

GAME LAND PROGRAM MANAGEMENT OBJECTIVES

- To provide, protect, and actively manage habitats and habitat conditions to benefit aquatic and terrestrial wildlife resources
- To provide public opportunities for hunting, fishing, trapping, and wildlife viewing
- To provide for other resource-based game land uses to the extent that such uses are compatible with the conservation of natural resources and can be employed without displacing primary users
- To provide an optimally sustainable yield of forest products where feasible and appropriate as directed by wildlife management objectives

GAME LAND PROGRAM HISTORY

Prior to 1971 game lands in North Carolina were limited to designated and tightly controlled Wildlife Management Areas (WMA's). In 1971 the current Game Lands Program was established. This change involved the expansion of game lands from about 700,000 acres to 1.5 million acres, changes in regulations, and reductions in fees to hunters and fishermen (Dean, 1971). The old WMA's were incorporated into the new Game Lands Program, but the new program also allowed the Commission to lease/incorporate additional lands as game lands to expand the land base. Beginning in the 1980s, landowners (both corporate and private) realized they could lease their properties for a higher rate to hunting clubs and private individuals and began to do so. These properties were subsequently removed from the Game Lands Program. Fortunately, the Natural Heritage Trust Fund was established in 1987 and the Clean Water Management Trust Fund in 1996. These funds provided money for the fee simple acquisition of select properties, many of which have been incorporated into the Game Lands Program. These acquisitions have greatly compensated for the loss of game lands leased from the private sector. Acquisition of state owned lands has been a major accomplishment of the NCWRC.

Significant game land acreage leased to the state of North Carolina is owned by the United States Forest Service (USFS), North Carolina Forest Service (NCFS), North Carolina Department of Agriculture (NCDOA), North Carolina Department of Environment and Natural Resources (NCDENR), U.S. Army Corp of Engineers (USACOE), The Nature Conservancy (TNC), major power and utility companies, and other land trusts, associations, and corporate and private entities. Currently, almost two million acres are enrolled in the Game Lands Program.

With the old Wildlife Management Area system, Commission staff were housed on each management area. These personnel were assigned both law enforcement and habitat management duties on their respective areas. Administration of the new Game Lands Program was assigned to the Division of Wildlife Management. Depot locations with equipment and habitat development crews were established and strategically located in the vicinity of all game lands. Law enforcement on these properties was assigned to the Division of Law Enforcement. With some minor organizational changes this system remained intact until 2012. In 2012, land management staff in the Division of Wildlife Management and certain similar positions in the Division of Inland Fisheries were merged with Division of Engineering staff into the Division of Engineering and Lands Management. This organizational change was made to deliver a more comprehensive and efficient wildlife and fisheries management program on all public lands and waters across the state. Depots remained at former locations and new depots/crews were established at additional locations to improve Agency efficiency.

PURPOSE AND NEED FOR A PLAN

A comprehensive Game Land Management Plan is needed for the **U**pper **T**ar **G**ame **L**and **C**omplex (hereafter UTGLC) to implement the NCWRC Strategic Plan and accomplish game land program objectives in a timely and efficient manner. A comprehensive Game Land Management Plan has never been written, therefore, it is important to develop and implement thorough and specific plans for the management of this game land and its resources. Many tracts have been added (2006-2008) to the game land since the acquisition of the original Shocco Creek tracts in 2003. Precise biological, forestry, and environmental data are outdated or lacking in some areas. With the creation of the North Carolina Wildlife Action Plan (NCWAP) in 2005, emphasis on the protection, conservation, and management for non-game species (terrestrial and aquatic) and their unique habitats have been addressed. With these changes it is time to address new challenges with a new Game Land Management Plan.

The plan will identify goals and objectives for managing and conserving the wildlife and other natural resources on the UTGLC by using current scientific knowledge and management techniques. The Management Plan will guide game land staff as they develop specific management strategies for identified feature species while integrating a sustainable yield forest and open land management program that creates, enhances, and maintains quality habitat for native wildlife and plant communities. The plan will also incorporate the recreational needs of the game land users into its management goals and objectives. The NCWAP states five goals as part of its core plan. These goals have been modified and adapted to assist with the development of the UTGLC Management Plan. The five goals are: 1) Identify key species in the Upper/Northern Piedmont EcoRegion used to base conservation and management decisions on, 2) Identify, conserve, and enhance habitats and the communities they support, 3) Identify and state conservation priorities and list challenges and conservation threats for the UTGLC, 4) Support educational efforts to improve understandings of wildlife resources among general public and conservation stake holders, and 5) Support and improve existing regulations and programs aimed at conserving habitats and communities.

This plan was developed with input from NCWRC staff as well as input from external agencies, organizations, and other stakeholders that have an interest in or use the game land, to ensure a comprehensive management program is administered on the UTGLC. The successful implementation of the plan will depend on the continued input and support from all interested parties. A ten year planning horizon was used in development of the plan. Review of and amendments to the plan will be made as needed.

REGIONAL CONTEXT

The UTGLC lies within the NCWRC Piedmont Eco-Region and the Northern Piedmont Work Area. It includes 19 counties in the northern half of North Carolina's Piedmont. There are 17 game lands (~168,000 acres) within the work area. The State of North Carolina, with the NCWRC as the primary custodian, owns in fee simple ~44,000 acres of these lands. Approximately 124,000 acres of game lands within the work area are owned by other governmental agencies and private sector companies and managed as game lands under cooperative lease agreements. Partial ownership by the NCWRC occurs on certain game lands.

The Northern Piedmont Work Area contains 26 public Boating Access Areas (BAA's) and 13 Public Fishing Access areas (PFA's). Management Depots are located at Caswell, Butner, Jordan, Lake Rogers, Tillery, and Weldon. In the Division of Engineering and Lands Management, nineteen permanent staff and four seasonal temporary positions are stationed in the Northern Piedmont. Under the direction of an EcoRegion Supervisor, a Management Biologist, two Wildlife Forest Managers, an Assistant Wildlife Forest Manager, a Conservation Technician Supervisor, and 14 Conservation Technicians (Tech. I's and II's) work on public lands and waterways.

REGIONAL CONSERVATION PARTNERSHIPS

Past and current partnerships for activities occurring on and around the UTGLC have included collaborative agreements and projects with a variety of entities. Land acquisition activities have been heavily supported by the Natural Heritage Trust Fund (NHTF) and the Clean Water Management Trust Fund (CWMTF) dealing with the transaction of these lands from International Paper Company (IP). Technical assistance and funding has been given by the National Wild Turkey Federation (NWTF) and Ducks Unlimited (DU). NWTF chapters have provided funding and volunteer work efforts for infrastructure and habitat improvements. Grants from the Arbor Day Foundation have funded recent reforestation efforts on nearby game lands, and it is expected that there may be opportunity for collaboration with the Shortleaf Pine Initiative.

GENERAL GAME LAND INFORMATION

LOCATION AND COUNTY DATA

The UTGLC is in the Piedmont Physiographic Province of North Carolina. It lies just west of the Fall Line the in the Northern Outer Piedmont Ecoregion, transitioning toward the east into the Rolling Coastal Plain Ecoregion, as defined by the U.S. Geological Survey (Griffith et. al., 2012). Four counties contain portions of these game lands, with the majority in Warren County (over 98% of Embro GL and ~47% of Shocco Creek GL). Large parcels of Shocco Creek GL are also in Franklin and Halifax Counties, with the remaining 4.3% in Nash County. Two of the three parcels of Sandy Creek GL are in Nash County, while the other is in Franklin County. Brinkleyville GL lies solely within Halifax County.

The four counties combined have a total area of 2,184 sq. mi. In 2010, the four county population totaled 232,122. (US Census Bureau, 2012)

	Area sq. mi.	2010 Population	People/sq. mi.	County Seat
Franklin County	492	60,619	123	Louisburg
Halifax County	724	54,691	76	Halifax
Nash	540	95,840	177	Nashville
Warren	428	20,972	49	Warrenton

(**Appendix I**, Ecoregions of NC Map; **Appendix II**, County Location Map (UTGLC Counties); & **Appendix III**, Game Lands Vicinity Map)

CLIMATE

The climate of the southeastern United States is classified as humid subtropical and characterized by hot, humid summers and mild to cool winters (Köppen-Geiger Climate Zones, 2013). The Northern Piedmont of NC experiences a range of normal mean monthly temperature from slightly above freezing in the coldest month (January), to the normal mean monthly temperature in the upper 70's in warmest month (July). Extremes in variation occur occasionally, but seasonal trends are fairly well defined and constant.

The closest centrally located weather station to the UTGLC is in Arcola, NC in Warren County. Historical climate data from September, 1930 to April, 2012 exhibit the annual temperature and precipitation regimes and averages.

In Arcola, NC, the average annual temperature maximum is 70.5 degrees F and the minimum is 46.9 degrees F. The average minimum monthly temperature ranges from 27.4 degrees F in January, to the average maximum monthly temperature of 89.0 degrees F in July (State Climate Office of NC). Precipitation annually averages 45.3 inches, ranging from 25.7 inches (2007) to 63.7 inches (1999). Average annual snowfall is 6.9 inches with a record of 26.4 inches (winter of 1935-36). The wettest

months of the year are June, July, and August, which average almost 4.75 inches per month (Southeast Regional Climate Center). The USDA Plant Hardiness Zone for the Northern Inner Piedmont region of NC is '7b'. The average first frost is November 1st to 10th and the average last frost is from April 21st to 30th (USDA Plant Hardiness Zone Map, 2012).

PHYSIOGRAPHY, HYDROLOGY, AND WATER QUALITY

The general topography region surrounding the UTGLC consists of broad, flat uplands and short side slopes that have been dissected by low gradient, winding streams creating (often) wide floodplains. On the UTGLC, elevations range from ~140 to ~410 feet above sea level. The western portions of the area game have overall more topographic relief than those towards the east at the Fall Line into the Coastal Plain.

The Tar River Basin, part of the larger Tar-Pamlico River Basin, drains the vast majority of the four counties containing the UTGLC. (The Tar-Pamlico encompasses 5,578 sq. mi. or ~10.4% of NC.) More precisely this area is defined as the Upper Tar Basin, containing the Fishing Creek and Swift Creek Sub-basins. The major tributaries flowing southeast into the Tar River are Sandy Creek, Shocco and Little Shocco Creeks, Fishing and Little Fishing Creeks, Reedy Creek, and Rocky Swamp.

Basin-wide water quality is at best marginal, with almost a third of the freshwater streams impaired by sediment, low pH, and fecal coliform. Only 21% of the streams full support their designated uses. 43% of the streams are threatened, 20% are partially supporting, 5% do not support their designated uses, and the remaining 11% are unknown. 92% of the pollution is caused by runoff from agriculture, hydrologic/habitat modification (e.g. stream channelization and ditching and draining of wetlands), urban development, and forestry. The remaining 8% of pollution is cause by point sources. (NSCU Water Quality Programs)

Within the Tar-Pamlico River Basin, the Swift and Fishing Creek Sub-basins are the most biologically diverse in NC (Prince, 1997). In fact, the Swift Creek Sub-basin may possibly be the most significant lotic creek ecosystem remaining along the Atlantic Seaboard (Alderman, et. al., 1993).

(**Appendix IV**, Hydrology Map & **Appendix V**, Topography Maps (SW & NE))

GEOLOGY AND SOILS

The geology of the region containing the UTGLC is characterized by Precambrian felsic gneiss and granite, Cambrian metavolcanic rocks, and Paleozoic sedimentary and metasedimentary rocks. Three distinct groupings of rocks occur in the area. Much of these game lands (particularly most of Warren County) are underlain by metamorphic rocks like gneiss, schist, and amphibolite. Eastern sections of the UTGLC are underlain by metasedimentary rocks of the Eastern Slate Belt and comprised of metamudstone, argillte, and epiclastic rocks. Towards the south (and most of Franklin County) contains unfoliated to weakly foliated granitic rocks. (Generalized Geologic Map of NC, USGS, 2004)

With portions of these game lands found in four counties a detailed examination of the area soils is beyond the scope of this plan. There are far too many soils types and variants to discuss thoroughly herein. However, it should be noted that the dominant soils in the vicinity are sandy loams and

loams, with a lesser abundance of silty clays and sandy clays present. Except for alluvial and colluvial deposits along streams and lower slopes, the soils are residual in origin and derived from underlying lithic formations. Sandy loams and variants are highly susceptible to erosion. The majority of the soils in the region are sub-types belonging to the Pacolet and Cecil Series on the uplands, and the Wedowee and Chewacla Series in the bottomlands. Less frequently found are examples of the Helena, Georgeville, Appling, Enon, and Wedhakee Series. (Web Soil Survey, NRCS, USDA, 2014)

(**Appendix VI**, Geologic Map)

HABITATS

The UTGLC has a diversity of habitats and natural community types, though the vast majority of the uplands have been converted to loblolly pine plantations. With only 0.3% of open lands, developed areas, and utility corridors, these game lands are mostly forested. Significant bottomland and floodplain acreage is found along the waterways. Terrestrial natural community types (as classified by Schafale and Weakley, 1990), list 11 natural community types for the UTGLC. These are: Basic Mesic Forest (Intermediate Subtype), Mesic Mixed Hardwood Forest, Mesic Mixed Hardwood Forest (Floodplain subtype), Piedmont Alluvial Forest, Piedmont Swamp Forest, Piedmont/Mountain Swamp Forest, Piedmont/Mountain Bottomland Forest, Piedmont Semi-permanent Impoundment, Low Elevation Seeps, Piedmont Boggy Streamhead, and Floodplain Pools.

For the purposes of this plan, these individual distinctions will not be addressed and a more basic grouping will be used to describe the game land habitat types and species assemblages in the 'Fish and Wildlife Communities Section'. Many of these obscurely distinct natural communities will be grouped into the basic categories of Upland Pine Forest (including natural pine, mixed pine-hardwood, and pine plantations), Mesic Forest, Floodplain Forest, Oak-Hickory Forest, Early Successional Habitats/Open Land, and Aquatic and Riparian Habitats.

NATURAL HERITAGE AREAS AND LISTED SPECIES

The North Carolina NHTF conducted a site surveys to inventory of natural areas, rare species, and biological communities of Albemarle-Pamlico Estuarine Region during 1991 and 1992 (Smith and LeGrand et. al., 1993). This inventory identifies and describes the most significant natural areas, documents all the natural communities and rare plant and animal species associated with them, and provides guidance for future land use decisions. Of the 18 natural areas identified in the immediate vicinity of the UTGLC, six terrestrial natural areas are rated as either high or very high significance, and four aquatic habitats are rated as very high or exceptional significance.

Occurrences of state-listed terrestrial animal species include one amphibian, four butterflies, potentially one mayfly species, and one mammal on or adjacent to these game lands. The four-toed salamander (*Hemidactylium scutatum*) is known from elsewhere in various areas of the Piedmont and is expected here. The mottled duskywing (*Erynnis martialis*) [State Status SR, S2], the reversed roadside skipper (*Amblyscirtes reversa*) [State Status SR, S3], and the frosted elfin (*Callophrys irus*) [State Status SR, S2] have been documented in the powerline ROW of the Wood Tract of the Shocco Creek GL in Franklin County, the latter two species only known from the Piedmont at this site. The Carolina roadside-skipper (*Amblyscirtes carolina*) [WL], is known from the Brinkleyville GL, near the

western extent of its range. The possibility exists, though unlikely, for one mayfly species, no common name, (*Baetisca becki*) in Halifax and Nash Counties. Bottomland areas near Sandy Creek GL and sections downstream on Swift Creek provide good habitat for the Coastal Plain subspecies of Rafinesque's big-eared bat (*Corynorhinus rafinesquii macrotis*) [SC]. Red-cockaded woodpecker (*Picoides borealis*) [E] was last observed in 1972 near the Brinkleyville GL near Rocky Swamp.

State-listed aquatic species include nine (possibly twelve) mussels, two (possibly five) fish, one amphibian, and one crustacean. The Triangle floater (*Alasmidonta undulata*) [T], dwarf wedgemussel (*Alasmidonta heterdon*) [E], Atlantic pigtoe (*Fusconia masoni*) [E], yellow lance (*Elliptio lanceolata*) [E], notched rainbow (*Villosa constricta*) [SC], Tar River spinymussel (*Elliptio steinstansana*) [E], creeper (*Strophitus undulatus*) [T], and Roanoke slabshell (*Elliptio roanokensis*) [T] occur in the watersheds flowing through the UTGLC. The Eastern lampmussel (*Lampsilis radiata*) [T], yellow lampmussel (*Lampsilis cariosa*) [E], green floater (*Lasmigona subviridis*), and chameleon lampmussel (*Lampsilis sp. 2*) are species of probable occurrence adjacent to or downstream from these game lands. Fish species include Roanoke bass (*Ambloplites cavifrons*) [SC], Carolina madtom (*Noturus furiosus*) [T], and least brook lamprey (*Lampetra aepyptera*) [T]. Mimic shiners (*Notropis volucellus*) and pinewoods shiners (*Lythrurus matutinus*) are also notable fish species. The Neuse River waterdog (*Necturus lewisi*) [SC] occurs throughout area streams. The North Carolina spiny crayfish (*Orconectes carolinensis*) has been documented. Future aquatic surveys may be needed to update the distribution or abundance of the aquatic fauna in the Upper Tar streams.

Nine listed vascular plant species are known from or adjacent to the lands of the UTGLC. Surveys have documented populations of several significantly rare, threatened, special concern, and watch list plant species. A partial list includes: Purple fringeless orchid (*Platanathera permamoena*), tall boneset (*Eupatorium saltuense*), cypress knee sedge (*Carex decomposita*), granite flatsedge (*Cyperus granitophilus*), crested coralroot (*Hexalectris spicata*), Piedmont quillwort (*Isoetes piedmontana*), Small's portulaca (*Portulaca smallii*), Appalachian golden-banner (*Thermopsis mollis*), and water purslane (*Didiplis diandra*).

(**Appendix VII**, UTGLC Rare Species List)

Upper Tar Game Land Complex Significant Natural Heritage Areas (SNHA's)

Terrestrial SNHA's:

**Sites identified on, adjacent to, or connecting Game Lands (Acreage)*
**Sites nearby to Game Lands (Acreage)*
(Significance Rating)
(Ownership; NCWRC, TRLC, TNC, PRV, NCDPR)

Fishing Creek Fern Slopes (~91 acres) **(High)** (NCWRC)

Fishing Creek/Arcola Hardwood Forest (~406 acres) **(High)** (PRV)

Little Fishing Creek/Odell Hardwood Forest (~502 acres) **(General)** (NCWRC, PRV)

Little Shocco Creek Hardwood Forest (~307 acres) **(General)** (PRV)

Lower Shocco Creek Bluffs and Floodplain (~1,172 acres) **(Very High)** (NCWRC, TRLC, PRV)

Maple Branch Floodplain Forest (~243 acres) **(High)** (NCWRC, PRV)

Medoc Mountain State Park (~1,742 acres) **(Very High)** (NCDPR)

Red Bud Creek Slopes (~149 acres) **(Moderate)** (PRV)

Reedy Creek Hardwood Forest (~329 acres) **(High)** (PRV)

Shocco Creek/Centerville Floodplain Forest (~880 acres) **(General)** (NCWRC, PRV)

Shocco Creek/Lickskillet Hardwood Forest (~741 acres) **(General)** (TNC, PRV)

TOTAL: (~4,265 acres) (~2,297 acres)

Aquatic SNHA's:

(Acreage Identified in Watershed)
(Mileage Adjacent to/or Through Game Lands)
(Significance Rating)

Fishing Creek Aquatic Habitat	(~822 acres)	(~10.9 miles)	(Exceptional)
Little Fishing Creek Aquatic Habitat	(~183 acres)	(~7.7 miles)	(Very High)
Little Shocco Creek Aquatic Habitat	(~29 acres)	(~1.9 miles)	(Unranked)
Reedy Creek Aquatic Habitat	(~79 acres)	(~7.2 miles)	(Moderate)
Rocky Swamp Aquatic Habitat	(~63 acres)	(~2.8 miles)	(Moderate)
Shocco Creek Aquatic Habitat	(~117 acres)	(~12.2 miles)	(High)
Swift Creek Aquatic Habitat	(~545 acres)	(~5.2 miles)	(Exceptional)
TOTAL:	**(~1,838 acres)**	**(~47.9 miles)**	

(**Appendix VIII**, Significant Natural Heritage Areas Map)

DEDICATED NATURE PRESERVES

All acreage on each of the four Game Lands is dedicated as a Nature Preserve under the Nature Preserves Act – Article 9A. Chapter 113A of the North Carolina General Statutes. Dedication of these tracts fulfills the terms of prior grant agreements of the Natural Heritage and Clean Water Management Trust Funds. These properties are to be held in trust by the State of North Carolina and

administered by the North Carolina Wildlife Resources Commission for the uses and purposes expressed in the Nature Preserves Act, and the terms and conditions of the specific articles of dedication of each game land. Each Nature Preserve is allocated into two main classes of protection, Primary and Buffer. Additionally, the Primary classification can be further classified into Restoration and Special Management Areas. Primary Areas include high quality terrestrial areas and riparian buffers of 300 feet along each side of streams defined as part of a Significant Aquatic Habitat or 200 feet along each side of streams draining into a Significant Aquatic Habitat. These areas are not actively managed and prohibited activities include, but are not limited to: construction; commercial activities and development; commercial silviculture; agriculture and grazing; gathering of native species of plants or plant products; the removal, disturbance, molestation or defacement of minerals, archaeological, and natural resources, except for research purposes as approved by the custodian; and other activities specifically restricted in the articles of dedication of each Game Land. These areas will be allowed to succeed naturally unless it is determined to be necessary for removal of hazards to visitors, control of disease that would damage or reduce the significance of the preserve, restoration after severe storm or fire damage, trail clearance and maintenance or for purposes of maintenance, or restoration of natural communities or rare species populations. Restoration Areas are those occurring within the 100-year floodplain but outside of the high quality terrestrial areas and riparian buffers. The goal within these areas is to restore natural community structure, composition, and function. Restoration can be achieved by utilizing either active or passive processes. One Special Management Area exists on the Shocco Creek Game Land in Franklin County. This area is primarily managed by Duke Energy Progress as a transmission powerline right-of-way, but provides habitat for several rare butterflies and other early successional species. Buffer Areas contribute to the management and protection of the Primary Areas by providing a cushion between the Primary Areas and areas outside the preserve or provide additional areas for species or process that require larger acreages. Buffer Areas are important because these areas provide habitat diversity and important successional stages and disturbance regimes. They maintain connectivity and continuity between Primary Areas. Buffer Areas consist of pine plantations, thinned pine forests and small openings. These areas are “actively” managed, and although Primary Area rules apply, additional forestry, wildlife, and infrastructure management activities may be planned and applied. Buffer Area management involves timber harvest and other forms of timber stand manipulation. Most management activities on the Game Lands occur in Buffer Areas.

See appendices for specific Game Land Articles of Dedication, management rules, and a breakdown of acreages by type. (**Appendix IX & XXI-XXIV**, Game Lands Dedicated Nature Preserves & **Appendix XV**, Restoration of Floodplain Forest Communities)

LANDSCAPE CONTEXT AND ACQUISITION HISTORY

The land in this area has been heavily used in the past. Most of this land at one time or another has been cleared and farmed. The majority of the farm land divided the countryside into a mosaic of family farms. Row crops (especially tobacco) were once extremely important in the region. More recently the uplands in particular have been converted into commercial pulpwood production forestry operations. Past management practices have greatly altered the landscape often to the detriment of ecological diversity and habitat quality.

The original Shocco Creek Game Land tracts were acquired from Georgia Pacific in 2003. In 2006, International Paper (IP) began reducing their land ownership in NC and all across the Southeast by selling off vast acreage. The Nature Conservancy (TNC) presented a package to the NCWRC, with

the added stipulation of a 5-year Fiber Supply Agreement to continue pulpwood production for IP. Most of the land for sale was in areas with a high value for watershed protection and CWMTF and NHTF monies helped secure these acquisitions. The State of North Carolina issued a Certificate of Participation Bond in the amount of $20 million on behalf of the NCWRC. This bond money matched the CWMTF and NHTF contributions. The bond money was used for areas outside of the riparian zone and those with low Natural Heritage values, such as pine plantations. Every year, the NCWRC uses Agency receipts to repay the bond debt. In total, ~65,000 acres were purchased by the NCWRC for inclusion into the Game Lands Program in Districts 1, 3, & 4.

Phased acquisition history:

(Original) Shocco Creek Game Land, 2003 (1,625 ac.)

Shocco Creek Game Land additions, Phase I, 2006 & 2007 (6,512 ac.)

Embro Game Land, Phase I, 2007 (4,282 ac.) & Phase II, 2008 (4,010 ac.) (Ultimately 8,856 ac.)

Brinkleyville Game Land, Phase II, 2008 (1,819 ac.)

Sandy Creek Game Land, Phase II, 2008 (928 ac.)

Upper Tar Game Land Complex (19,740 ac.)

SURROUNDING LAND USE

An analysis of SEGAP data (Southeast Gap Analysis Project) indicates the following conditions within the area surrounding the UTGLC: forested – 73.0%, agricultural, pasture, other herbaceous – 22.1%, developed – 4.6%, and open water – 0.3%. The search area (roughly 390 square miles) was defined to include the area between Warrenton, Littleton, Aurelian Springs, Ringwood, and Castalia. (SE Online Gap Data Explorer Tool) These counties are very rural and economically depressed compared to the more urbanized and metropolitan counties of the Triangle. Commercialized industry (manufacturing and technological) is lacking and intensely developed areas are small and few. Many residents in this region seek work elsewhere, or work in forestry, agriculture, and related fields. Most of the population resides in single family dwellings distributed across the landscape on small to sizeable private properties. Many of these properties are long-time family farms, and livestock production, small grain farming, pasturing, and haying are still widely practiced. This mosaic of individual properties also contains large percentage of forested acres, and therefore timber harvesting operations are economically important in the region. For the last century, forest management on private lands has occurred on an enormous acreage in these counties. At one time, International Paper Company (IP) held almost 22,000 acres of commercial forest lands. (**Appendix X**, Game Land Vicinity Aerial Photo)

CULTURAL AND HISTORICAL IMPORTANCE

The historical and cultural significance of the counties comprising the UTGLC is well-documented. The surrounding region is rich in Native American history and artifacts. Paleo-Indian Period stone artifacts (>8000 BC) are rare (as expected), but Archaic Period (0 BC/AD – 8000 BC) and Woodland Period (~1700 AD – 0 AD/BC) stone artifacts, particularly projectile points, are quite numerous and encountered frequently as surface finds.

Still occupying the region today, the Haliwa-Saponi descend from the Saponi, a Siouan-speaking Native American tribe of North America's Southeastern Piedmont. (The name Haliwa is derived from the two counties, Halifax and Warren, being their ancestral homelands. They later added Saponi to their name to reflect their descent from the Saponi peoples of present-day northeastern North Carolina and Virginia.) In the early 1700's the Nansemond Tribe merged with the Saponi to strengthen their settlements against the growing colonial presence of Virginia plantation ownership, and the continuous warfare imposed along with repeated disease outbreaks inflicted by the Haudenosaunee peoples (Iroquois Five Nations). In 1714, the Saponi, Tottero, Occaneechi, Keyauwee, Enoke (Eno), and Shakori formally coalesced, becoming 'The Saponi Nation'. After the American Revolutionary War, from the 1730's to the 1770's, the Saponi community began gathering and living in "The Meadows" of southwestern Halifax County. By 1734, many Nansemond Indians migrated to live with the Algonquian-speaking Nottoway Tribe in Virginia, while others settled with the Iroquoian-speaking Tuscarora Tribe in eastern North Carolina. (Wikipedia, Haliwa-Saponi)

Today the Haliwa-Saponi Tribe is comprised of about 4,300 enrolled tribal members, of which ~62% reside within the immediate area (Fishing Creek and Brinkleyville Townships) in a tight radius around the town of Hollister, in Halifax and Warren Counties. They have created their own Indian church, schools, and industries. They annually host one of the largest pow-wows in NC, held on tribal grounds and open to the public since 1967. (Haliwa-Saponi, Official Site)

Small cemeteries, known, unknown, marked, and unmarked are scattered across the landscape of the UTGLC and the local region. It is unknown how many are on these game lands. A few are presently maintained (by private individuals); though many are only evidenced by simple stone markers and oblong soil depressions. Many long abandoned homesteads persist on the uplands, though very few structures remain today. Small outbuildings, stone foundations, hang-dug wells, tobacco barns, and derelict farm equipment are often encountered across these game lands, but most are too far gone to protect or restore.

Note: Cultural and prehistoric artifacts should not be disturbed, tampered with, or removed from state property. These resources should be left in situ for the enjoyment of others and the future information they may provide to historians and researchers.

TRACT DISTRIBUTION AND DIVISION

The geographic center of the UTGLC is in Arcola, NC and these game lands are bisected by major NC highways; Hwy. 561, Hwy. 58, and Hwy. 43. Parcels are distributed across an area roughly 22 by 24 miles wide. There are 26 named sections comprising this game land complex. Individual areas are associated with local place names; usually roads, streams, other geographic features, local communities, and family or historical names. (**Appendix XI**, State Maintained Road Network)

Each game land is divided into 2 to 4 Compartments and each compartment is divided in to as many as 4 Sub-compartments. Most of the subdivisions represent one single, distinct tract, unless the tract is larger and requires additional subdivision. Functional boundaries such as roads, trails and waterways were used to separate these larger tracts into their constituent subdivisions. A number and a letter are assigned to each (1-4 and A-D). Compartments range in size from under 200 to over 4,000 acres.

(**Appendix XII**, Tract Distribution Maps by Game Land)

UTGLC Tract Division *(GIS acreages do not equal game land totals)*

Embro Game Land (*8 tracts total* ~8,859 ac., Actual 8,856 ac.):
Country Club, ~779 ac.
Davis Bugg, ~275 ac.
Forest Service, ~974 ac.
Gum Pond, ~402 ac.
Odell-Embro, ~772 ac.
Odell, ~4,252 ac.
Reedy Creek, ~187 ac.
Rightmeyer, ~1,218 ac.

Brinkleyville Game Land (*5 tracts total* ~1,836 ac., Actual 1,819 ac.):
Aycock Road, ~875 ac.
Hwy 4, ~94 ac.
Hwy 4/561, ~128 ac.
Rocky Swamp, ~439 ac.
Williams Road, ~300 ac.

Sandy Creek Game Land (*3 tracts total* ~923 ac., Actual 928 ac.):
Red Bud, ~307 ac.
Sumler Road, ~175 ac.
Taylor Store Road, ~441 ac.

Shocco Creek Game Land (*10 tracts total* ~8,110 ac., Actual 8,137 ac.):
Beamon Hunt Road, ~273 ac.
Earnest Turner Road, ~1,355 ac.
Hwy 58, ~288 ac.
Lickskillet East, ~351 ac.
Lickskillet West, ~161 ac.
Nansemond Trail, ~2,005 ac.
Nash County, ~349 ac.
Plantation, ~776 ac.
Shocco Springs Tract, ~645 ac.
Wood, ~1,907 ac.

PURPOSE OF GAME LAND

The UTGLC is special for many reasons. As a resource for hunting, fishing, and outdoor recreation opportunities, few other places in the northern Piedmont offer such a large, mostly contiguous (over 19,000 acres undeveloped lands) outdoor destination to the public. The quality of aquatic habitats and the array of rare, threatened, and endangered species are exemplary for this part of the state and the entire Southeast. The conservation of these lands and the acquisition by the WRC are closely tied to the protection of these sensitive aquatic habitats. The slopes and bottomlands are also of good quality and support several priority species. Because of the size and quantity of these habitats and the associated habitat management, the UTGLC is one of the better locations in the Piedmont for public land turkey and deer hunting and for viewing several Neotropical migrating songbird species associated with these forested habitats.

The game land is located within an hour to an hour and a half drive of many of North Carolina's largest metropolitan areas. (**Appendix XIII**, Major Cities Proximity Map) The protection and

conservation of such a sizeable area of “wild land” in this part of North Carolina makes it extremely unique and valuable to all citizens.

The game land exhibits a model of diverse “on the ground” modern wildlife management in many aspects. With the diversity of habitats and inhabitants there are unique management strategies and challenges. Forestry, prescribed fire, sensitive habitat and rare species protection, game and non-game species habitat enhancement are currently being used to manage these lands. Demonstration of these techniques, particularly CURE management, and the results they promote provide valuable educational and research opportunities.

GOALS

- Provide for a diversity of habitat types and forest age classes though science based land management practices that are properly interspersed and juxtaposed across the landscape to ensure that a wide variety of terrestrial and aquatic wildlife species are conserved on the game land.
- Conserve popular sport fish and game species at fishable/huntable levels through science based land management and sound regulations.
- Provide quality habitats across the game land for endangered, threatened, and rare species to promote sustainable and perpetual populations, and if feasible, investigate the possibilities of and means for reintroducing extirpated species which should occur in the region.
- Provide sufficient infrastructure and opportunity to allow all game lands users a quality experience while on the game land with minimal habitat degradation and minimal conflict among user groups.
- Promote forest health (and native species restoration) through timber stand improvement measures while maintaining a sustainable yield of quality forest products where applicable to achieve habitat objectives.

MEASURES OF SUCCESS

- Wildlife and fish inventories/surveys indicate that a wide variety of species are present at sustained levels and are properly managed for on the game land.
- Surveys and inventories for target sport fish and game species indicate that population levels are being managed and harvested at sustained levels.
- Inventories/surveys indicate that populations of endangered, threatened, and rare species found on the game land are being maintained or restored.
- Inventories/surveys indicate that previously unknown populations or previously unknown endangered, threatened, and rare species are found on the game land.
- A diversity of habitats are managed and maintained to maximize the benefit to the widest diversity of native species, while protecting sensitive species and significant natural communities, and controlling the spread of invasive species.
- Currently, about 500 acres of fire-maintained habitats are scheduled to be prescribed burned on a 3-5 year rotation, but this number is expected to increase to ~1,500 acres per year.
- Infrastructure is provided and maintained at a level that allows the public to reasonably access and enjoy the game land for wildlife-associated recreation.

- Public use of the game land is managed so that minimal conflicts among game land users occur.
- Agreements with conservation partners are initiated that allow game land goals to be reached more expediently.
- Reasonable public complaints regarding management of the game land are minimal.
- Wildlife violations, illegal activity, misuse, and abuse of the resources occurring on the game land are decreased.

PUBLIC USES

HUNTING AND TRAPPING OPPORTUNITIES

With over two million people living in the Research Triangle area (Raleigh-Durham-Chapel Hill) that are within a roughly sixty mile distance to the UTGLC, public land hunting opportunities are increasingly important. Hunting has always been an integral part of the property, even before WRC management, when local hunt clubs held sizeable acreages under lease. These game lands are most popular for wild turkey (*Meleagris gallopavo*) and white-tailed deer (*Odocoileus virginianus*) hunting opportunities, but provide excellent waterfowl habitat (locally) and favorable small game habitat with viable populations of rabbits, quail, squirrels, and various furbearers in certain areas. Hunters remain the primary user group on the UTGLC.

Continued habitat protection, management, and enhancement have provided excellent hunting opportunities for countless sportsmen. These game lands are likely one of the best public land and non-permit areas in the state for deer and turkey hunting success. The region boasts an abundant deer herd, with Halifax and Franklin Counties routinely having some of the highest harvests in the state. (During the 2013-2014 deer season, Halifax ranked second and Franklin was fifth.) Turkey and deer hunting effort remains heavy and success is high. Currently, deer may be hunted with hounds during the regular gun season on the UTGLC, except for Sandy Creek GL. The four game lands of the UTGLC all have a Moderate Gun Either-Sex Deer Season during the first and last weeks of the Eastern Firearms Deer Season.

Over the last five hunting seasons an average of 119 deer (high 171 in 2008) and 20 turkeys (high 25 in 2013) are annually reported as harvested. (PAWS Hunter Harvest Reporting Summary)

(**Appendix XIV,** 5 Year Deer and Turkey Harvests)

Small game hunting on the UTGLC is fair to good, with moderate to heavy hunting effort and high success for eastern gray squirrel (*Sciurus carolinensis)* and eastern cottontail rabbit (*Sylvilagus floridanus*), but with relatively low hunting effort and success for northern bobwhite quail (*Colinus virginianus*) and American woodcock (*Scolopax minor*). Mourning dove (*Zenaida macroura*) hunting opportunities are slim, unless taken incidentally or in association with the vegetative response of recent timber harvesting activities. (There are dove fields on these game lands.) Other animals that are likely taken incidentally (and expected to occur occasionally too frequently), but are targeted by only a small number of sportsmen are: American crow (*Corvus brachyrhynchos*), groundhog

(*Marmota monax*), common snipe (*Gallinago gallinago*), sora (*Porzana carolina*), and Virginia rail (*Rallus limicola*). However, raccoon (*Procyon lotor*) hunting at night remains popular.

Waterfowl hunting opportunities are plentiful because of the considerable amount of available wetlands. However, these hunting opportunities are likely only pursued by a limited number of individuals who have knowledge of the local "swamps". Beaver ponds, the larger creeks, and other natural wetlands (sloughs and oxbows) provide good waterfowl habitat and at times afford excellent opportunity and success. During high water, flood events, the inundated bottomland forest provides premium waterfowl habitat. Wood ducks (*Aix sponsa*) are the primary species harvested, but Canada geese (*Branta canadensis*), mallards (*Anas platyrhychos*), black ducks (*Anas rubripes*), green-wing teal (*Anas crecca*), blue-wing teal (*Anas discors*), and hooded mergansers (*Lophodytes cucllatus*) are encountered frequently. American wigeon (*Anas americana*), gadwall (*Anas strepera*), Northern pintail (*Anas acuta*), and Northern shoveler (*Anas clypeata*) have been taken in the vicinity. The possibility exists (if only as a rarity) to encounter nearly every species of Atlantic Flyway waterfowl, especially the species of puddle ducks that pass through or overwinter in the Piedmont of North Carolina.

Trapping effort for various furbearers is not well documented, as is also true for specific varmint and predator hunting. Legally trapped species include: coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), beaver (*Castor canadensis*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), river otter (*Lontra canadensis*), Virginia opossum (*Didelphis virginiana*), mink (*Mustela vison*), long-tailed weasel (*Mustela frenata*), and raccoon. Hunter effort specifically targeting coyotes (by calling and shooting) seems to be on the increase in recent years.

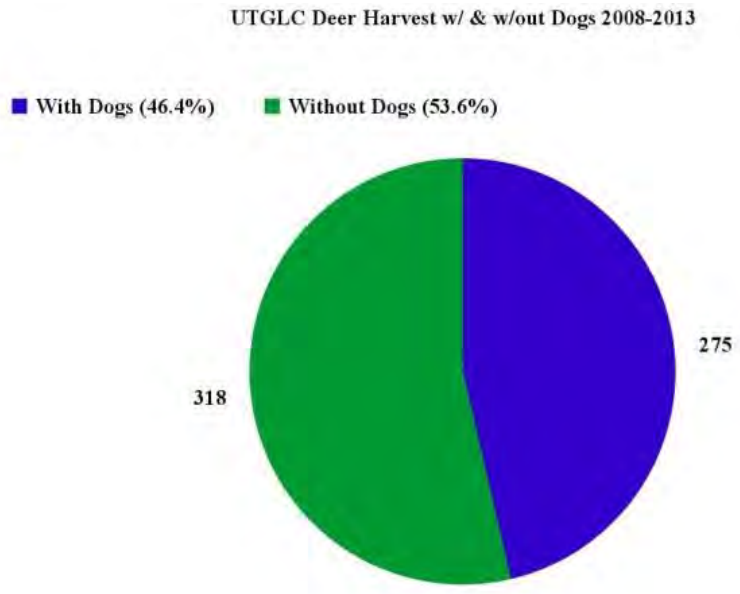
Feral swine (*Sus scrofa*) have not yet been documented on the UTGLC, but at some point in the future they may present a serious ecological threat and problematic management issues. Diligent monitoring and rapid response should be implemented to detect and dissuade feral hogs from colonizing these game lands and this area of the northeastern Northern Piedmont.

Black bear (*Ursus americanus*) have become increasingly common in recent years in the vicinity of the UTGLC, notably expanding westward into the Northern Piedmont from areas of population strongholds farther east. Sightings are frequent, particularly during the summer months when young males are dispersing from their natal home ranges. There has been an open bear season in Halifax and Northampton Counties for some time, but the harvest has been minimal or non-existent. (In the 2013-2014 bear season, 7 bears were reported from Halifax County (none from game lands) and no bears were taken in Nash County.) Based on recent management suggestions originating from the NCWRC Black Bear Management Plan (NCBBMP, 2011-2012), a Piedmont Bear Management Unit (PBMU) has been established. After statewide public hearings for a Piedmont black bear season proposals were held and comments were received, the inaugural black bear season will be implemented statewide in the fall of 2014. This bear season will run concurrently with the gun deer season in Piedmont counties and will be subject to the existing laws regarding deer dog hunting. Bear season in Franklin and Warren Counties will open on the beginning of Eastern Gun Deer Season and run until January 1st. Baiting for any species is specifically prohibited on all game lands.

The UTGLC game lands are currently six-day-per-week game lands. The only public comments received regarding this structure was the desire by a few individuals to limit deer dog hunting to half a week and allowing still hunting only for deer on the remaining days. Commission staff will further evaluate this request and may alter the current status of a three-day-per-week game land in the future.

Dog hunting for deer on the UTGLC is a hugely popular tradition. Initially, all of these game lands were open to deer hunting with dogs. Because of adjacent private landowner complaints, shortly after inception, three tracts comprising the Sandy Creek GL were removed as areas where dog hunting was permissible. These tracts did not provide enough acreage to allow dog hunting without frequent adjacent landowner conflict. This type of hunting has the potential to cause great conflict between the organized dog hunters and adjacent private landowners, hunters pursuing other species, and especially those still hunting deer on the game land and on nearby private lands. The release of hounds often entails unpredictable scenarios. Rarely do dogs stay entirely on game land property. In the pursuit of deer, dogs frequently end up on private land and negatively affect the quality and success of (still) hunting on both the game land and adjacent private lands. Livestock disturbance, trespassing, property damage, and lost hunting dogs, are often frequently cited complaints, among others. This has been an issue of contention for many years and may need to be formally addressed. Not all blocks of game land are deemed suitable for intense dog hunting activity because of size. Tracts that lack sufficient acreage may possibly be removed from general regulations and dog hunting for deer may be prohibited on a localized basis. The intent would never be to prohibit all deer dog hunting opportunities on these game lands, but certain parcels may prove more suitable for still hunting only because of small size or immediate proximity to private land. A five (hunting) season average (2008-2013) of reported hunter harvest from the UTGLC indicates that 53.6% of the total deer harvest has been with the use of dogs. (PAWS Hunter Harvest Reporting Summary.) There was much public comment in favor of the continuation of deer hunting with hounds on these lands, but more so from individuals requesting that dog hunting be limited to specific days or stopped altogether on these public hunting areas. Feasibility and appropriateness of these game lands for hound hunting will be evaluated by NCWRC staff on a tract by tract basis, with the ultimate goal of preserving hound hunting opportunities to the extent possible, while also protecting the rights of adjacent private landowners.

Figure 1:



FISHING OPPORTUNITIES

Fishing effort and success is largely unknown on the UTGLC. There are no lakes or ponds managed for public fishing. Fishing opportunities are limited to the area's streams. Every parcel of the UTGLC is either bounded by or dissected by a sizeable stream. Though fisherman may access these streams via game land access points, it is likely that much fishing effort is not centered on Commission property, but rather adjacent to it while floating or wading. Very possibly, Roanoke bass (*Ambloplites cavifrons*), known locally as 'redeyes', are the most sought after species by light-tackle enthusiasts. Being a species of Special Concern, it should be noted that the daily creel limit is two fish per day with an 8-inch minimum size limit. (The world record Roanoke bass, weighing 2 pounds, 11 ounces was caught in Fishing Creek in Nash County in 1994.) Bluegill (*Lepomis macrochirus*), redbreast sunfish (*Lepomis auritus*), largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and brown bullhead (*Ameiurus nebulosus*) are the most frequently caught species. Other sunfish species like pumpkinseed (*Lepomis gibbosus*), warmouth (*Lepomis gulosus*), and green sunfish (*Lepomis cyanellus*), and catfish species like white catfish (*Ameiurus catus*), yellow bullhead (*Ameirus natalis*), and flat bullhead (*Ameirus platycephalus*) could be expected. Occasional chain pickerel (*Esox niger*) and redfin pickerel (*Esox americanus*) can be found. Bowfin (*Amia calva*) and flier (*Centrarchus macropterus*) are likely to be encountered in stagnant water, beaver swamps, and weedy backwater situations. Longnose gar (*Lepisosteus osseus*) utilize a wide range of habitats throughout different times of the year. (A complete list of fish species can be found in **Appendix XVI**, Aquatic Species of the Upper Tar.)

WILDLIFE VIEWING

Wildlife viewing includes activities such as birding, wildlife photography, and general wildlife viewing. Wildlife viewers are considered to be a primary user group at the UTGLC, and management strategies to increase the number of wildlife viewers utilizing these game lands should be implemented. Many wildlife viewing enthusiasts who come to these game lands are particularly interested in birds, butterflies, and other wildlife species associated with early successional habitat types and bottomland hardwood forests.

Strategies to increase and enhance wildlife viewing opportunities include: continue to maintain and develop partnerships with wildlife viewing groups and the public, establish directional signage along roads that provide access to the game land, erect informational signage and kiosks regarding wildlife viewing opportunities at key access locations. Infrastructure improvements needed to better facilitate this user group includes signage as noted above, development of parking areas, and the establishment of informational kiosks at key access locations. (See Infrastructure Section) The continuation of active habitat management as outlined in the habitat and management sections of this plan will ensure that adequate numbers and a high diversity of wildlife species are present on the game land and will serve to keep viewer interest high. Threats to a quality wildlife viewing experience include conflicts with other user groups on the game land.

OTHER GAME LAND USES, USERS, AND ACTIVITIES

To provide public opportunities for hunting, fishing, trapping, and wildlife viewing are the primary uses of game lands. Other resource-based game land uses are permitted to the extent that such uses are compatible with the conservation of natural resources and traditional uses, and can be employed without displacing primary users. (NCWRC Game Land Use Evaluation Procedure)

Non-consumptive user activities include, but are not limited to, all aspects of wildlife/nature viewing on the game land. Walking, hiking, sight-seeing, bird watching, and nature photography are widely practiced throughout the year, especially during closed hunting seasons.

Hiking

Hiking popularity on the UTGLC is unknown and levels of use are undocumented, but this activity certainly occurs year round by casual explorers. There are no designated hiking trails located on these lands. The entirety of these game lands is open to walkers and hikers every day of the year. There are (currently available and proposed) over 103 miles of maintained roads and trails, as well as 'woods paths', firelines, utility corridors, etc. accessible for these activities. Many thousands of acres of forests and undeveloped lands through a diversity of habitat types and age compositions are available to users.

This existing network of roads and trails is adequate to meet demand and no new hiking trails are proposed. We do not anticipate the need or desire to dedicate certain existing paths as "hiking only" trails, though "foot travel is encouraged" in these areas. Extensive construction of designated trails would be incompatible with the management objectives of the wildlife resources and habitats. Where appropriate, upgrades to unmaintained, existing paths and roads would increase walking and hiking opportunities for those desiring less strenuous exploration. Strategies to increase and enhance hiking opportunities include: directional signage along roads that provide access to the game land, informational kiosks denoting maintained paths and key access locations, and development of improved parking areas. (See Infrastructure Section) Conflicts among hunters and hikers and wildlife watchers occasionally occur. Increasing game land information available to the public through online resources and informational kiosks at key access locations may help reduce this source of conflict among user groups.

Horseback Riding

Equestrian use, including all equine species, is prohibited on the UTGLC. With the highly erosive soils, sensitive aquatic communities, SNHA's, and streamside management zone buffer restrictions on the UTGLC, it is known that unrestricted horseback riding and extensive trail development on these game lands would be an unsuitable activity and likely degrading to a variety of aquatic and terrestrial habitats and species. Horseback riding would create additional erosion issues and may cause damage to vegetation, wildlife openings, and plantings. Equestrian presence also exacerbates the probability of introducing additional exotic plant species, and could potentially promote conflicts between hunters, hikers, and wildlife watchers. During the Public In-put Meeting and the On-line Comment Period, there was no mention of requesting horseback riding, only questioning about why it

is prohibited. The equestrian community has not expressed any interest in the development of riding areas and designated trails. Adequate private land acreage in the region is currently fulfilling this requirement.

Camping

Primitive (hunter) camping in designated camping areas is currently not provided on the UTGLC. Three hunter camping areas are planned on these game lands in the coming years. Two campgrounds will be constructed on the Shocco Creek Game Land; a ten site area on the Nansemond Trail Tract, and a five site area on the Hwy. 58 Tract. On the Embro Game Land, a five site area will be constructed on the Odell Tract. Consistent with other WRC game land campgrounds, camping will be restricted to September 1st – February 28th and March 31st – May 14th during open hunting seasons. These camping areas will consist of all-weather gravel access roads with numerous unimproved sites capable of accommodating a few tents or small campers. There will be no tables, fire rings, bathrooms, or running water and availability will be on a first-come, first-served basis. It is expected, like in other campgrounds on other game lands, that some hunters may occupy particular spaces throughout the duration of deer season.

Off-Road Vehicles

Unauthorized off-road vehicle (ORV) and ATV use is a constant and growing problem across all portions of these game lands, particularly behind gated closures and on firelines. Operation of any motorized land vehicle (except wheelchairs), including ATV's, not licensed for highway use is specifically prohibited. The UTGLC is currently not designated as a Disabled Access Game Land (under the Disabled Access Program) for holders of a Disabled Access Permit, which allows driving on any Commission-maintained road open for vehicular travel and on open or un-gated roads and trails for hunting purposes. With the extensive road network on these game lands open for seasonal use by (licensed) automobiles, there is really no advantage to implementing specifically designated disabled access roads, as there are ~52 miles of roads that are open or will eventually be open for driving. Areas behind permanent closures are closed for specific reasons, usually to prevent the public from driving into and across private land parcels and Natural Heritage Primary Areas. The development of designated trails or changing restrictions for off-road vehicle use should not be implemented on the UTGLC to protect sensitive habitats and reduce primary user group conflicts. Intensive recreational riding has severe negative impacts on wildlife, plant communities, water quality, soil preservation, and the tranquility of the outdoor experience.

Mountain Biking

Mountain biking (on maintained roads and trails) currently occurs on the UTGLC, but at low levels. Hunters sometimes use bikes to access distant areas behind closed gates; however most maintained roads are open-gated seasonally to allow vehicular traffic from early September until the middle of May. The current level of mountain biking should not be increased. High intensity mountain biking should be discouraged on non-graveled roads and woods trails due to the erosive nature of the soils and because it can degrade wildlife habitat especially in sensitive areas. Potential conflicts also exist

with hunters, hikers, and wildlife viewers. The existing maintained roads on these game lands are sufficient to accommodate limited use by bikers, and no designated bike trails will be developed. This activity should not be featured or encouraged on the undeveloped portions of the UTGLC.

Edible Plant Collection

Wild edible foraging for personal use only is certainly practiced widely on these game lands but it is unknown to what extent. The picking of mushrooms, various edible plants, nuts, fruits, and berries occurs by many whom actively seek these wild foods at specific times of the year. Pursuant to the North Carolina Administrative Code (NCAC), 15A NCAC 10D.0105, only the following plants, animals, and materials may possessed on or removed from game lands:

- Wildlife, birds, or fish legally taken under a valid hunting, fishing, trapping, or falconry license.
- Small amount of edible plants or plant parts for personal consumption, except any plants on a state or federal protected list.
- Insects, worms, or other invertebrates collected as fish bait for personal use, except any on a state or federal protected list. Any fish bait collected may not be sold.
- Small amounts of animal parts, plant parts not removed from live plants, dirt, rocks, and water. These items may not be collected for commercial purposes or sale.
- Firewood for use while camping on game land.
- Litter and road-kill animals, except where specifically prohibited.
- To possess or remove any other plants, animals, and materials requires written permission. This includes, but is not limited to, firewood to be taken off game lands, pine straw, ginseng, snakes, lizards, turtles, frogs, and salamanders.

Geocaching

Geocaching is an outdoor recreational activity that is occurring on the game land and gaining popularity. Participants use Global Positioning Systems (GPS) or other mobile devices to hide and seek containers called “caches”. There are an unknown number of geocache locations on the UTGLC. It is believed that most caches are located in safe to reach locations just off main roads. Caches located in potentially hazardous locations could put people in dangerous situations and should be discouraged. When administered in appropriate areas, geocaching is a great outdoor activity that could be used to promote and educate the public about management activities occurring on game lands. Currently, the NCWRC is exploring potential ways to implement these activities across the state’s game lands.

Canoeing, Kayaking, Boating

Opportunities for boating recreation are limited on the UTGLC because of the size of suitable waterways and annual water flow cycles. Though there are a probable maximum of 170 miles of potentially navigable waters in the countywide region (through sections of private land between roads), the middle stretches of these streams are probably only feasibly navigable during wet weather periods or high water events, and probably never from their upper reaches. The lower sections of the major tributaries provide the most potential for skilled and determined paddlers. Challenging float trips (with frequent portages) are possible for fishing, duck hunting, and exploration, but unfavorable

stream obstacles should be expected. Countless log jams, sand shoals, and beaver dams will be encountered on any lengthy excursion. During normal flow regimes, only the larger downstream sections of these streams should be considered marginally navigable. Put-in and take-out points are difficult and not necessarily associated with game land or state maintained roads. Investigations to determine better access points will be pursued.

Research and Education

Research and study on the UTGLC has included a variety of biodiversity surveys and inventories. Extensive investigations by the North Carolina Natural Heritage Program (NCNHP) and WRC Aquatic Diversity Staff have identified significant (exemplary and unique) natural communities and an array of rare, threatened, and special concern plant, vertebrate, especially invertebrate species. These game lands could also be used as field research sites for various University or WRC research projects. Educational opportunities here could include field trips (by request) ranging from formal scholastic programs to organized special interest groups.

FISH AND WILDLIFE COMMUNITIES

Upland Pine Forest

Current Extent and Condition: Upland Pine Forest (including Mixed Pine-Hardwood and Pine Plantation) occupies about 80.8% (~15,958 acres) of the UTGLC. This forest type is generally confined to the uplands, especially on ridge-tops and side-slopes, on xeric sites, or on sites that were previously in agricultural production. The dominant canopy species is loblolly pine (*Pinus taeda*), whether natural or planted, with occasional specimens of shortleaf pine *(Pinus echinata)*. Virginia pine *(Pinus virginiana)* is rarely encountered. A minor component of various hardwoods is often

present that includes sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), yellow poplar (*Liriodendron tulipifera*), black gum (*Nyssa sylvatica*), white ash (*Fraxinus americana*), and various oaks (*Quercus spp*.) and hickories (*Carya spp*.). Common mid-story species include flowering dogwood (*Cornus florida*), sourwood (*Oxydendrum arboreum*), eastern red cedar (*Juniperus virginiana*), hop-hornbeam (*Ostrya viginiana*), and ironwood (*Carpinus caroliniana*), while scattered species include persimmon (*Diospyros virginiana*), redbud (*Cercis canadensis*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), and winged elm (*Ulmus alata*). Understory shrub species include viburnums (*Viburnum spp.*), blueberries (*Vaccinimum spp*.), huckleberries (*Gaylussacia spp*.), and deciduous hollies (*Ilex spp*.) The herbaceous layer is rather sparse without the influence of timber harvesting and prescribed burning activities, but hosts a diversity of grasses, legumes, and forbs following management.

Loblolly pine plantations (~14,758 acres, 74.8%) are included in this habitat type for these purposes. Often thought of as monocultures, pine plantings on the UTGLC do resemble agricultural crops. Intensive site preparation under the management of IP (prior to WRC ownership) has resulted in commercial forests geared toward pulpwood fiber production. Red maple, yellow poplar, and sweetgum can be particularly competitive during the establishment of planted pine seedlings. Management strategies for pine plantations include repeated thinnings and periodic prescribed fire. After multiple burns and a first-time thinning, these pine plantations very closely resemble natural pine stands in appearance and by vegetative composition and structure with representatives of nearly all the aforementioned tree species present in the stand to some degree.

- ***Desired Future Conditions*** *(DFC)* – Include a mix of closed canopy pine woodlands and open canopy pine savannahs using prescribed burning, timber harvests, and regeneration to restore and maintain these stands. The goal will be to restore shortleaf pine stands on suitable sites where possible and manage existing loblolly pine stands to maximize age class diversity. While some sites may have a mix of pine species and scattered mast producing hardwoods, all sites will have a goal to create an open, diverse understory and dense herbaceous groundcover. The creation and maintenance of scattered (~1+/ac) standing snags of various sizes and coarse woody debris is desirable. Some of these stands may be allowed to mature to mixed pine-hardwood forest and eventually to the oak-hickory forest type, particularly those stands that we are not able to regularly manage with fire.

- ***Target Game Species*** – This habitat is particularly important for bobwhite quail and cottontail rabbit, gets significant use by deer and turkey, and sporadic use by gray squirrel and woodcock. These species are closely associated with this habitat type at certain times of the year and during certain life stages, and they should be the focus of management attention because they attract hunters to this game land.

- ***Target Non-Game Species*** – Sharp-shinned hawk (*Accipiter striatus*), brown-headed nuthatch (*Sitta pusila*), hairy woodpecker (*Picoides villosus*), red-headed woodpecker (*Melanerpes erythrocephalus*), field sparrow (*Spizella pusilla*), Bachman's sparrow (*Peucaea aestivalis*), prairie warbler (*Dendroica discolor*), Seminole bat (*Lasiurus seminolus*), and southeastern crowned snake (*Tantilla coronata*) are among the priority non-game species that should benefit from this habitat type, particularly those stands managed for larger diameter trees and a lush herbaceous and small shrub dominated understory. They should be a focus of management attention because they are especially important on this game land, or there are unique/important management or conservation opportunities. (**Appendix XV**, NCWAP Priority Species Lists by Habitat)

- ***Management Strategies and Needs*** (to achieve DFC) – Will primarily involve repeated prescribed burning to reduce undesirable hardwood encroachment, open the woody understory, and promote diverse herbaceous groundcover. (Less frequent fires will create pine woodland conditions and more frequent and intense fires will promote pine savannah conditions). Generally, pine woodlands will have a mix of age class and size distribution with advanced pine regeneration available to perpetuate the stand. Pine savannahs generally have a much more open canopy and a very open understory with a heavy grass and forb component as the dominant groundcover. Timber harvesting, including thinning (to reduce basal area) and clearcutting (for regeneration purposes) will be used. Selective use of herbicides may be required, particularly in stands where we are not able to use fire to sufficiently achieve DFC.

- ***Infrastructure Needs*** – Will primarily involve new firebreak and logging access construction in some areas and re-construction, re-furbishing, improvement, and maintenance of old roads and firebreaks in other areas. In instances where roads, trails, and firelines cross streams or are adjacent to Natural Heritage Primary Areas, special attention should be given to avoid sediment runoff.

- ***Threats*** – Include invasive species, incompatible adjacent land uses which may limit the use of prescribed fire, catastrophic wildfire, and extreme weather events. Lack of periodic fire, successional change, and encroachment by hardwoods would degrade the quality of these habitats. Monitoring and controlling infestations of kudzu (*Pueria lobata*), wisteria (*Wisteria sinensis*), multiflora rose (*Rosa multiflora*), maiden grass (*Miscanthus sinensis*), and other problematic exotics should be a priority.

Mesic Forest

Current Extent and Condition: Mesic Forest occurs on an unknown acreage of the UTGLC. (This type is not separated from upland hardwood in the old forest inventory). These forests generally occur on lower and middle slopes, and in many streamside corridors where topography creates mesic moisture conditions. Dominant canopy species include yellow poplar, northern red oak (*Quercus rubra*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), pignut hickory (*Carya glabra*),

and Florida maple (*Acer barbatum*). Other associates occurring commonly include sweetgum, white ash, black gum, red maple. Common mid-story species include flowering dogwood, sourwood, hop-hornbeam, ironwood, and redbud. The herbaceous layer is very dense in the spring but becomes rather sparse after these ephemerals disappear by early summer. Lush spring displays of mayapple (*Podophyllum peltatum*), spring beauty (*Claytonia virginica*), trout lily (*Erythronium americanum*), Dutchman's breeches (*Dicentra cucullaria*), Solomon's seal (*Polygonatum biflorum*), black cohosh (*Cimcifuga racemosa*), bloodroot (*Sanguinaria canadensis*), and bellwort (*Uvularia spp.*) occur on the richest sites. Others including christmas fern (*Polystichum acrostichoides*), broad beech fern (*Phegopteris hexagonoptera*), maidenhair fern (*Adiantum pedatum*), wild ginger (*Asarum canadense*), heartleaf (*Hexastylis spp.*), and liverleaf (*Hepatica americana*) remain visible later in the year.

- ***Desired Future Condition*** *(DFC)* – Includes ensuring the preservation of these rich habitats without negative influences from active management of the uplands upslope of their occurrence. "Old growth" stands with larger diameter trees, a well-developed mid-story, and periodic canopy gaps with lush herbaceous groundcover will eventually develop in these areas and natural processes will influence their ultimate state. They will be left undisturbed to ensure the threat of invasive species introduction is reduced and the diverse ephemeral herb community remains intact. Much of what would be termed Mesic Forest is protected by from future disturbance, timber harvests, and active management by Natural Heritage restrictions in Primary Areas.

- **Target game species** – Transitional habitat for many species, including deer, turkey, gray squirrel, raccoon, etc.

- **Target non-game species** – Kentucky warbler (*Oporornis formosus*), hooded warbler (*Wilsonia citrina*), wood thrush (*Hylocichla mustelina*), and silver-haired bat (*Lasionycteris noctivagans*) are among the priority non-game species associated with this habitat. They should be a focus of management attention because they are especially important on this game land, or there are unique/important management or conservation opportunities. (**Appendix XV**, NCWAP Priority Species Lists by Habitat)

- **Management Strategies and Needs** (to achieve DFC) – On occasion, at the timber type/habitat break occurring at the upper limit of the mesic forest (when not within Primary Areas), the removal of scattered non-mast producing trees (yellow polar, red maple, sweetgum, etc.) may be included as part of an upland pine timber harvest to create a better transition between habitats and to help create small canopy gaps, but otherwise no direct forest management activities will occur in these areas. Monitoring and targeted control of invasive species may be required.

- **Infrastructure Needs** – None. New infrastructure development (trails, firebreaks, etc.) in this habitat, particularly on slopes is discouraged. In instances where existing roads or trails cross riparian areas and streams, special attention should be given to avoid sedimentation and prevent or repair conditions that hinder aquatic animal passage (i.e. perched and blocked culverts).

- **Threats** – Include invasive species, incompatible adjacent land uses (including forestry practices), catastrophic wildfire, and extreme weather events.

Floodplain Forest

***Current Extent and Condition**:* Floodplain Forest, better termed Piedmont Alluvial Forest, occurs in bottomland corridors along the major creek drainages and their larger tributaries. These bottomland hardwoods make up approximately 12.2% (2,401 acres) of the UTGLC. Dominant canopy species include sweetgum, yellow poplar, red maple, slippery elm (*Ulmus rubra*), sycamore (*Platanus occidentalis*), black walnut (*Juglans nigra*), river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis laevigata*), bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), boxelder (*Acer negundo*), and occasionally swamp chestnut oak (*Quercus michauxii*) and willow oak (*Quercus phellos*). The understory often contains ironwood, hop-hornbeam, pawpaw (*Asimina triloba*), spicebush (*Lindera benzoin*), and hazelnut (*Corylus americana*). A well-developed groundcover is often present and is comprised of grasses and herbs including woodland sea oats (*Chasmanthium latifolium*), sedges (*Carex spp.*), spotted jewelweed (*Impatiens capensis*), and wingstem (*Verbesina occidentalis*). Abundant vines include grapes (*Vitis spp.*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*).

- ***Desired Future Conditions** (DFC)* – Mature, closed canopy forest with a diversity of over-story and mid-story species adapted to hydric soils, scattered snags and coarse woody debris, well-developed herbaceous layer of native plants, and seasonally flooded sloughs and floodplain pools. Floodplain forests located across the game land will remain undisturbed by active management. Natural disturbances, including periodic flooding, will dictate future forest

composition and structure. These stands will be left to develop into old growth forests and serve as streamside management zones and riparian buffers. The protection and retention of these forests ensures they remain as functional buffers along rivers and major streams and creeks. Natural hydrologic functions of these forests should be maintained. Where possible, non-native exotic species are controlled.

- ***Target Game Species*** – This habitat is especially important to woodcock, wood duck, and raccoon, and is heavily used by deer, turkey, gray squirrel, and various furbearers.

- ***Target Non-Game Species*** – This habitat supports a high diversity and abundance of non-game species, including Acadian flycatcher (*Empidonax flaviventris*), yellow-billed cuckoo (*Coccyzus americanus*), worm-eating warbler (*Helmitheros vermivorus*), hooded warbler, Kentucky warbler, wood thrush, hairy woodpecker, spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opaqum*), northern gray treefrog, common ribbonsnake (*Thamnopsis sauritus*), hoary bat (*Lasiurus cinereus*), Rafinesque's big-eared bat, and eastern box turtle (*Terrapene carolina*). (**Appendix XV**, NCWAP Priority Species Lists by Habitat)

- ***Management Strategies and Needs*** (to achieve DFC) – Timber harvests will not be implemented in these areas. These habitats will remain undisturbed and allowed to perpetuate on their own and reach climax status. All of this acreage is permanently protected as SNHA primary and secondary buffers and falls within streamside management zones (SMZ's) adjacent to riparian areas. Prescribed fire may be allowed to back into these habitats where appropriate, especially where creeks and tributaries can be utilized as natural firebreaks for larger upland burn units. Targeted herbicide applications may be used to control non-native invasive species. Areas severely impacted by beaver activities may need attention to preserve live timber and terrestrial habitat from inundation. Where streambanks and natural hydrology of the stream and floodplain pools have been negatively altered, these conditions should be repaired where feasible.

- ***Infrastructure Needs*** – Identification and limited development of non-vehicular access. Parking areas should be located outside of the floodplain. Gates should limit vehicular access where appropriate. Stream and creek crossings should be maintained, but new development should not occur. In instances where existing roads or trails cross riparian areas and streams, special attention should be given to avoid sedimentation and prevent or repair conditions that hinder aquatic animal passage (i.e. perched and blocked culverts).

- ***Threats and Management Challenges*** – Limited management is allowed within Natural Heritage buffer areas and SMZ's. An increase in the establishment and spread of invasives like Japanese stilt grass (*Microstegium vimineum*), Chinese privet (*Ligustrum sinense*), autumn olive (*Elaeagnus umbellata*) and Japanese honeysuckle (*Lonicera japonica*) is expected.

Oak-Hickory Forest

Current Extent and Condition: Oak-Hickory Forest occupies very of the upland hardwood on the UTGLC (acreage unknown). The canopy contains a mix of species including white oak, northern red oak, black oak (*Quercus velutina*), southern red oak (*Quercus falcata*), pignut hickory, mockernut hickory (*Carya tomentosa*), and southern shagbark hickory (*Carya carolinae-septentrionalis*). Drier sites contain a higher component of chestnut oak (*Quercus prinus*), scarlet oak (*Quercus coccinea*), and post oak (*Quercus stellata*). Yellow poplar, red maple, black gum, and scattered pines are also common. The understory often contains ironwood, hop-hornbeam, flowering dogwood, sourwood, redbud, eastern red cedar, witch hazel (*Hamamelis viginiania*), fringe-tree (*Chioanthus virginicus*), and several viburnums, hollies, and blueberries. The herb layer varies from sparse to numerous and diverse with various grasses, legumes, and composites.

- ***Desired Future Conditions*** *(DFC)* – Includes maintaining a diversity of upland hardwood species and various age class compositions ranging from undisturbed old growth stands, to areas of upland hardwood regeneration where possible. Because many of these areas are exemplary examples of this forest type in NC, they are protected from active management or disturbance by Natural Heritage guidelines and shall remain intact in perpetuity. They will be

left to develop into climax forests and will be altered only by natural processes (light gap regeneration, catastrophic replacement, species successional progression, etc.) In other less significant areas, active management may include limited hardwood thinning and introduction of fire to facilitate oak regeneration, the development of hardwood savannahs to serve as linkage corridors between other upland habitat types, and timber stand improvement cuts to reduce competition, balance species diversity and remove less desirable hardwoods.

- ***Target Game Species*** – Deer, turkey, gray squirrel, raccoon, and various other furbearers. These species rely heavily on this habitat type at certain times of the year and during certain life stages, and they should be the focus of management attention because they attract hunters to this game land.

- ***Target Non-Game Species*** – These species should be a focus of management attention because they are especially important on this game land, or there are unique/important management or conservation opportunities. Priority bird species include: Cooper's hawk (*Accipiter cooperii*), whip-poor-will (*Caprimulgus vociferous*), eastern wood pewee (*Contopus virens*), scarlet tanager (*Piranga olivacea*), yellow-billed cuckoo, wood thrush, hairy woodpecker, and others. Mammal species include: eastern mole (*Scalopus aquaticus*), long-tailed weasel, and likely some bat species. Amphibians include: the northern gray treefrog, northern slimy salamander (*Plethodon glutinosus sensustricto*), four-toed salamander (*Hemidactylium scutatum*), eastern spadefoot toad (*Scaphiopus holbrooki*), and others. Reptiles include: corn snake (*Elaphe guttata*), eastern smooth earthsnake (*Virginia valeria*e), mole kingsnake (*Lampropeltis calligaster rhombomaculata*), eastern kingsnake (*Lampropeltis getula getula*), broad-headed skink (*Eumeces laticeps*), eastern box turtle, and others. (**Appendix XV**, NCWAP Priority Species Lists by Habitat)

- ***Management Strategies and Needs*** (to achieve DFC) – Will primarily involve a hands-off approach in most stands. In areas where management will be beneficial or can help in restoration or improvement, select timber harvesting strategies will be used to achieve desired species dominance or age class compositions. Some areas will be included into existing or future burn blocks to facilitate ease of burning larger areas without creating permanent firelines, to promote different understory species, and to facilitate oak regeneration. The creation of hardwood savannahs in a few key connectivity corridors between existing early successional habitats will be implemented. In these localized areas, the basal area of hardwoods left after timber harvest will be very low (~40 BA) and include less dominant trees with slender boles and smaller crowns. The resulting soil scarification, daylighting of the canopy, and the repeated use of prescribed fire will promote an open understory with the heavy herbaceous and shrub groundcover that is required by many high priority game and non-game species.

- ***Infrastructure Needs*** – Will be minimal, but may include gates to control access, new firebreak and logging access construction in some areas, and re-construction, re-furbishing, improvement, and maintenance of old roads and firebreaks in other areas. In instances where roads, trails, and firelines cross streams or traverse steep slopes, special attention should be given to avoid sediment runoff.

- ***Threats*** – Include invasive species, incompatible adjacent land uses, catastrophic wildfire, extreme weather events, and climate change. Lack of occasional fire and encroachment of

competing species would degrade the quality of these habitats. Monitoring and controlling infestations of tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), and mimosa (*Albizia julibrissin*) should be a priority.

Early Successional Habitats/Open Lands

Early successional habitats are one of the most important habitat types for a large diversity of species, particularly many priority species. Unfortunately, in the traditional sense as fields and areas of “treeless brushy growth”, this habitat is very limited on the UTGLC. The loss of these habitats in the last half century has led to the severe decline of so many familiar and once abundant game and non-game species. Isolation via fragmentation and small “patch” size are limiting factors for several primary early successional transient and permanent residents. Connectivity of suitable habitat is essential for the dispersal and colonization of many specialized inhabitants. Plant diversity is high, forage is abundant, vegetation structure provides excellent vertical cover, and many species (particularly certain Neotropical migrant songbirds and upland game species) rely on these habitats almost exclusively for nesting and brooding activities. Early successional habitats are considered those on which the vegetation is ≤ 20 years of age, or those on which the vegetation is manipulated and maintained by periodic disturbance. For these purposes this category will include (non-

agricultural) fields, clearcuts, regenerating forests, utility corridors and right-of-ways, managed remnant Piedmont prairies, and thinned forest stands maintained by fire with a high herbaceous and shrub-scrub component. Many of these habitats are ephemeral and have a limited longevity, while others can potentially be maintained indefinitely by periodic burning, disking, mowing, light grazing, selective herbicide applications, and frequent timber management. From bare ground to young forests, countless different plant and animal species will utilize the succession of the changing vegetation structure throughout time. Thus why it is so important to continually create and maintain the full spectrum of early successional habitats across the landscape.

Current Extent and Condition: Fields and open land habitats comprise less than 1% of the UTGLC. There are no fields, therefore powerlines and other utility corridors, road shoulders, and areas impacted by logging (log decks and major skid trails) serve as the best examples of open lands. Forested early successional habitat acreage (thinned and burned pine stands) will fluctuate due to timber harvesting activities and burn frequency. As various plant community assemblages change over time, areas that are not intensively managed quickly revert to densely forested conditions. Increased ground level shading caused by canopy closure results in the loss of understory plant diversity and cover structure. Areas left to their own revert to this state in a few decades. Fortunately, with the active timber management program on these game lands, most areas that have seen timber work have remained suitable for classification as forests providing early successional habitat. Repeated burns in thinned pine stands have maintained shrub, grass, and herbaceous groundcover by excluding sapling hardwood encroachment. (Thinned stands without an established burn regime develop a sub-canopy under the dominant trees over time and groundcover diversity is lost.) Some pine stands at Shocco Creek GL have been burned three times in the last 10 years.

Current forest management strategies have accomplished the enhancement of large acreages of loblolly pine plantations. At a young age these stands are first-time thinned (less than 18 years old) and introduced to a prescribed burn regime (3-5 year return interval). This rejuvenates the value of this type of early successional habitat for many years to come, until time for a second thinning. Since 2003, there have been over 3,500 acres thinned.

Fallow field ("old field") management strategies and specifically, periodic maintenance (mechanical and herbicide treatments) of roadsides, utility corridors, and other non-forested areas creates and maintains a type of early successional habitat almost completely dominated by herbaceous vegetation. Diverse grasses, legumes, coarse herbs (annual and perennial) are characteristic. Key differences from forested types are the near absence of sapling tree species (though various shrubs and diminutive tree species are often scarcely present).

A few common plant species indicative of Piedmont upland early successional habitats (all types) include: pokeweed (*Phytolacca americana*), blackberries (*Rubus spp.*), dog fennel (*Eupatorium capillifolium*), ragweed (*Ambrosia aretemisifolia*), broomstraw (*Andropogon spp.*), partridge peas (*Chamaecrista spp.*), goldenrods (*Solidago spp.*), asters (*Aster spp.*), chickasaw plum (*Prunus angustifolia*), fireweed (*Erechtites hieracifolia*), plume grass (*Erianthus spp.*), Indian grass (*Sorghastrum spp.*), begger lice (*Desmodium spp.*), butterfly peas (*Centrosema* and *Clitoria*), milkweeds (*Asclepias spp.*), and various lespedezas (*Lespedeza spp*.).

- ***Desired Future Conditions*** *(DFC)* – Include maintaining (or increasing) a percentage of quality early successional habitats across the landscape with adequate connectivity for early successional species' populations to remain stable or increase. Documentable increases in population levels of quail, various shrub and ground nesting songbirds, and other non-game high priority species is desired. Continued active forest management by way of thinnings and

eventually clearcuts, and the increased use of prescribed fire are essential for maintenance will be utilized. Non-forested early successional habitats will remain productive and periodic mechanical or chemical maintenance will prevent advanced woody succession. The percentage of the game land acreage classified as early successional habitat will increase over time, with the development of additional firelines and forest openings (log decks), and the continued maintenance of widened road shoulders.

- ***Target Game Species*** – Quail, rabbit, woodcock, deer, and turkey. These species rely heavily (quail and rabbit almost exclusively) on this habitat type at most times of the year and during certain life stages, and they should be the focus of management attention because they attract hunters to this game land and are critical for these species.

- ***Target Non-Game Species*** – There is a high diversity and abundance of shrub-nesting birds on the UTGLC, but probably more so on the surrounding private and agricultural lands. NCWAP priority early successional bird species include: chuck-will's-widow (*Caprimulgus carolinensis*), whip-poor-will, eastern kingbird (*Tyrannus tyrannus*), eastern meadowlark (*Sturnella magna*), prairie warbler, Bachman's sparrow, field sparrow, grasshopper sparrow (*Ammodramus savannarum*), and others. American kestrel (*Falco sparverius*), bobolink (*Dolichonyx oryzivorus*), and loggerhead shrike (*Lanius ludovicianus*) are occasional, and barn owl (*Tyto alba*) and dickcissel (*Spiza americana*) could be expected. Priority documented reptiles include: mole kingsnake, eastern kingsnake, and eastern box turtle, and there is potential for eastern slender glass lizard (*Ophisaurus attenuatus longicaudus*). Potential priority mammals include: least shrew (*Cryptotis parva*), meadow vole (*Microtus pennsylvanicus*), and long-tailed weasel. (**Appendix XV**, NCWAP Priority Species Lists by Habitat) In addition, there is a high diversity and abundance of invertebrates in early successional habitats and several rare butterflies exist on these game lands.

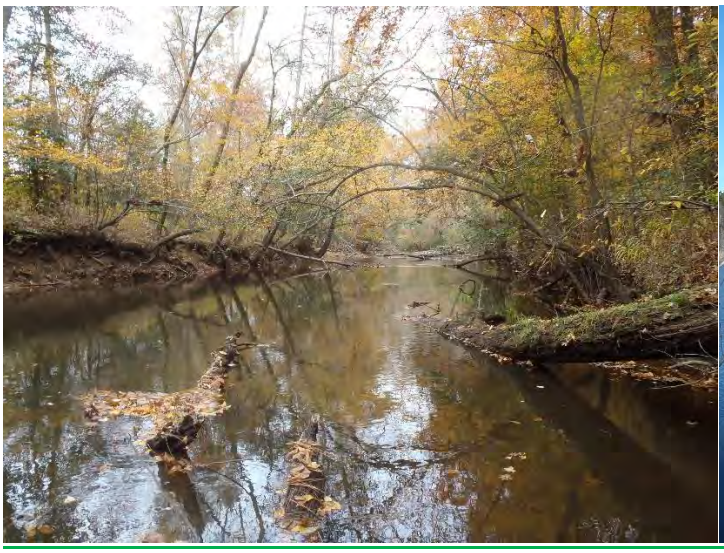
- ***Management Strategies and Needs*** (to achieve DFC) – Will focus on the maintenance of existing early successional habitats and the creation of additional acreage where possible. Though active forest management will be imperative to ensure habitat creation possibilities in the future, prescribed fire will be the most important aspect of maintaining what already exists. Prescribed fire requirements will increase over the next few years as young stands reach burning age and the cumulative effect of more burn acreage due per year continues to build. The amount of suitable "burn days" in a season cannot be controlled, but manpower constraints will make it difficult to achieve prescription goals in the future. Areas currently in an open state by various types of fallow field and "thicket" management should be prevented from converting to woodland by any necessary means (i.e. heavy equipment, herbicide spraying etc.) Continued surveys and monitoring of various key early successional species will allow for assessment of current practices and possible implementation of new methodologies.

- ***Infrastructure Needs*** – Will almost exclusively involve the creation and maintenance of permanent firelines and additional logging access improvements. Gate erection to control access on new firelines and countless culverts and significant gravel in necessary locations on the newly constructed firelines will be required. In instances where roads, trails, or firelines cross streams or traverse slopes, special attention should be given to avoid sediment runoff.

- ***Threats*** – Include invasive species and a lack of sufficient resources to maintain the required disturbance regime. Encroachment of competing/undesirable species, fire exclusion, and the discontinuance of intense management would degrade the quality of these habitats. All

previously mentioned invasive plant species could be problematic in early successional habitats, including Chinese privet, tree-of-heaven, princess tree, Japanese stilt grass, Japanese honeysuckle, maiden grass, wisteria, kudzu, autumn olive, mimosa, and multiflora rose. Fire ants are also a problematic in this habitat.

Riparian and Aquatic Habitats



Streams dissecting the UTGLC are part of the Tar-Pamlico River Basin (Fishing Creek and Swift Creek Sub-basins). As estimated on ArcGIS, almost 50 miles of blue-line streams (including the major creeks) run through or adjacent to these game lands. Blue-line intermittent tributaries were not calculated. Larger streams in this area typically have substrates composed of sand and mud with abundant woody debris, while smaller tributaries flowing off of surrounding ridges generally have cobble, gravel, and sandy substrates. Streams within the aforementioned watersheds support considerable aquatic diversity, including 13 species: 3 fishes, one amphibian, and at least 10 freshwater mussels that are considered priority species by the NCWAP, or otherwise state or federally listed. (See Natural Heritage Areas and Listed Species Section for aquatic species and rankings list.)

The exact acreage of permanent/ephemeral wetland habitats is unknown on these game lands, but ArcGIS aerial imagery estimates indicate that there may be close to 1,200 acres of wetlands and periodically flooded bottomlands on the UTGLC. Numerous small beaver ponds, some larger swamp complexes, floodplain pools, sloughs, and oxbow lakes of permanent and semi-permanent status exist in every sizeable bottomland along every major creek. Long established lacustrine habitats are likely to remain more permanent, whereas beaver influenced wetlands are subject to natural succession and alteration by natural processes including flooding, breaching, and beaver abandonment. Ephemeral pool type wetlands are subject to recent climatic and metrological conditions.

Current Extent and Condition: The waterways on these game lands are likely some of the highest quality and species diverse freshwater habitats in the country. Though historically many have been degraded by pollution runoff and sedimentation, many have recovered and stabilized somewhat over time. Current land use practices have improved with regard to sedimentation and nutrient loading in the last half century, but adjacent lands still contribute sediment and pollution. All of the streams on the game land possess permanently protected vegetated riparian buffers and all attempts are made to reduce erosion and sedimentation from management activities.

- ***Desired Future Conditions*** *(DFC)* – Includes maintaining the integrity and functionality of these sensitive aquatic communities and the species assemblages that occur there. They will be protected in perpetuity and should only be negatively altered by biological and environmental processes beyond the control of our management. (Improper land use activities on adjacent private lands in the surrounding watersheds pose the major threat for the continued health of riparian ecosystems.) Improved water quality, reduced pollution and sedimentation, and restored biodiversity should be the goal of all watersheds in the region not just the sections of streams flowing through these game lands.

- ***Target Game Species*** – Largemouth bass, various sunfishes, channel catfish, and bullheads.

- ***Target Non-Game Species*** – The following species are a conservation priority in the Upper Tar River Basin. They should be a focus of management because there are unique/important management or conservation opportunities and multiple species with special conservation status designations. The NCWAP lists the following fish as priority aquatic species: johnny darter (*Etheostoma nigrum*), glassy darter (*Etheostoma vitreum*), notchlip redhorse (*Moxostoma collapsum*), shorthead redhorse (*Moxostoma macrolepidotum*), V-lip redhorse (*Moxostoma pappillosum*), and comely shiner (*Notropis amoenus*). The following mussels are priority aquatic species: variable spike (*Elliptio icterina*), triangle floater, creeper, notched rainbow, Atlantic pigtoe. Priority species utilizing isolated and ephemeral wetlands include northern gray treefrog, marbled salamander, spotted salamander, four-toed salamander, and eastern spadefoot toad. (**Appendix XVI**, Aquatic Species of the Upper Tar)

- ***Management Strategies and Needs*** (to achieve DFC) – The protection of waterways from sedimentation by maintaining forested riparian corridors and minimizing sedimentation and erosion from roads, firelines, and other soil disturbance activities should be paramount. This includes maintaining a 300 foot vegetated corridor on perennial streams and 200 foot forested corridor on intermittent streams following all NC Forestry and NCDOT Best Management Practices (BMP's). Beaver management may be needed. Excessive beaver activity (series of dams, impounding long reaches of waterways) can reduce aquatic diversity by homogenizing habitat and altering water quality (e.g., increased temperature and reduced dissolved oxygen). This may be imperative to protecting populations of various rare mussel species. Periodic surveys should be utilized to assess the distribution and status of aquatic fauna. It may be important to work with upstream landowners to fence cattle out of creeks, prevent nutrient loading and fertilizer runoff from agriculture, enhance natural vegetation adjacent to waterways, and follow other BMP's to reduce sedimentation and pollution in these streams.

- ***Infrastructure Needs*** – Are unknown, but may include additional gates to control access on roads and firelines to help prevent further erosion and sedimentation. All earth-moving and soil disturbance projects (outside Primary Areas) should be performed following the necessary BMP guidelines for soil stabilization and erosion prevention. (i.e. road and fireline

construction/improvement, forestry operations, silt fence, water bar, culvert, and turnout installation, vegetation establishment, and placement of rock/gravel where necessary, etc.) When culvert or ford stream crossings are upgraded or replaced, special consideration should be employed to avoid sedimentation and prevent or repair conditions that hinder aquatic animal passage (i.e. perched and blocked culverts). There will no management or disturbance within the Primary Areas.

- ***Threats*** – Invasive species introduction, pollution, and sedimentation are major threats to aquatic biodiversity in these game land streams. Others include excessive beaver activity, incompatible (deleterious) adjacent land uses, catastrophic weather events, and changes in temperature and rainfall.

FIELD MANAGEMENT

There is no active field management on the UTGLC, as there are no fields. However, about 7 miles of firelines (with more to be established in the future) are maintained on a biennial or triennial basis. This maintenance includes bushhogging, disking, and planting with small grains and clovers in the fall. These linear wildlife openings provide important "edge habitat" in an otherwise forested landscape, while also allowing for safe and efficient prescribed burning to be conducted. In years that these firelines are not maintained they continue to provide valuable foraging, nesting, and brooding habitat for a variety of wildlife species particularly for deer, turkeys, and quail. They also facilitate user access and allow for increased hunting opportunities.

Additionally, logging decks across these game lands are often cleared, enlarged, and seeded to various crop species beneficial to wildlife. Powerline and utility corridor ROW's (~62 acres) are also occasionally managed as fields, and are maintained periodically as open by the WRC or utility companies.

FOREST MANAGEMENT

Objectives:

The application of sound forest management techniques within the UTGLC will provide for optimal quality, quantity, and diversity of wildlife habitat, protection and recovery of significant and sensitive communities, and a sustained yield of forest products. The primary focus of forest management on these game lands is restoring ecosystem functionality, improving wildlife habitat, and sustaining overall forest health. Through natural processes and past land use practices, some of the forest communities are less than optimal and are degraded or being replaced. Many of these habitats could benefit from active forest management. To restore and enhance existing forest types and encourage the regeneration of desired future types, implemented forest management practices such as timber harvesting, reforestation, prescribed burning, herbicide applications, and mechanical treatments will be used. All forestry activities will be performed in a manner that shall not negatively affect the sensitive significant aquatic habitats, the Significant Heritage Natural Areas (SNHA's) or designated Natural Heritage Primary Areas.

Forest Organization:

Due to the fact that the UTGLC is a large non-contiguous land area, some method to ensure a systematic examination of the entire forest has been established. Because of the differing sizes and numbers of game lands and tracts in this region, this method involves all the NCWRC owned and managed game lands in the NE piedmont region, not just those in the UTGLC (Tilley, Lower Fishing Creek, and the Upper Roanoke River Wetlands Game Lands are also included). Each year the Wildlife Forester or Forest Manager examines approximately 9000 acres across all seven game lands in the NE Piedmont. The idea behind this method was to spread annual examinations across all seven game lands so that, with the exception of the smaller game lands (Sandy Creek, Brinkleyville, and Lower Fishing Creek), a portion of each game land is reviewed each year. Emphasis was placed on creating equity between years rather that equity between GL's. Some of the compartments are quite large, such as the Odell Compartment at Embro Game Land that is in excess of 4000 acres, and approximately half of that year's entire examination schedule is on this particular game land tract. Each game land is divided into 2 to 4 separate compartments. Each compartment is divided in to as many as 4 subdivisions, depending on the size and make up of each compartment. Most of the subdivisions represent one single, distinct tract, unless the tract is larger and requires additional subdivision. Functional boundaries such as roads, trails and waterways were used to separate these larger tracts into their constituent subdivisions. A number and a letter are assigned to each (1-4 and A-D). In order to systematically plan management needs, subdivisions of these compartments were mapped and a schedule prepared for annual examinations. The prescription calendar consists of four fiscal years and is equal to the four year harvest cycle. These subdivisions were mapped according to similar timber types. A schedule for examination schedule is included in Figure 2. (This procedure utilizes a 60-year rotational age for pine and a 100-year rotational age for hardwood. An overall majority of the manageable forest is pine dominated and very few acres of manageable hardwood forest exist outside of Natural Heritage Primary areas.) Timber harvest areas and other necessary silvicultural treatments are determined and Timber-Wildlife Prescriptions are prepared during annual unit examinations. These prescriptions include a summary of proposed sale locations, volumes to be sold, and any reforestation needs after harvest. Areas that are scheduled to be prescribed burned the upcoming winter and spring and those scheduled for herbicide applications are also included in the prescriptions. The main goal of this system is to disperse harvesting and to encourage enough frequency of harvesting in each compartment to ensure that the highest quantity and quality of wildlife habitat is created and maintained. (Seamster, 1976)

Major Forest Types and Management:

Natural Upland Pine (NUP): The UTGLC is not known for its NUP that make up only 1% of these game lands. Made up of mostly loblolly pine, many of these areas were converted by previous landowners to industrial pine plantation resulting in few remaining examples. Selected tree removal (thinnings) will be used to reduce the stem density of NUP stands and to maintain them at approximately 50-60 sq. ft. of basal area per acre. All non-mast producing hardwoods will be removed. The result of harvest operations will allow increased growth of remaining trees and stimulate the growth of forbs, grasses, and legumes. If the site allows, prescribed fire will be used to maintain an open understory and diverse herbaceous groundcover. Many of these stands lay inside or between existing pine plantations, due to proximity and similarity of management, these stands will be managed with those surrounding forests.

When a pine stand has reached rotational age (60 years), a final harvest (clear-cut) will be conducted. The maximum size of the clear-cut will remain small with an irregular shape, as are many of these stands. This increased “edge effect” will provide habitat for many wildlife species. Depending on site productivity and characteristics, the stand will be reforested with loblolly pine, shortleaf pine or mixed hardwood. Reforestation species and density will be determined by species and specific site conditions.

Pine Plantations (PP): Loblolly pine plantations were established by International Paper Company (IP) and other previous industrial landowners on approximately 75% of the area on these game lands. The majority of these are less than 25 years old. The plantations vary in spacing from 5’ x 8’ to 10’x10’ and the younger age stands (7-12 years) have high to moderate amounts of herbaceous groundcover and offer excellent habitat for quail, small game, and other early successional species. Once plantations surpass approximately 12 years of age, there is a significant decline in the

composition of brushy and weedy cover. Prescribed fire has been utilized where appropriate to reduce competing stems and to promote understory diversity and structure. Not all pine plantations on these game lands have seen (or will see) fire and some have yet to be thinned. Many of these stands are just recently being first-time thinned at 15-22 years of age, depending on site indices. Approximately half of the loblolly pine stems and all non-mast producing hardwoods are removed resulting in a basal area of 50-60 sq. ft. per acre. This re-opens the canopy allowing sunlight penetration to maintain a diversity of herbaceous groundcover. Additional thinning will keep these stands open and will allow increased growth of remaining trees and stimulate the growth of forbs, grasses, and legumes. If the site allows, prescribed fire will be used to maintain an open understory and diverse herbaceous groundcover. Since 2006 several thousand acres of pine plantation have been thinned on these game lands.

When a pine stand has reached rotational age (60 years), a final harvest (clear-cut) will be conducted. Depending on site productivity and characteristics, the stand will be reforested with loblolly pine, shortleaf pine or mixed hardwood. Reforestation species and density will be determined by species and specific site conditions.

Upland Hardwood (UPH): The UTGLC is not known for its oak and hickory forests that make up only 5% of these game lands. Many of these areas were converted by previous landowners to industrial pine plantation. A modified two-aged management approach will be used for upland hardwood. This will result in only minor losses in mast production during regeneration. A rotation of 100 years for upland hardwoods has been set, although final harvest of high quality oak-hickory stands will not occur. These rotations will allow for sawtimber sizes, optimum mast production, and den formation (Jackson et. al., 1981) and also allow for old growth forest attributes (Cooper, 1986). The goal of hardwood regeneration will be to regenerate oaks. This will be attempted using pre-harvest treatments such as chemical injection, basal bark treatment, TSI work (Timber Stand Improvement), and commercial thinnings to create openings in the stand and encourage oak regeneration. Once advanced regeneration is in place either a shelterwood cut or a group selection cut will be employed to allow the regeneration to grow. Shelterwood cuts will retain high quality dominant and co-dominant oaks at a basal area of approximately 40-60 sq. ft. per acre. Pine, soft hardwood, and oaks competing with leave trees will be removed, but adequate den trees will be retained. Theoretically, the forest stand would be composed of hardwoods 50 and 100 years old. Therefore, upland hardwood stands 50 years and older are candidates for regeneration as described above. Management of these hardwood stands with long rotation ages allows these stands to develop old growth characteristics and ensures a significant oak component (Cooper, 1986). To date there have been no UPH thinning's (savannah creation) and no hardwood clearcuts. Ideally, many hardwood stands will be allowed to age to >100 years and individual trees will "age out", die naturally, and be replaced intermittently with pockets of younger regeneration in the resultant canopy gaps.

Bottomland Hardwood (BH): Bottomland hardwood accounts for approximately 12% of the area on these game lands located along Shocco Creek, Little Shocco Creek, Fishing Creek, Little Fishing Creek, Reedy Creek, Sandy Creek, Rocky Swamp and their tributaries. There has been no timber

management work done in BH, even under former IP management other than to convert the upper margins of these habitats to hardwood or pine plantation. This conversion has removed some selected high quality trees, and some clearcuts were replanted with cottonwood and sycamore for pulpwood production. All of these areas are now protected and dedicated as Natural Heritage Primary Areas. Dedicated Nature Preserve (DNP) and SNHA restrictions limit active forest management, allow for mature forest development, and protect streamside management zone buffers. Significant acreage of bottomland habitat has been inundated by long-term beaver activity, creating permanent and semi-permanent wetlands and some early successional bottomland forest.

Mixed Pine-Hardwood (MPH): Approximately 5%-of the area on these game lands is considered mixed pine-hardwood. These are forest stands where pine-is mixed with an almost equal hardwood component. The MPH forests are a transitional type between upland pine and bottomland hardwood forests and these stands exist as a result of past selective timber harvesting practices. Over time they will naturally transition to predominately hardwood without active timber management. If a greater hardwood component is desired in any given compartment, timber management practices will be used to convert MPH to hardwood. Considering the large amount of upland pine and pine plantations on these game lands, upland hardwood is lacking in most areas. Conversion to pine will be rare.

Hardwood Plantation (HP): Less than 1% of these game lands are occupied by HP. Made up of mostly cottonwood, sycamore, sweetgum, or ash, many of these areas were converted from Bottomland Hardwood or some other type of transitional forest type by previous landowners for the purpose of providing high-quality, soft hardwood pulpwood to the white paper mills in the area. Most of these areas occur inside the 100-year floodplain on primary and secondary drainages. Using a variety of active and passive techniques, most of these areas will be restored to BH unless they fall inside a Natural Heritage Primary Buffer.

Fields/Open Land: Less than 1% of these game lands are occupied by fields or other types of open areas. Most of the existing open areas are either regional electrical power transmission corridors or local power or utility easements. Over time, many smaller (approximately 1 acre) openings will be developed through the timber management process where timber harvest operations are concentrated (logging decks). Some of these areas will be developed and maintained as wildlife openings. Additionally, although not quantified, game land road shoulders and firebreaks are maintained as open areas and may be planted in wildlife beneficial, cool season annuals where management dictates. Through these processes, approximately 1000 acres of openings will be established and maintained over time and dispersed widely across the UTGLC.

Prescribed Fire:

Prescribed fire is one of the most beneficial tools land managers have for forest and wildlife management. It is essential to the perpetuation, restoration, and management of many plant and animal communities. On the UTGLC burning is focused in thinned pine stands. (**Appendix XVII**, Established Burn Blocks Map) Six (6) designated burning blocks totaling more than 1,300 acres have been established, with more acreage planned. There are approximately 7 miles of firebreaks surrounding these burn blocks. Past and future blocks are/will be designed, where possible, utilizing natural firebreaks (creeks and streams) or man-made features (roads, trails, and right-of-ways), thus maximizing burn acreage and reducing the need for extensive permanent line construction. Blocks will be burned on a two or three-year rotation under a long-term fire regime. The distribution of recent burns will be aimed at providing a mosaic of burned and unburned habitats across the landscape. Some managed forest stands will never be incorporated into the prescribed burning program because of distance to Smoke Sensitive Areas (SSA's), proximity to private land boundaries, difficulty of burning, or infrequent required weather parameters. Most burning will be completed in late winter/early spring, though occasional growing season burns may be utilized. Permanent firelines will be planted with wheat, rye, oats, or occasionally various clovers after initial construction and every third year when these blocks are scheduled to be burned again. Recent annual prescription plans call for burning approximately 500 acres per year, but in the future as the regeneration areas reach eight years of age and more acreage is thinned, annual burning requirements hope to exceed 1,500 acres per year. To accomplish game land burning goals, additional resources (manpower and equipment) will be needed.

Herbicide:

The use of herbicide is another silvicultural practice that will be employed on these game lands. It is a very effective tool that can be used for a wide range of applications. Due to the topography and forest stand size, aerial application using a helicopter is the preferred method for herbicide application. Imazapyr is used for release spraying because it is hardwood selective and at

appropriate rates does not affect conifers and desirable groundcover species like grasses, forbs, legumes, and various vines and shrubs. Site preparation spray mixtures (imazapyr and glyphosate in combination with additional herbicides) designed for the complete removal of all vegetation (prior to re-planting) will be used.

Mechanical Treatment:

Mechanical treatment (including roller chopping, pre-commercial thinning, bedding, and root-raking) has been used infrequently on these game lands by the WRC because of the high cost, labor intensity and soil disturbing potential. Previous landowners used these practices frequently in efforts to suppress competition and establish forest types outside of their typical landscapes. Prescribed fire and herbicide have been preferred methods and achieve similar results. However, there are certain instances where fire and herbicide application will not be effective in accomplishing the desired goals. The main uses of mechanical treatment in the future will be to control advanced hardwood competition in pine stands, site preparation work on reforestation areas, and to reduce the number of stems in a regenerating timber stand.

Timber Sale Program:

Timber management on these game lands has been planned and carried out under a forest management plan and a timber sale program since 2006, when the WRC began land acquisition activities in this area. Early harvests were designed for selective harvests in pine saw timber areas, though the majority of harvests currently are first and second thinning's. In the future as pine plantations age and the saw-timber market gets more established, saw-timber sales will resume. Each year on these game lands, timber is harvested on 5 to 10 stands. Over the past 5 years 70,000 tons of pine pulpwood, 12,000 tons of saw-timber and 500 tons of hardwood have been sold and harvested from the UTGLC. Over the last 2 years, approximately 1500 acres of upland pine forest has been thinned on the UTGLC. (**Appendix XVIII**, Timber Sale History Map)

Below is a brief description of the timber sale process:

> Each year those units scheduled for examination will be inspected to determine which stands are in need of harvest. Sale areas will be delineated on the ground and definite boundaries established and properly marked. Timber to be sold on these areas will be marked with paint, measured for volume estimates, and recorded in field notes for later determination of volume totals. In most thinnings, a 100% tally of all sawtimber trees to be cut will be kept, except in some cases where volume estimates will be taken from plot sampling. Where a painted boundary delineates an operator-select or clearcut sale boundary or leave trees are marked to be retained, various pulpwood and sawtimber estimating techniques will be used. (Forester's Field Handbook, NCFS, 1988) Future sales involving mostly pulpwood or very uniform timber stands may be handled on a "per unit" basis. A detailed map showing the locations and boundaries of each sale area will be prepared from aerial imagery data on ArcGIS. Black ink maps are preferred since copies must be made for distribution. A Multiple-Use Forestry Prescription Report will be prepared outlining the impact of the sale on wildlife populations and other aspects of the environment. Information is also included to keep inventory information up to date. Timber sale volumes will be computed from field notes, tally sheets, and plot data and checked for accuracy. A 'Timber Sale Agreement' (contract) will be completed specifying the number, size classes, and species of trees to be cut and outlining the 'Conditions of the Sale' to be met by the timber buyer and the Commission. The 'Timber Sale Agreement', Multiple-Use Report, maps, and volume information will be submitted to the Raleigh office for processing. A Northern Piedmont Region Forester or Wildlife Forest Manager will be responsible for showing the sale to prospective buyers, inspection of the harvesting operation to ensure compliance with the terms of the contract, and making the final inspection for release of the Performance Bond posted by the buyer. (Forest Products Sale Procedures, NCWRC, 2009)

Forest Management Needs:

The most current forest inventory on these game lands was updated by IP and passed along to the NCWRC in 2006. This data details all timber stands acquired from IP. This data, while the best available, is not complete across the UTGLC, has many errors and cannot be updated in its current format. No data exists for tracts acquired before or outside of the IP acquisition. There have been many changes on these lands from intensive timber management, natural succession and additional acquisition (outside of the IP acquisition) over the years, making an updated forest inventory critical for future timber management. A new forest inventory is currently beginning conducted on the manageable forests of the Shocco Creek and Embro game lands. The inventory should be complete by the end of the 2014 calendar year. Inventories on Sandy Creek and Brinkleyville will be completed by NCWRC staff or contractors in the future. Once these inventories are complete NCWRC should have an accurate inventory of the manageable forests on the UTGLC. Due to limited resources, forest inventories will not be conducted on non-manageable forests (Natural Heritage Primary Areas) in the UTGLC at this time. These forests are protected and active management is prohibited except where necessary for infrastructure maintenance; disease or insect control; disaster recovery or to restore or maintain natural communities or rare species populations.

Genetically improved loblolly pine seedlings have been used almost exclusively for reforestation on these game lands. This is primarily because loblolly pine is the dominant native pine species and was planted for the faster growth and yield for pulpwood production. Loblolly pine is also preferred because seedling survival has been superior to shortleaf pine (also native) seedlings until recently. With modern advances in seedling quality, proper planting methods, and site preparation work, shortleaf pine has become a viable option for reforestation with regard to seedling survival. In the future, for select reforestation situations, shortleaf pine will be considered when site conditions allow for reforestation.

Upland pine management on these game lands has been aimed towards the creation of (forested) early successional habitats. In the future, where appropriate and permissible, some selected stands of upland hardwoods should be thinned or clearcut to provide linkage corridors between these habitats.

Recent Timber-Wildlife Prescriptions called for prescribed burning approximately 1,000 acres per year on the UTGLC. This is has only been accomplished one time in the last ten years (1,087 acres in 2007). The number of acceptable burn days is unknown each year, and on every suitable burn day, burning should remain the top priority. Current staffing levels are likely inadequate to achieve this goal. Increased manpower (seasonal employees, trained prescribed burners) will be needed to fulfill this requirement. Other options include contract burning (traditional or aerial ignition), but there is uncertainty that assistance could be acquired from private burning contractors. Aerial ignition burning would be complex to orchestrate on these game lands because of the relatively small block size, very specific weather parameters required, variable fuel conditions influenced by topography, and simply the distance from other areas in the southeast where large scale helicopter burning would take precedence on such limited burn days. Contract burners in the southeast already have more private land acres to burn than they can possibly accomplish in a single burn season, and they are reluctant to take on new “priority” acres under deadline.

Figure 2:

Northeast Piedmont Planning Unit Examination Schedule

	2014-15 2018-19 2022-23		2015-16 2019-20 2023-24		2016-17 2020-21 2024-25		2017-18 2021-22 2025-26	
Game Land	Cmpt #	Acreage	Cmpt #	Acreage	Cmpt #	Acreage	Cmpt #	Acreage
Brinkleyville	1	522	-	-	2	875	3	422
Embro	4	4049	3	2190	1	1753	2	864
Lower Fishing Creek	-	-	-	-	1	692	2	606
Roanoke River Wetlands	1	1664	2	2757	3	1953	4	2743
Sandy Creek	1	174	-	-	2	308	3	446
Shocco Creek	1	1430	3	3289	2	1064	4	2354
Tillery	4	800	2	777	3	2025	1	1331
Total		8639		9013		8670		8766

Review before June 15 2014, 2018, 2022, 2026 for Fiscal Year Timber Prescriptions
2014-15, 2018-19, 2022-23

Game Land	Cmpt #	Acreage	Tracts
Brinkleyville	1	522	Williams Road, Hwy 4, Hwy4/561
Embro	4	4049	Odell
Lower Fishing Creek	-	-	
Roanoke River Wetlands	1	1664	Odom, Garibaldi
Sandy Creek	1	174	Sumler Road
Shocco Creek	1	1430	Shocco Springs, Lickskillet West, Lickskillet East, Beaman Hunt
Tillery	4	800	Tillery Longleaf
Total		8639	

Review before June 15 2015, 2019, 2023, 2027 for Fiscal Year Timber Prescriptions
2015-16, 2019-20, 2023-24

Game Land	Cmpt #	Acreage	Tracts
Brinkleyville	-	-	
Embro	3	2190	Rightmeyer, Odell-Embro, Odell West
Lower Fishing Creek	-	-	
Roanoke River Wetlands	2	2757	Pollocks Ferry
Sandy Creek	-	-	
Shocco Creek	3	3289	Ernest Turner, Wood
Tillery	2	777	Banks Farm
Total		9013	

Review before June 15 2016, 2020, 2024, 2028 for Fiscal Year Timber Prescriptions
2016-17, 2020-21, 2024-25, 2028-29

Game Land	Cmpt #	Acreage	Tracts
Brinkleyville	2	875	Aycock Road
Embro	1	1753	Country Club, Forest Service
Lower Fishing Creek	1	692	Grammon Road, Maple Swamp
Roanoke River Wetlands	3	1953	Boone
Sandy Creek	2	308	Red Bud
Shocco Creek	2	1064	Old Neck Road, Hwy 58
Tillery	3	2025	Hwy 481
Total		8670	

Review before June 15 2017, 2021, 2025, 2029 for Fiscal Year Timber Prescriptions
2017-18, 2021-22, 20225-26

Game Land	Cmpt #	Acreage	Tracts
Brinkleyville	3	422	Rocky Swamp
Embro	2	864	Reedy Creek, Gum Pond, Davis Bugg
Lower Fishing Creek	2	606	Leggett
Roanoke River Wetlands	4	2743	Cypress Swamp, Urquhart
Sandy Creek	3	446	Pullen Pasture
Shocco Creek	4	2354	Nansemond, Nash County
Tillery	1	1331	Slashes
Total		8766	

Brinkleyville Game Land

Compartment	Sub Unit A	Sub Unit B	Sub Unit C	Acreage
1	Williams Road	Highway 4	Highway 4/561	522
2	Aycock Road	Aycock Road		875
3	Rocky Swamp	Rocky Swamp		422
				1819

Embro Game Land

Compartment	Sub Unit A	Sub Unit B	Sub Unit C	Acreage
1	Country Club	Forest Service	Reedy Creek	1753
2	Reedy Creek	Gum Pond	Davis Bugg	864
3	Rightmyer	Odell-Embro	Odell West	2190
4	Odell	Odell	Odell	4049
				8856

Sandy Creek Game Land

Compartment	Sub Unit A	Acreage
1	Sumler Road	174
2	Redbud	308
3	Taylor Store Road	446
		928

Shocco Creek Game Land

Compartment	Sub Unit A	Sub Unit B	Sub Unit C	Sub Unit D	Acreage
1	Shocco Springs	Lickskillet West	Lickskillet East	Beamon Hunt Road	1430
2	Old Neck Road	Highway 58			1064
3	Ernest Turner Road	Wood			3289
4	Nansemond Trail	Nash County			2354
					8137

INFRASTRUCTURE

Objectives/Considerations

(Resource Management, Infrastructure Needs, Biological Impacts, and User Experience Satisfaction)

The built infrastructure should provide for sufficient access and use for wildlife-related recreation, support management activities, contribute to the greatest functionality, and should not negatively impact sensitive habitats or wildlife resources. Some guiding principles for developed infrastructure on Upper Tar Game Land Complex are listed below:

- Access and accommodations for users (parking lots and roads open for vehicular travel) should remain in the best possible condition at all times, and remedied in a reasonable time after any failure or damage.
- 2-wheel drive, all-weather access should be provided to popular areas, key locations, and strategic access points on the game land.
- Periodic (or emergency) maintenance and repair should be performed on all infrastructure contained on the game land to keep assets in the highest working order and function.
- Infrastructure should be repaired, renovated, or replaced prior to exceeding the reasonable "life span" expectancy when feasible.
- The aesthetic appeal and integrity of Upper Tar Game Land Complex should be maintained.
- Through traffic (i.e. cars driving *through*, not *to* the game land) should be discouraged.
- Disabled access should be made to new and existing facilities where possible.
- Erosion related to infrastructure should be avoided, minimized and/or mitigated.
- Traffic speeds (non-DOT roads) should be slow (<30 mph) for public safety, to encourage slower, scenic driving, to minimize conflicts between vehicles and pedestrians, and to minimize wildlife-vehicle collisions and reduce road-kill wildlife mortality.
- Trails, firebreaks, and roads will not be designated for the exclusive use of particular user groups or activities.
- Some of the species found on the game land are sensitive to the direct and indirect impacts of roads and other development. Large tracts of forest free from roads and other infrastructure should be maintained.
- While meeting user and management needs, built infrastructure should leave a minimal footprint on the game land.

Assessments of existing infrastructure throughout Upper Tar Game Land Complex were conducted by Engineering & Lands Management staff in 2014. The infrastructure maps included in the appendices of this document show the locations of existing public roads, administrative access roads, trails, and gates within the game land. The results of the assessments along with recommendations for maintenance and improvements are discussed by category below.

Road Assessment

(**Appendix XIX**, Infrastructure, Access and Road Network, and Recreational Facilities Map)

The tracts that comprise Upper Tar Game Land Complex are scattered over southeast Warren County, southwest Halifax County, northeast Franklin County, and northwest Nash County. Most

tracts have frontage on a state maintained road. There are two tracts of land on Embro Game Land (Davis Bug and Reedy Creed), one tract on Brinkleyville Game Land (Rocky Swamp North), and two tracts on Shocco Creek Game Land (Lick Skillet West and Nash County) that are land locked and do not have public access from the state road network. Vehicular access is provided into most tracts by game land roads maintained by the NCWRC. Most NCWRC roads terminate at a dead end within the game land tract. A limited number of game land roads are used as the access to private land beyond the game land tract.

The game land roads provide public access, administrative access, and firelines. The focus of this assessment is on the approximately 100 miles of year round and seasonal public access roads and trails. Public access activities include but are not limited to the following: hunting, fishing, hiking, wildlife viewing, geocaching, and other outdoor recreation.

Existing Road Conditions

The overall condition of the public access roads vary from good to poor. The roads primarily have one travel lane, which is gravel or soil, and does not have ditches. Maintenance demands are considerable given the constricted corridors and topography of the game land. The roads were primarily constructed for timber management access prior to the property being purchased by the State of North Carolina. A limited number of roads have been improved by the installation of drainage measures, stone driving surface, and daylighting of the road area (removing trees to allow sunlight to reach the road surface). Unimproved roads are very narrow and can be impassable.

Daylighting and other improvements have primarily occurred as part of timber management activities. Daylighting and drainage of the roads are critical to maintain a solid road base and prevent erosion. Portions of the roads traverse steep slopes and utilize water bars to minimize erosion. The profile of the water bars require the use of high clearance vehicle to traverse over them.

Major roads in good condition include:

Shocco Creek GL – Wood Tract - West Main Access
The main access road into the Wood Tract (West Section) has an all-weather surface averaging 10' wide. The road provides access from NC 561 to the northern end of the tract, and it terminates at an electrical transmission right-of-way. The road generally has good daylight and sufficient shoulders to allow two-way traffic to pass. There are two culverts that appear to be undersize and show signs of overtopping. The road also has several waterbars that are difficult to traverse without a high clearance vehicle.

Brinkleyville GL – Aycock Road Tract – Main Access from Aycock Road
The main access road into the Aycock Road Tract has an all-weather surface averaging 10' wide. The road provides access from Aycock Road to a tee in the road on the east side of the tract. The road has a good travel way with only minor erosion in some of the drainage ditches. This road is used by adjoining land owners to access their property.

Embro GL – Forest Service Tract – Odell-Embro Road Access
The road provides access into the Forest Service Tract from Odell-Embro Road to a terminus north of Reedy Creek. The road has an all-weather surface averaging 10' wide. The road has sufficient daylight to allow drying after rains.

Future Road Improvements

The majority of roads within the UTGLC are in fair to poor condition. Some of the roads require minor improvements such as the addition of gravel or minor grading. A number of roads need substantial improvements or full re-builds. The improvements needed included daylighting and opening of the road corridor, installing ditches and cross drain pipes, replacing existing culverts, repairing erosion, and installing a gravel surface. Parking/turn around areas are needed at the end of access roads. Parking areas area also needed at various locations where there are not seasonal access roads into the game land. The future road improvements have been broken down into high, medium, and low priorities. It should be a goal to perform the high priority projects over the next 10 years with the medium priority projects done next as resources allow. At the end of this ten year period, a new assessment will be performed and new priorities set.

High Priority

The following roads are high priority:

- Embro GL – Rightmeyer Tract
- Embro GL – North Odell Loop (Elliot Block)
- Shocco Creek GL – Plantation Tract
- Shocco Creek GL – Nansemond Trail Tract
- Sandy Creek GL – Red Bud Tract
- Embro GL – Odell Tract – West Portion

Embro GL – Rightmeyer Tract

Public access to the Rightmeyer Tract is currently provided by a seasonal road off of Odell-Embro Road, but this only allows vehicle access to the southeast corner of the tract. An extensive road network through the tract exists, but they currently connect to the public roads through private property. A new road is needed to connect the Odell-Embro Road access to the southwest road network. A new section of road is also needed to cross Bobbits Branch to connect with the northern road network. Connecting the road systems will greatly improve access to the game land for the public and WRC staff. Approximately 0.7 miles of new road is needed, and 3.6 miles of road needs to be upgraded with stone and drainage. The cost of this work is estimated to be $715,000.

Embro GL – Northern Odell Tract Loop (Elliot Block)

The northern portion of the Odell Tract currently has two seasonal access roads, one off of Jessie Shearin Road, and the other off of Odell Road. The two access roads are not connected by a formal road, but the public is utilizing a timber trail to travel between the existing spur roads. The existing roads have stone base in place. Improvements to the existing roads include daylighting the road corridor, creating drainage ditches, and shaping the road section. A full road build will be required to convert the existing trail portion to an all-weather road. The existing spur roads total 1.6 miles in length, and the trail section is 0.8 miles long. The cost of the improvements is estimated to be $400,000.

Shocco Creek GL – Plantation Tract

The Plantation Tract is accessed by a seasonal road extending from the end of Old Neck Road. This tract does not have road frontage except for the end of Old Neck Road; therefore, the only means of public and administrative access to the tract is by the seasonal access road. The main section of the road generally travels to the south, with several spur roads off of it. The roads range from fair to poor condition. The roads have stone base in areas, but lack drainage ditches and daylighting. Culverts

are needed for cross drainage in several locations. Sections of the roads traverse steep slopes and have erosion issues. The recommended improvements include clearing a corridor to daylight each road, grading a road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating six parking/turnaround areas. The total length of the road network is 3.1 miles. The estimated cost of the road improvements is $465,000.

Shocco Creek GL – Nansemond Trail Tract

There are six seasonal access roads into the Ernest Turner Tract. Access A crosses through the northern block from NC 561 to Nansemond Trail. Access A has two spur roads that run north and south. Access B parallels NC 561 and connects to the highway at each end. Two spur roads travel east off of Access B. Access C is a short spur into the northeast corner of the Tract off of NC 43. Access D is a spur into the east side of the tract from NC 43. Access E begins at Nansemond Trail, crossing a short reach of private property, and travels south. Access E has three spur roads of if it in the interior of the tract. Access F begins as a new access road on Nansemond Trail and travels north and west into the tract. Access F includes two short spur roads.

Access A varies from fair to poor condition. The eastern end of Access A has stone base and has been daylighted. Several waterbars across the road require a high clearance vehicle to cross. The road is difficult to traverse. It is recommended that the remaining sections of the access be daylighted. Further recommended improvements include grading a road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating parking/turnaround areas at the end of the two spurs. The total length of the roads in this access is 1.8 miles.

Access B varies from fair to poor condition. The northern end of Access B had been cleared to provide daylight to the road. The road has a clay surface, water bar crossing, and does not have drainage ditches. It is recommended that the remaining sections of the access be daylighted. Further recommended improvements include grading a road section with ditches and cross drain pipes as required and installing a stone driving surface. The total length of the roads in this access is 1.4 miles. A camping area is proposed to be constructed off of this access road.

Access C is a short, 0.1 mile long, path off of NC 43. Recommended improvements include clearing a corridor for the road, grading a road section with ditches, installing a stone driving surface, and creating a small parking/turnaround area.

Access D is in good condition. The road has been daylighted and has stone base in most all locations. Recommended improvements include removing stumps from daylighting the shoulders and installing additional stone base in areas.

Access E varies from fair to poor condition. The road has a sufficient clearing but there is no stone surface. The road has severe waterbars that require a high clearance vehicle to cross. Recommended improvements include grading a road section with ditches, reducing the size of the waterbars, installing culverts where needed, installing a stone driving surface, and creating two small parking/turnaround areas.

Access F varies from good to poor condition. The section of road immediately off of Nansemond Trail is new construction and has an 18’ wide gravel surface. One half of the road length has been daylighted. The roads do not have ditches and in areas surface drainage across the road is causing erosion. Recommended improvements include daylighting the remaining portions of the road, grading a road section with ditches, installing culverts where needed, installing a stone driving surface, and creating two small parking/turnaround areas.

Sandy Creek GL – Red Bud Tract
The Red Bud Tract has limited road frontage on Sumler Road. An existing seasonal road provides access into the interior of the tract. The road splits near the center of the block and spurs out in three directions. The roads provide public and administrative access to the interior of the tract, which is one of three blocks in the UTGLC that have restrictions on deer hunting with dogs. The existing roads have narrow clearings and a limited amount of stone base. The recommended improvements include clearing a corridor for each road, grading a road section with ditches and cross drain pipes, installing a stone driving surface, and creating two parking areas. The total length of the road network is 1.1 miles. The estimated cost of the road improvements is $220,000.

Embro GL – Odell Tract – West Portion
The western section of the Odell Tract is accessed from a seasonal spur road off of Odell-Embro Road. The road splits into two sections that cross through the middle of the block. The road was not accessible on the day of inspection due to a mudhole. A primitive campground is proposed off of this access road, as well as a parking area. Recommended improvements include drainage improvements, clearing of ditches, shaping the road, and installation of stone base. Improvements to this 1.0 mile section of road are estimated to cost $150,000.

Medium Priority

Embro GL – Country Club Tract
Shocco Creek GL – Highway 58 Tract
Shocco Creek GL – Ernest Turner Tract
Shocco Creek GL – Wood Tract
Sandy Creek GL – Taylor Store Road Tract
Brinkleyville GL – Rocky Swamp Tract
Brinkleyville GL – Aycock Road Tract
Embro – Forest Service Tract
Embro GL – Gum Pond Tract
Embro GL – Odell-Embro Tract
Embro GL – Odell Tract – Odell-Embro Road Access
Embro GL – Odell Tract – Airlie Road East
Embro GL – John Alston Road

Embro GL – Country Club Tract
The Country Club Tract is primarily served by a seasonal through road from NC 43 to Big Woods Road. There are four spur roads off of the through road, three of which lead to or cross an electrical transmission right-of-way. The main road is in fair condition with stone base on the majority of the road. The spur roads are in poor condition. Drainage and topography challenges have led to erosion on portions of the spur roads. The through road is 1.8 miles long, and the total length of the side spurs is 1.3 miles.

The Country Club Tract is also accessed by a seasonal spur road from Big Woods Road into the northeast portion of the tract. This road is currently a narrow path with no stone base or drainage controls. The spur is 0.2 miles long.

Another seasonal spur road provides access to the northern tip of the Country Club Tract from US 158 Business. The existing road is a narrow path without stone base or drainage controls. The spur is 0.3 miles long.

The roads at the Country Club Tract need daylighting to allow sunlight to dry the roads. All roads need some drainage improvements and additional stone to be all weather roads. Three parking areas at the end of spur roads are also proposed. The estimated cost for improvements to these roads is $540,000.

Shocco Creek GL – Highway 58 Tract

The Highway 58 Tract is accessed by a seasonal road off of NC Highway 58. This tract does not have road frontage on NC 58; therefore, the only means of public access to the tract is by the seasonal access road. The road splits into two main spurs and two smaller spurs within the block. The recommended improvements include clearing a corridor for each road, grading a road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating two parking areas. A primitive camping area is proposed at the end of one of the spurs. The total length of the road network is 1.4 miles. The estimated cost of the road improvements is $210,000.

Shocco Creek GL –Ernest Turner Tract

The Ernest Turner Tract has four access roads. The first access road is off of Maple Road and provides access to the northeast section of the tract. The second access is off of Maple Road and provides access to the northwest section of the tract. The third access is off of Ernest Turner Road and provides access to the southern portion of the tract. The fourth access leaves Ernest Turner Road and runs northwest into the tract.

The Maple Road northeast access has stone base and an approximately 20' wide clearing. Recommended improvements include clearing a corridor for the roads, grading a road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating three parking/turnaround areas. The length of the Maple Road northeast access is 1.9 miles.

The Maple Road northwest access is 0.1 mile long. The existing road is an overgrown path. Recommended improvements include clearing a corridor for the road, grading a road section with ditches, installing a stone driving surface, and creating a small parking/turnaround area.

The Ernest Turner Road south access has a surge stone base and has been daylighted. Recommended improvements include removing small trees from shoulders, grading a road section with ditches, installing additional stone, and creating a parking/turnaround area at the end of the seasonal access. The length of the Ernest Turner Road south access is 0.5 miles.

The Ernest Turner Road north access is 0.2 mile long. The existing road is an overgrown path. Recommended improvements include clearing a corridor for the road, grading a road section with ditches, and installing a stone driving surface. Four additional parking areas are proposed for the Ernest Turner Tract, three along Ernest Turner Road and one on Maple Road.

The estimated cost of road improvements on the Ernest Turner Tract is $450,000.

Shocco Creek GL – Wood Tract

There are three access roads into the Wood Tact, all off of NC 561. The west access road is the primary access, starting on NC 561 adjacent to an electrical transmission right-of-way, with numerous

spurs into the Tract. The center access is a rough path starting on NC 561 between the two intersections with Gillfield Road. A trail connects the west and center access roads. The east access starts near the intersection with Taylor Store Road.

The west access's primary road begins at NC 561 and travels to the northern portion of the Wood Tract, where it crosses the electrical transmission right-of-way. The main access road is in good condition with an 11' wide gravel road and adequate daylight to the road surface. The road has two culverts that have signs of overtopping. Waterbars are used on the road to control surface flow, but multiple bars are abrupt and require a high clearance vehicle to cross. Recommended improvements to this section of road include grading of drainage ditches in locations, replace culverts where undersized, rebuild waterbars, add stone in locations, and crown gravel section.

A pair of spur roads provides access to the west corner of the Wood Tract off of the main west access road. These roads are in good condition until the end sections. The end sections require drainage improvements, as well as opening the road corridors and installation of stone surface. A parking/turnaround area is recommended for the end of each spur.

Three spur roads travel to the north off of the main west access road. The northern most of the spurs has some rutting. It is recommended that this road be crowned, additional stone added and a parking/turn around area be created at the end. The other two spurs are in good condition. It is recommended that vegetation control be used to limit the amount of herbaceous vegetation growing through the stone section.

One spur leads off to the east from the main west access road, headed toward the electric transmission right-of-way and the center access. This spur is in fair to poor condition. It is recommended that this spur be crowned and stone base be placed. A parking/turnaround area is recommended for the end of the seasonal access.

The total length of road in the west access network is 5.25 miles.

The center access is currently an unimproved path in poor condition. Recommended improvements include clearing a corridor for the road, grading a road section with ditches, installing a stone driving surface, and creating a small parking/turnaround area. The length of the center access is 0.9 miles.

The east access road has a narrow clearing with a stable stone base. The spur road to the east is a narrow path with deciduous vegetation on the surface. Recommended improvements include clearing a corridor for the roads, grading a road section with ditches, installing a stone driving surface, and creating a small parking/turnaround area. The east access totals 0.6 mile in length.

The estimated cost of road improvements on the Wood Tract is $280,000.

<u>Sandy Creek GL – Taylor Store Road Tract</u>
The interior of the Taylor Store Road Tract is accessed by a seasonal road off of Taylor Store Road. The road splits into two spurs near the center of the block. The roads are provide public and administrative access to the interior of the tract, which is one of three blocks in the UTGLC that have restrictions on deer hunting with dogs. The existing roads have narrow clearings and are depressed at locations. Several culverts have blockages or show signs of overtopping. The recommended improvements include clearing a corridor for each road, grading a road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating three parking areas. The total length of the road network is 1.4 miles. The estimated cost of the road improvements is $280,000.

Brinkleyville GL – Rocky Swamp Tract

The Rocky Swamp Tract is accessed by a seasonal road network off of NC 561. The existing roads are in fair to poor condition. The roads have a narrow clearing and not all sections have a stone base. Portions of the road are depressed, which forces stormwater runoff to use the road bed as a channel. This road network is needed to provide administrative and public access to the property and the network of trails off of the road. A parking area is proposed at the end of the seasonal access. The road network is 0.9 mile long. The recommended improvements include clearing a corridor for the roads and a full re-construction of the roads, including extensive grading to eliminate the depressed road sections. The estimated cost of construction is $180,000.

Brinkleyville GL – Aycock Road Tract

The Aycock Road Tract has two seasonal access roads, one off of Aycock Road and another off of Wayman Church Road. This tract has limited road frontage on State Roads; therefore, the access roads provide the primary means for public and administrative access to the property. The Aycock Road access is in good conditions, with most sections having adequate clearing, stone base and ditches. Recommended improvements include clearing of woody vegetation from the ditches, installation of cross drainage structures at required locations, and installation of additional stone base. Two parking areas are also proposed. The Aycock Road access includes 2.7 miles of roads. The Wayman Church Road access is in fair condition. The road has stone base on approximately 70% of the road length. Recommended improvements for this section include installation of drainage ditches, cross drain pipes, stabilization of erosion areas, and installation of stone base. A parking area is proposed at the end of the seasonal access. The Wayman Church Road access is 0.8 mile long. The estimated cost of improvements to roads on the Aycock Road Tract is $280,000.

Embro – Forest Service Tract

The Forest Service Tract has access roads off of NC 43 and Odell Embro Road. The access road off of Odell Embro Road is in good condition in most locations, with the end 0.4 mile section needing drainage improvements and more stone. The access off of NC 43 is narrow and will require clearing and grading for drainage. Parking and turnaround areas are needed at the end of both of the access roads. The total estimated cost of the improvements is 0.4 mile long. The estimated cost of these improvements is $120,000.

Embro GL – Gum Pond Tract

The Gum Pond Tract is accessed by a seasonal spur road off of Davis Road. The existing road is in very poor condition. The road has a very narrow clearing, is rutted, and has areas of erosion. This road is needed to provide administrative access to the property and to allow public access to the interior of the block. A parking area is proposed at the end of the seasonal access. The road is 0.5 mile long and requires clearing and a full road construction. The estimated cost of construction is $100,000.

Embro GL – Odell-Embro Tract

The Odell-Embro Tract is accessed by two seasonal spur roads off of Odell-Embro Road, one leading north and the other south. These roads are needed to allow public access to the interior of the Tract and to allow administrative access. Parking areas are proposed at the end of the seasonal access on each road. The existing roads are not currently passable due to rutting and narrow clearings. Required improvements include clearing of a corridor, drainage controls, and stone base. The combined length of the roads is 1.2 miles. The estimated cost of improvements is $240,000.

Embro GL – Odell Tract – Odell-Embro Road Access
A seasonal access road into the Odell Tract is located on Odell-Embro Road approximately 0.8 miles west of the intersection with Airlie Road. The existing road is in fair condition. The road has a stone base and is experiencing erosion in some of its ditches. Recommended improvements include cleaning of the ditches, re-shaping the road section, installation of additional stone, and stabilization of the ditches. A parking area near the end of the seasonal access is proposed. Improvements to the 0.8 mile road section are estimated to cost $120,000.

Embro GL – Odell Tract – Airlie Road East
Two seasonal spur roads provide access into the Odell Tract east of Airlie Road. One access is located approximately 0.3 mile south of the intersection with Odell-Embro Road. The second is located approximately 0.2 mile north of the intersection with Spruills Bridge Road. Both spurs provide access into the Game Land tract toward Little Fishing Creek. The existing roads are narrow paths and will require a full road build to be all-weather accessible. A parking area is proposed at the end of both roads. The total length of the two spurs is 1.1 miles. The estimated cost of improvements is $220,000.

Embro GL – John Alston Road
John Alston Road is a NCDOT maintained gravel road that provides access to the north east portion of the Odell Tract. The road has little stone coverage and is rutted in locations. Two roads and four trails spur off the side of John Alston Road and a trail system continues from the end of state maintenance. One of the spur roads provides access through the game land to private land, and another provides access to a cemetery. It is recommended that these roads be improved with stone base (0.2 miles in length). It is also recommended that two parking areas be created off of John Alston Road to provide the public with areas to park while utilizing the game land. The estimated cost of these improvements is $20,000.

Low Priority

Shocco Creek GL – Shocco Springs Tract
Shocco Creek GL – Lick Skillet East Tract
Shocco Creek GL – Beaman Hunt Road Tract
Shocco Creek GL – Lick Skillet West Tract Access
Shocco Creek GL – Nash County Tract Access
Sandy Creek GL – Sumler Road Tract
Brinkleyville GL – Williams Road Tract
Brinkleyville GL – Highway 4 Tract
Brinkleyville GL – Highway 4/Highway 561 Tract
Embro GL – Reedy Creek Tract Access
Embro GL – Davis Bug Tract Access
Embro GL – Odell Tract – South Section

Shocco Creek GL – Shocco Springs Tract
A seasonal access road into the Shocco Springs Tract is located off of Shocco Springs Road. The road splits into three spurs near the center of the tract. The recommended improvements include daylighting a corridor for the road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating two small parking areas. Improvements to the 1.6 mile road network are estimated to cost $240,000.

Shocco Creek GL – Lickskillet East Tract
A seasonal access road into the Lickskillet East Tract is located off of Lick Skillet Road. The road splits into multiple spurs to access various portions of the tract. The existing roads are in fair to poor condition, with narrow clearings, no drainage ditches, and limited stone coverage. The recommended improvements include daylighting a corridor the road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating two small parking areas. Improvements to the 1.9 mile road network are estimated to cost $285,000.

Shocco Creek GL – Beaman Hunt Road Tract
A seasonal access road into the Beaman Hunt Road Tract is located at the end of Beaman Hunt Road. The existing road is in fair condition. The road has a stone base in a 20' wide clearing. The recommended improvements include daylighting a corridor the road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating a small parking area. Improvements to the 0.5 mile road section are estimated to cost $75,000.

Shocco Creek GL – Lickskillet West Tract Access
Currently, there is no public access to the Lickskillet West Tract. An easement into the site from a pubic road is needed to allow public access to the tract. The estimated cost of an easement and access road is unknown at this time.

Shocco Creek GL – Nash County Tract Access
Currently, there is no public access to the Nash County Tract. There is an administrative access across neighboring property. There is a deeded easement (30' wide) for the construction of a public access road to the property. Construction of an access road within the easement is needed to allow public access to the tract. The estimated cost of an access road in the easement is $100,000.

Sandy Creek GL – Sumler Road Tract
The Sumler Road Tract is accessed by a road across private land at the end of Sumler Road. The existing road has limited amounts of stone base and is rutted in locations. The recommended improvements include daylighting a corridor for the road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating a parking area. The total length of the road network is 0.6 miles. The estimated cost of the road improvements is $120,000.

Brinkleyville GL – Williams Road Tract
The Williams Road Tract has two seasonal access roads that spur into the tract from Williams Road. The existing roads are approximately 20' wide clearings that have grown up with herbaceous vegetation. The recommended improvements include daylighting a corridor for each road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating a small parking area at the end of each access. The total length of the two roads is 0.6 miles. The estimated cost of the road improvements is $90,000.

Brinkleyville GL – Highway 4 Tract
The Highway 4 Tract has one seasonal access road that spurs into the tract from NC Highway 4. The existing road is a nearly grown over path that is not graveled. The recommended improvements include daylighting a corridor for the road, grading a crowned road section with ditches and cross drain pipes as required, installing a stone driving surface, and creating a small parking area at the end of the seasonal access. The length of the seasonal road is 0.3 miles. The estimated cost of the road improvements is $45,000.

Brinkleyville GL – Highway 4/Highway 561 Tract
The Highway 4/Highway 561 Tract has one seasonal access road into the tract from NC Highway 4, near the intersection with NC 561. The road provides access through the tract to private property to the north of the tract. A spur road provides access to the center of the tract. The existing road is in fair condition. The road has adequate clearing. Portions of the road have gravel and drainage ditches. The recommended improvements include shaping the road section, creating drainage ditches where needed, installing a stone driving surface, and creating a small parking area at the end of the spur road. The length of the seasonal roads is 0.4 miles. The estimated cost of the road improvements is $50,000.

Embro GL – Reedy Creek Tract Access
Currently, there is no public access to the Reedy Creek Tract. A timber management road exists from Odell-Embro Road to the site, but the road crosses private property. An easement into the site from a pubic road is needed to allow public access to the tract. The estimated cost of an easement and access road is unknown at this time.

Embro GL – Davis Bugg Tract Access
Currently, there is no public access to the Davis Bug Tract. An administrative access exists through an adjoining property to Davis Bugg Road. A deeded easement to the Tract exists along the edge of an adjoining property. Construction of an access road within the easement or access through an alternate path is needed to allow public access to the tract. The estimated cost of an easement and access road is unknown at this time.

Embro GL – Odell Tract - South Section
The southern portion of the Odell Tract has access from two seasonal spur roads, one off of Airlie Road, and the other from Long School Road. The Airlie Road access is in fair condition adequate clearing and stone base. Clearing of the ditches, improved cross drainage, and additional stone is recommended. The Long School Road access has waterbars that require a high clearance vehicle to cross and some areas of rutting. Recommended improvements include drainage improvements and stone for both roads, vegetation control on the Airlie Road access, additional clearing on the Long School Road access. A parking area is proposed at the end of both roads. The total length of the roads is 1.7 miles. The cost of the improvements is estimated to be $255,000.

Road Maintenance

All roads require inspection and maintenance to function well and avoid damage and deterioration. Maintenance should be performed regularly, as the longer the delay in needed maintenance, the more damage will occur and the more costly the repairs will be.

Typical Road Maintenance Practices

- Inspect Roads regularly, especially before the winter season and following heavy rains.
- Keep ditches and culverts free from debris (see also Culvert Maintenance Section of this Management Plan).
- Remove sediment from the road or ditches where it blocks normal drainage.
- Regrade and shape the road surface periodically to maintain proper surface drainage.
    - Typical road should be crowned at approximately 4%, or ½” per foot.
    - Some roads may not require a crown, but should have a constant cross slope (super-elevation).

    - Gravel should be distributed at an even depth across the road.
    - Gravel should have an even distribution of fine and course materials.
    - Keep downhill side of the road free of berms, unless intentionally placed to control drainage.
    - Proper maintenance and grading of the road will require a motorgrader and a roller.
- Avoid disturbing soil and vegetation in ditches, shoulders, and cut/fill slopes to minimize erosion.
- Maintain shoulders on both sides of the road to ensure oncoming vehicles have enough room to pass. Shoulders should be relatively flat and periodically mowed.
- Maintain an erosion-resistant surfacing such as grass or rip-rap in ditches.
- If it is determined that a road needs major repairs or upgrade, contact Regional Supervisor and Design Services to schedule an assessment.

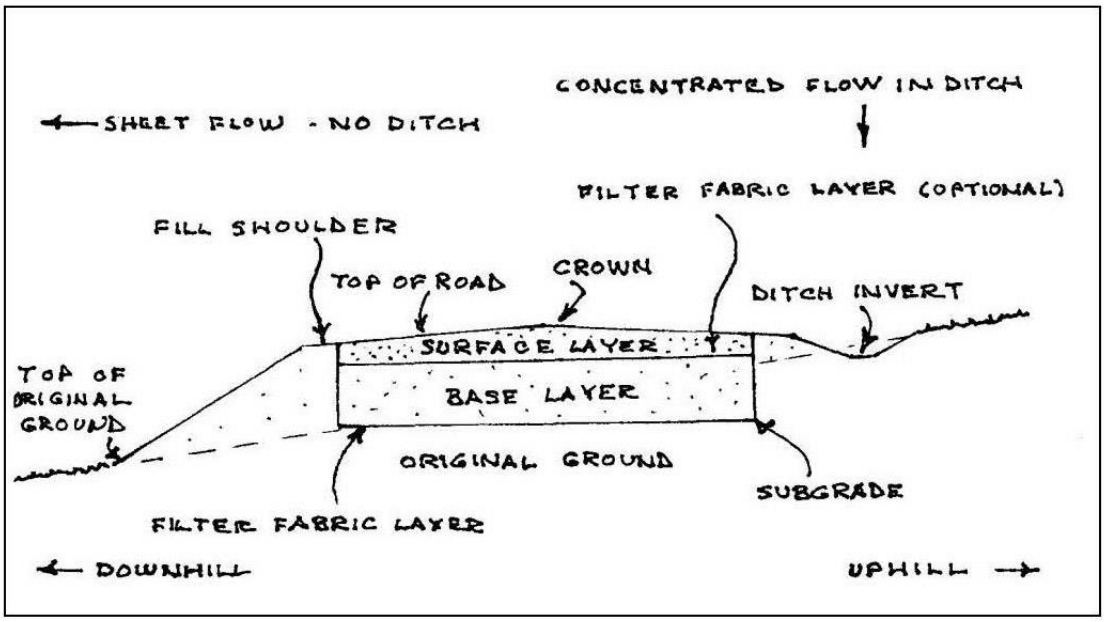


Figure 3 – Typical Road Cross-Section – Canaan, NH Highway Department

<u>Road Safety Features</u>

- Remove trees and other vegetation as necessary to provide adequate sight distance and clear travel way.
- Install and maintain road signage. This includes:
    - Stop signs –Should be installed at every major road intersection, with the signs on the minor roads.
    - Warning signs – Should be installed to warn the public of any road closures or problems in the game land.
    - Road/Route signs – Should be installed at every major road intersection.

- Information kiosks with Game Land Road Map – Entry signs should be installed at key entrances to the game land off of DOT roads. Information kiosks should be located near the major entrances and parking areas.

Gates

Gates should be used on game lands for maintenance and habitat conservation. For maintenance purposes, gates should be used to limit access to roads that are unsafe or are in disrepair, or to limit use on roads to certain times a year in order to minimize the wear and deterioration of the road. If a road is considered unsafe or in disrepair, field staff should contact an engineer. The engineer will perform an inspection to determine the best course of action to repair or upgrade the road. All gates installed on game lands should the standard swing gate and painted orange or yellow for maximum visibility. No cable gates should be installed, and any existing cables should be replaced.

Troubleshooting

Road Surface Problems

Problem: Longitudinal erosion of the road surface
Possible Causes:

- Flat or U-Shaped road. A crown or super-elevation of the road is needed to shed water laterally off the outer edges of the road surface.
- Small ridge of soil or grass growth along the outer edge of the road is preventing water from draining off the road surface. Edge needs to be graded to remove this ridge.
- Water is traveling in a wheel rut. Road needs to be regraded. This problem often results from soft roads.
- Road ditch is not large enough and overflows onto road surface. Install more frequent turnouts to get water away from the road or increase the size of the ditch.

Problem: Lateral erosion cutting across the road surface
Possible Causes:

- Most often occurs at a low spot in the road or where a ditch filled in and no longer functions. Water builds up and overtops and erodes the road surface. A culvert should be installed in this location.

Problem: Potholes
Possible Causes:

- Potholes are typically caused by insufficient crown or road cross slope. The road should be re-graded to remove the potholes, then re-crown or super-elevate the road as necessary.

Ditch Problems

Problem: Bottom of ditch is eroding
Possible Causes:

- Slope of ditch is too steep to handle the flow without additional protective measures, which include additional vegetation, erosion control mats, rip-rap, check dams, etc.

- Ditch is too small to handle the volume of water flowing through it. May need to install periodic turnouts to reduce flow through the ditch.
- Bottom of ditch is too narrow and needs to be widened to a parabolic shape.

Problem: Sides of ditches are slumping or eroding
Possible Causes:

- Side-slopes are too steep and need to be lessened by digging the back.
- Side-slopes need to be stabilized with additional vegetation, erosion control mat, or rip-rap.

Parking Areas

Currently, there are few designated parking areas within the Upper Tar Game Land Complex. Over the duration of this Management Plan, parking and turn around areas should be provided. Proposed parking areas have been shown on the Road Infrastructure Map. Proposed parking areas have been shown at the end of selected spur roads and at other locations where there are not seasonal access roads into the game land.

Any new parking area should provide a gravel surface (approximately 6" layer of compacted ABC stone) and provide enough parking for three to five vehicles. Depending on the amount of use, clearing, and grading required, it is estimated that each parking area will cost between $5,000 and $15,000. 76 improved parking areas are proposed.

Gates

There are 53 existing gates located throughout the game land, which limit access to certain roads and portions of the game land. The majority of the gates on the game land are pipe gates with some cable gates. The cable gates should be phased out in favor of pipe swing gates, for safety concerns. 27 of the existing gates are planned to be replaced. 108 new gates are proposed.

The game land is typically closed outside of hunting season, with all gates closed and locked. Some gates on the game land are opened/closed during specific times of the year, typically for deer and turkey hunting seasons. A Controlled Access Map (**Appendix XIX**, Infrastructure, Access and Road Network, and Recreational Facilities Map) has been included in this report, which identifies which gates/roads are seasonally open to the public.

Drainage Structure Assessment

Dams

There are no known dams located on the Upper Tar Game Land Complex.

Impoundments

There are no impoundments on the Upper Tar Game Land Complex.

Culverts

Due to the size of the game land complex and total number of culverts, inspection of all culverts annually is impractical. However, during the road investigation with field staff, several culverts were identified as needing repair or upgrade. These include the following:

> Shocco Creek Game Land, Ernest Turner Tract; Culvert Location N 36.23684 W 78.06074; 48" CMP. Culvert is beginning to rust out. Schedule for replacement.
>
> Shocco Creek Game Land, Wood Tract; Culvert Location N 36.187811, W 78.046183; 18" CMP 40' long. Culvert was partially blocked, had outlet scour, and signs of overtopping. Remove debris blocking inlet. Evaluate the size of the culvert. Replace if undersized. Install rip rap outlet protection.
>
> Shocco Creek Game Land, Wood Tract; Culvert Location N 36.18868, W 78.047761; 24" CMP 40' long. Culvert was partially blocked, had outlet scour, and signs of overtopping. Remove debris blocking inlet. Evaluate the size of the culvert. Replace if undersized. Install rip rap outlet protection.

(Culverts replaced on perennial streams should allow the passage of aquatic organisms.)

Culvert Maintenance

Culvert maintenance is performed to extend the life and ensure proper function of the installed drainage structure. The accumulation of sediment and/or debris at the inlet or outlet of a culvert or damage such as crimping of the pipe effectively reduces the diameter and flow capacity of the pipe.

Culvert maintenance includes removal of accumulated sediment and/or debris that prevents passage of water (and organisms) through culvert inlets, outlets, and connected drainage ways. It may also include reinforcement of eroding inlets and outlets by installing riprap or other erosion control measures. Damaged culverts and culverts requiring frequent repeat maintenance should be considered for future remediation via redesign and reinstallation.

The following items should be checked for and addressed as part of routine maintenance inspections:

- partial or complete blockage of the inlet or outlet of the pipe with sediment, stone, leaves, woody debris, refuse, or any other items that could affect flow through the culvert
- evidence of scour, bank, or channel bed erosion near the inlet or outlet of the culvert
- evidence of flow overtopping the road at the culvert location
- damage to the pipe including crimping of the inlet or outlet, crushing or piercing of the pipe
- severe corrosion of the pipe
- damage to headwalls

Staff should inspect ditches and culverts as part of their regular road maintenance activities. This inspection is especially important during leaf-fall and following periods of heavy rain. Staff should consider the location of the culvert before performing maintenance using heavy equipment. Culverts

located in active stream channels, dedicated or critical habitat areas may require special permission or installation of erosion control measures before maintenance can commence.
Leaves and woody debris that have accumulated in or around the inlet of the culvert should be removed immediately using hand tools, if possible. Removal of accumulated silt and/or gravel from ditches approaching the culvert inlet should be performed using a small excavator, backhoe, or a tractor equipped with a scrape blade. Sediment in or around the immediate vicinity of the pipe inlet or outlet should be removed using hand tools to prevent damaging the culvert. Cleaned out material is to be pulled away from the culvert then hauled and spread at a site where it cannot be washed back to the culvert area.

Repeat problems with sediment collecting around the inlet may indicate the existence of an erosion problem originating from the slopes, streams, or ditch lines in the vicinity of the culvert. Identification and stabilization of these problem areas through practices such as seeding or matting could improve performance of the culvert and reduce maintenance requirements.

Flow overtopping the road at the culvert location generally indicates that the pipe is undersized and could warrant resizing and replacement. Any damage to the culvert, as described above, may also necessitate replacement of the pipe. If maintenance staff identifies any culverts that may need replacement, they should contact engineering staff to calculate the peak flow capacity and diameter of the new pipe.

Boundary

The Upper Tar Game Land has approximately 190 miles of boundary line that is maintained. Most of this boundary adjoins private land (without road access), though there is considerable boundary mileage adjoining DOT road frontage and along major creeks. Annually, around 38 miles are scheduled to be painted and posted so that the entire boundary is visited on a three-year rotation. In the early summer of 2014, boundary contracts were initiated and private contractors were utilized to paint and post 21 miles of Brinkleyville GL boundary. It is expected that contract boundary posting will continue in the future on an as needed basis.

Recreational Facilities Assessment

(**Appendix XIX**, Infrastructure, Access and Road Network, and Recreational Facilities Map)

Boating Access

There are no public boating access facilities in the Upper Tar Game Land Complex.

Public Fishing Access

There are no Public Fishing Access Areas on the Upper Tar Game Land Complex.

Shooting Ranges

There are no shooting ranges on the Upper Tar Game Land Complex.

There is a private membership shooting range located on Earnest Turner Road, approximately 1000 feet east of the Shocco Creek Game Land.

Non-Traditional Uses

Geocaching

Geocaching is a recreational activity, in which participants use a GPS receiver or mobile device to hide and locate hidden containers, or caches, located somewhere outdoors. Game lands have become a very popular geocaching location, with hundreds of hidden caches. At this time, it is not known how extensively the UTGLC are utilized for geocaching. There are no major infrastructure elements required for this non-traditional use, but it would be beneficial to the participants to provide parking areas near the start/end of the geocaching trails.

Hiking/Camping

The game land currently does not have any designated camping areas. Three primitive camping areas are proposed in the UTGLC. One primitive camping are is proposed for the Shocco Creek GL – Odell Tract, West Block. The second primitive camping area is proposed for the Embro GL – Nansemond Trail Tract. The third primitive camping area is proposed for the Shocco Creek GL – Highway 58 Tract.

The game land contains many miles of roads, trail, and firelines. It is anticipated that the existing network of roads, trails, and firelines will be sufficient to meet demand for hiking, hunting, and other uses. Hikers and hunters are not restricted to roads and trails and are welcome (and encouraged) to walk across all open portions of Upper Tar Game Land Complex. As demand increases, staff will evaluate the need for establishing additional trails.

Horseback Riding

Currently, horseback riding is not permitted on the Upper Tar Game Land Complex.

Recreational Facility Maintenance

Maintenance of recreational facilities is critical to the overall operation of the game land program. Typical use of the game lands is dispersed, however, recreational facilities concentrates users on a specific area or feature. This concentration of users, whether it is a boating access, fishing access, shooting range, or other use, results in a need to ensure the facility is safe and functional. Routine

site visits for inspection and maintenance will accomplish this goal. Site visits should consist of two actions: (1) Inspection for safety issues and functionality, (2) Actual maintenance activities.

1. Inspections should examine the following items
   a. Safety inspection items:

      Facility components
      - Decking
      - Handrails
      - Structural supports (piles, substructure, and floats)
      - Fasteners (bolts, screws, and nails)

      Slip or trip hazards
      - Uneven walking surfaces
      - Mud on walking surfaces
      - Ponded water on walking surfaces
      - Drop-offs

      Overhead
      - Dead trees or limbs
      - Overhead utilities

   b. Functionality Inspection Items

      Parking
      - Surface condition (ruts, potholes, gravel)
      - Delineation (wheel stops, paint)

      Ramp
      - Blockages (sediment, wood)
      - Surface condition

      Pier/Dock
      - Bollards
      - Wooden components
      - Bumpers

      Shooting range
      - Berms
      - Target area
      - Benches
      - Shelter (roof, structure, and floor)

      Signage
      - Kiosk (entrance, regulation, and information)
        - ADA
        - No Parking
        - Keep Ramp Clear
2. Maintenance activities should include routine and corrective activities
   a. Routine Activities include:
      - Litter and debris removal
      - Grass mowing

- Woody vegetative growth control

b. Corrective activities can include but not be limited to:
    - Lumber replacement
    - Sign replacement
    - Minor grading
    - Tree or limb removal

Over time recreational facilities degrade to the point that routine maintenance activities cannot provide corrective action. Examples of this level of degradation include but are not limited to: structural problems, persistent and/or severe erosion issues, and broken/or severely degraded concrete. Once this level of degradation is reached, supervisory personnel should inspect the facility and determine the scope of the needed repairs. If major repairs are required, supervisor personnel should contact an engineer for assistance.

RESEARCH AND SURVEYS/INFORMATIONAL NEEDS

Research and surveys are a critical component of management of fish and wildlife resources on the UTGLC. Continued and future research and survey projects are needed to make sound scientific decisions, prescriptions, and assessments of the resources across these game lands to meet the goals and objectives of this plan. A large component of research and surveys on all game lands should be adaptive management, where monitoring is able to evaluate the effects of management to improve future actions for target species. Current and on-going research and survey projects on these game lands focus heavily on priority species and hunter success and satisfaction opinions.

Current (and past) research and survey projects occurring on these game lands:

- Aquatic diversity surveys
- Insect surveys (dragonfly and butterfly)
- Herpetological inventories
- Hunter surveys (public opinion)
- Natural Heritage inventory surveys
- Wood duck nest box project

Although there have been several studies conducted and numerous surveys and projects implemented, there is still a need to continue to improve inventories and monitoring, as well as continue to gather knowledge and information regarding wildlife and aquatic resources across these game lands. Songbird and quail surveys should be continued to further assess management impacts and measure long-term population trends. Inventory surveys should be conducted to assess whether priority species are present, and which habitats they are using. Continued songbird, mammal, herpetological, and vegetation surveys are needed to document and monitor management impacts and provide baseline data prior to management (to provide recommendations for future management). Aquatic surveys of the streams across the game land are needed to monitor

populations and to document and monitor aquatic diversity, communities, habitat quality, and the potential for restoration of rare or priority aquatic species.

Research and survey possibilities for these game lands:

- Implement songbird point count surveys
- Implement point count surveys for quail
- Additional inventory of reptiles and amphibians
- Implement small mammal surveys in key habitats
- Establish a North Carolina Bat Acoustic Monitoring Program route, bat mist netting, and installation of bat houses
- Population (size and trend) inventories for target game and priority non-game species
- Inventory and delineate wetland habitats
- Additional hunter effort and success surveys
- Continued comprehensive inventory of aquatic species and habitats
- Implement American woodcock and nightjar surveys
- Further inventory of rare insects (dragonflies and butterflies)
- Monitor and control invasive plant species (early detection, rapid response)
- Expand research and knowledge of critical habitat types (bottomlands, early successional, shortleaf pine restoration, hardwood savannah creation, etc.)
- Continue and expand surveys and monitoring of user group numbers, activities, satisfaction, and intensity
- Complete forest inventory stand mapping for entire game land

Informational needs for these game lands include close monitoring of current and planned future land use and projected growth in the Northeast Piedmont and regionally in the Triangle. Local government and community development land use planning, zoning changes, and other arising incompatible land uses will have a tremendous potential impact as they relate to the UTGLC management goals and objectives. Local development and transportation upgrade related plans and proposed projects should be monitored closely to ensure that negative impacts to important wildlife corridors between the game land and the nearest permanently conserved lands are minimized or mitigated. “Efforts should be made to monitor and provide information from the Green Growth Toolbox to planners for long-range transportation planning and local land use planning that may affect habitat quality and the ability to manage habitats on these game lands” (Cook, 2014).

(**Appendix XX**, Urban Expansion Projection Maps; 2020, 2050, 2100)

ACQUISITION PLAN

Negative impacts associated with intense development pose significant threats to wildlife species and habitats identified as conservation priorities in North Carolina (Wallace and Tarr, 2012). Landscape scale habitat fragmentation, rapid human population growth, and increased urban expansion in the regional proximity to the UTGLC make the protection of undeveloped lands and biological resources paramount. These factors increase the demand for public use areas and wild, open spaces, while at the same time putting tremendous pressure on ecological communities and environmental quality. Incompatible land uses adjacent to these game lands can have negative direct impacts on habitats and species and also indirect impacts such as fragmenting remaining habitat patches and impeding

the movement of animals across the landscape. Incompatible land uses adjacent to these game lands can negatively impact management activities (e.g. limiting prescribed burning) and public uses (e.g. no firearm hunting within 150 yards of a building on the edge of game lands).

Currently, the UTGLC is surrounded by predominantly rural lands, which means that there is still an opportunity to maintain the rural landscape, protect additional important habitat areas, buffer existing managed lands, strengthen connectivity corridors for wildlife, and increase public access and use opportunities. In keeping with the objectives of the NCWRC's Game Lands Program to provide, protect, and actively manage habitats to benefit aquatic and terrestrial wildlife resources, there is a need to strategically expand the UTGLC when and where possible.

Priority property acquisitions will be identified and categorized based upon the potential to improve game land access, enhance connectivity of these game lands, and/or allow the opportunity to protect critical habitats and imperiled species. The highest priority tracts are inholdings or adjacent tracts that provide key (needed) game land access, enhance the connectivity of current holdings, offer restoration and preservation potential, or connect corridors between these game lands and other regional conservation lands. Tracts that contain unique or high quality natural communities, possess listed species, or provide critical buffers along sensitive watersheds or other adjacent biotic features are also highest priority for acquisition or other conservation measures. Tracts of secondary priority are large tracts immediately adjacent to the game land that provide important additional (conservation and recreational) acreage, but do not provide key access to or enhance connectivity of existing holdings or do not contain high priority natural resources. A few key parcels to be purchased outright or public ROW easements to be secured to provide access onto currently inaccessible game land tracts have been identified and will eventually be pursued.

These properties should be pursued when available. Tracts offered for acquisition should be evaluated on a case by case basis to determine if they address a significant game land and/or conservation need. Land investigations and grant application processes should be initiated. Regardless of acreage, tracts surrounding the UTGLC will be evaluated for the:

- Presence of threatened, rare, endangered, and special concern species
- Proximity to and shared boundary with existing NCWRC property
- Protection of existing NCWRC property from encroachment by development
- Improvement of the connectivity between existing game land blocks
- Creation of corridors to partner properties and other conservation lands
- Presence of (or protection for) high quality terrestrial and aquatic habitats
- Presence of exemplary natural communities
- Presence of intact priority habitats or those that can be restored
- Benefits to game land users and improving public access
- Potential to increase the ecological benefits from prescribed fire
- Facilitation of the ease of administering prescribed fire on the landscape

Funding sources for land acquisition activities have had large cuts made to their budgets over the last several years, so leveraging the increasingly scarce acquisition funds and securing new funding sources will be a major future challenge facing NCWRC acquisition activities.

FINANCIAL ASSESTS AND FUTURE NEEDS

Current staffing and available equipment are sufficient to meet immediate needs for maintaining the infrastructure and management needs of the game land. Additional (seasonal) manpower may be needed, particularly to meet future prescribed burning goals. Older pieces of equipment will be replaced as they begin to age, become outdated, or become in a state of disrepair.

Current assets:

- Personnel - The staff located at the Tillery Wildlife Depot includes 3 permanent positions (1 Wildlife Forest Manager, 1 Conservation Technician II, and 1 Technician I), and two seasonal positions (5 or 11 months). Other regional staff working in part on these game lands includes: EcoRegion Supervisor, Management Biologist, Conservation Technician Supervisor, District Fisheries Biologist, Fisheries Biologist I, District Wildlife Management Biologist, Central Aquatic Nongame Coordinator, Eastern Aquatic Nongame Biologist, Piedmont Wildlife Diversity Coordinator, Wildlife Diversity Biologist I, up to 4 Wildlife Enforcement Officers, and Facility Engineer.
- Equipment- The Tillery Depot has a crawler dozer, farm tractors and implements, grain drills, mowers (bushhogs, lawnmowers, and A-boom), slip-on fire suppression units, motor grader, backhoe, a dump truck, utility trailers, a hauling unit, boats, and all-terrain vehicles (gators and four-wheelers).
- Structural – There are no buildings on the UTGLC.

Future needs: With an emphasis on increasing and diversifying the user base of the game land, new constituents will expect a higher level of maintenance and access to game land infrastructure. Additional assets and funding needs necessary to meet the goals and objectives of this plan are: (see **Table 1**: Financial Summary of Activities)

- Personnel – No immediate additions to the personnel anticipated
- Equipment – No immediate major equipment purchases anticipated. Funds needed to replace equipment as needed
- Funds for kiosks, signage, and educational materials to inform game land users
- Funding for parking area and hunter campground construction and upgrades
- Funding for future game land parcel acquisitions
- Funding for contract boundary work
- Funds for road construction, improvements, and repairs
- Funds for the development of improved canoe launch access into Fishing Creek from Hwy. 561 or Hwy 43
- Funds to purchase gravel, culverts, and gates (routine maintenance and construction)
- Funding for additional and on-going training of employees (equipment operation, safety, habitat management work, species identification, etc.)
- Funds for research and surveys
- Funds to complete forest inventory and stand mapping

Table 1: Upper Tar Game Land Complex Financial Summary of Activities

Upper Tar Game Land Complex Financial Summary of Activities																
Habitat Activities																
					Unit											
Project	**Description**	**Activity**	**Quantity**	**Unit**	**Cost**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Total**
H	Firebreaks	Establish firebreaks	3	mi	3000	9000	9000	9000	9000	9000						45000
H	Firebreaks	Maintain firebreaks	3	mi	600	1800	3600	5400	7200	9000	32400	32400	32400	32400	32400	189000
H	Firebreaks	Install culverts on firebreaks	3	ea	200	600	600	600	600	600						3000
H	Firebreaks	Maintain culverts on firebreaks	2	ea	50	100	250	400	550	1400	1400	1400	1400	1400	1400	9700
H	Nest Structures	Install Wood Duck Boxes	2	ea	150	300	300	300	300							1200
H	Nest Structures	Maintain Wood Duck Boxes	3	box	75	225	375	525	675	675	675	675	675	675	675	5850
H	Vegetation Control	Prescribe burning	1500	ac	30	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000	450000
															Sub-total:	703750
Operation and Maintenance Activities																
					Unit											
Project	**Description**	**Activity**	**Quantity**	**Unit**	**Cost**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Total**
O & M	Signs and Boundaries	Maintain boundary	36	mi	200	7200	7200	7200	7200	7200	7200	7200	7200	7200	7200	72000
O & M	Public Use Facilities	Maintain campground	3	camp	500		500	500	1000	1000	1500	1500	1500	1500	1500	10500
O & M	Public Use Facilities	Maintain hunter parking areas	25	park	500	2000	4000	6000	8000	10000	12000	12500	12500	12500	12500	92000
O & M	Road and Trails	Maintain Road	36	mi	2500	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	900000
O & M	Road and Trails	Install/Replace Culverts (included in Development)	0	ea	500	0	0	0	0	0	0	0	0	0	0	0
O & M	Road and Trails	Maintain Culverts	60	ea	50	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	30000
O & M	Road and Trails	Install gates	6	gate	1000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	60000
O & M	Road and Trails	Maintain gates	42	gate	100	4200	4800	5400	6000	6600	7200	7800	8400	9000	9600	69000
															Sub-total:	1233500

Table 1: (Cont.)

Upper Tar Game Land Complex Financial Summary of Activities (Cont.)																
Development Activities and Renovation																
					Total											
Project	**Description**	**Activity**	**Quantity**	**Unit**	**Cost**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Total**
D	Road Upgrade and Build New (1)	Embro, Rightmeyer Tract	4.3	mi	715,000	X										715,000
D	Road Upgrade and Re-build (1)	Embro, Odell Tract (Northern Loop)	2.4	mi	400,000		X									400,000
D	Road Upgrade (1)	Shocco Creek, Plantation Tract	3.1	mi	465,000			X								465,000
D	Road Upgrade & Campground (1)	Shocco Creek, Nansemond Trail Tract	3.3	mi	Unk Value	X										Unk Value
D	Road Upgrade (1)	Sandy Creek, Red Bud Tract	1.1	mi	220,000		X									220,000
D	Road Upgrade & Campground (1)	Embro, Odell Tract (West Portion)	1	mi	150,000			X								150,000
D	Road Upgrade (2)	Embro, Country Club Tract	3.6	mi	540,000				X							540,000
D	Road Upgrade & Campground (2)	Shocco Creek, Hwy. 58 Tract	1.4	mi	210,000				X							210,000
D	Road Upgrade (2)	Shocco Creek, Earnest Turner Rd. Tract	2.7	mi	450,000					X						450,000
D	Road Upgrade (2)	Shocco Creek, Wood Tract	6.8	mi	280,000					X						280,000
D	Road Upgrade (2)	Sandy Creek, Taylor Store Rd. Tract	1.4	mi	280,000							X				280,000
D	Road Upgrade (2)	Brinkleyville, Rocky Swamp Tract	0.9	mi	180,000						X					180,000
D	Road Upgrade (2)	Brinkleyville, Aycock Rd. Tract	3.5	mi	280,000						X					280,000
D	Road Upgrade (2)	Embro, Forest Service Tract	0.4	mi	120,000							X				120,000
D	Road Upgrade (2)	Embro, Gum Pond Tract	0.5	mi	100,000							X				100,000
D	Road Upgrade (2)	Embro, Odell-Embro Tract	1.2	mi	240,000								X			240,000
D	Road Upgrade (2)	Embro, Odell Tract (Odell-Embro Rd. Access)	0.8	mi	120,000								X			120,000
D	Road Upgrade (2)	Embro, Airlie Rd. Tract (East)	1.6	mi	220,000									X		220,000
D	Road Upgrade (2)	Embro, John Alston Tract	0.2	mi	20,000									X		20,000
D	Road Upgrade (3)	Shocco Creek, Shocco Springs Tract	1.6	mi	240,000										?	240,000
D	Road Upgrade (3)	Shocco Creek, Lickskillet East Tract	1.9	mi	285,000										?	285,000
D	Road Upgrade (3)	Shocco Creek, Beamon Hunt Rd. Tract	0.5	mi	75,000										?	75,000
D	No Access, No Easement (3)	Shocco Creek, Lickskillet West Tract	Unk	mi	Unk Value										?	Unk Value
D	Build Road, Deeded Easement (3)	Shocco Creek, Nash County Tract	Unk	mi	100,000										?	100,000
D	Road Upgrade (3)	Sandy Creek, Sumler Rd Tract	0.6	mi	120,000										?	120,000
D	Road Upgrade (3)	Brinkleyville, Williams Rd. Tract	0.6	mi	90,000										?	90,000
D	Road Upgrade (3)	Brinkleyville, Hwy. 4 Tract	0.3	mi	45,000										?	45,000
D	Road Upgrade (3)	Brinkleyville, Hwy. 4/561 Tract	0.4	mi	50,000										?	50,000
D	No Access, No Easement (3)	Embro, Reedy Creek Tract	Unk	mi	Unk Value										?	Unk Value
D	No Access, No Easement (3)	Embro, Davis Bugg Tract	Unk	mi	Unk Value										?	Unk Value
D	Road Upgrade (3)	Embro, Odell Tract (South Section)	1.7	mi	255,000										?	255,000
					Unit Cost											
D	Parking Area Construction	All Game Lands	76	ea	5,000			(Average 7 per year)								380,000
															Sub-total:	6,630,000
														GRAND TOTAL:		8,567,250

REGULATIONS AND ENFORCEMENT

Regulations specific to game lands are in place to help manage natural resources. They are developed by NCWRC staff members, state legislatures, county officials, and the general public. Wildlife Enforcement Officers (WEO's) are responsible for enforcing the all statutes and regulations that pertain to the Game Land Program. Each game land has unique needs for special regulations that are in place to help manage the resources. There is also a permit system in place to allow game land managers the ability to permit the use of local or specialized resources within the existing framework of statutes and regulations. The Lands and Use Committee developed a set of guidelines to assist field staff in permitting the use of or the harvesting of resources from game lands.

Enforcement issues and specific regulations pertaining to the UTGLC include investigating, patrolling, and checking hunters and fisherman for game and fish law compliance (equipment, bag and creel limits, licenses), managing the illegal removal of wildlife and forest products, illegal off-road vehicle use and equestrian activity, littering, vandalism, and other unauthorized activities. Regulations have been developed to prohibit the removal of certain wildlife and plant species for commercial resale. Amphibians, reptiles, and rare or sensitive plants are vulnerable to collectors and can be over harvested if not regulated. One unique challenge in the past on these particular game lands has been illegal gold mining/panning in area streams. Severe disturbance of stream banks and stream beds from digging material to pan or run through crudely constructed sluice boxes is extremely damaging to sensitive aquatic ecosystems and riparian habitats. The use of ATV's and horseback riding on these game lands is currently prohibited. Reducing and discouraging the amount of illegal ATV and equestrian activity helps protect game land roads, forests, fields, and soil and water quality. WEO's play an important role in informing and educating game land users of specific game land laws and regulations and enforcing them.

With the expected rise in non-consumptive game land users, an increased enforcement presence will be necessary on the UTGLC. A shift in focus away from primarily hunting and fishing regulation enforcement will be required to monitor the activities of diverse user groups, ensure the safety of all persons, and help reduce the likelihood of conflicts between traditional and non-traditional users .

PARTNERSHIPS/COLLABORATION/VOLUNTEER OPPORTUNITIES

See 'Regional Conservation Partnerships' section.

Past and current partnerships are expected to remain strong and viable. Future collaborations will hopefully grow to include projects of larger regional impact on habitat management, conservation, restoration, connectivity, and enhancement. Land acquisition opportunities will be pursued actively and all measures will focus on the protection and preservation of the resource while providing accessibility and opportunity for the greatest diversity of uses by the public when they are compatible with game land primary objectives. Volunteer opportunities will continue to be offered to individuals or organized groups as requested, and strategies to achieve needed and desired game land management goals for habitat and infrastructure improvements, research study, and education will be implemented and coordinated by NCWRC staff.

PUBLIC INPUT

A major component of this plan is the public input gathered, reviewed, and addressed for biological, recreational, infrastructure, and management related aspects of these game lands. The Upper Tar Game Land Management Plan Public Input Meeting was held April 10th, 2014 at the Chief W.R. Richardson Tribal Government Complex, Haliwa-Saponi Tribe, in Hollister, NC. An overview of game land information and management activities was presented, questions were answered, and comments were taken. Twenty-seven people were in attendance, 15 citizens and 12 Commission staff. Online comments were taken through a questionnaire survey at www.ncwildlife.org and specific (non-survey) comments were taken at gamelandplan@ncwildlife.org.

The Development Team later reviewed all questions and comments, and all comments that pertained to the NCWRC mission and objectives were considered. Individual and collective comments are addressed throughout this plan. The overwhelming majority of comments were about lack of access (or current satisfactory access), road improvements, deer dog vs. still hunting preferences, and banning the use of high capacity magazine rifles. Another frequent comment also addressed in this plan involved six-day-per-week hunting and the possible designation of specific days for specific types of hunting. Otherwise comments referenced small game, big game, upland game, non-game, and waterfowl habitat, rare plant and animal species, wildlife viewing and bird watching opportunities, the lack of fields and agricultural plantings, and riparian, wetland, and upland habitats. (See the following exhibits for all public comments.)

Exhibit 1: Public Input Meeting Notes
Exhibit 2: Game Land Management Plan Comment Questions
Exhibit 3: On-line Comment Responses
Exhibit 4: Comment Cards Transcribed
Exhibit 5: Comment Letters

Rocky Swamp, Brinkleyville Game Land, Halifax, Co.

REFERENCES CITED

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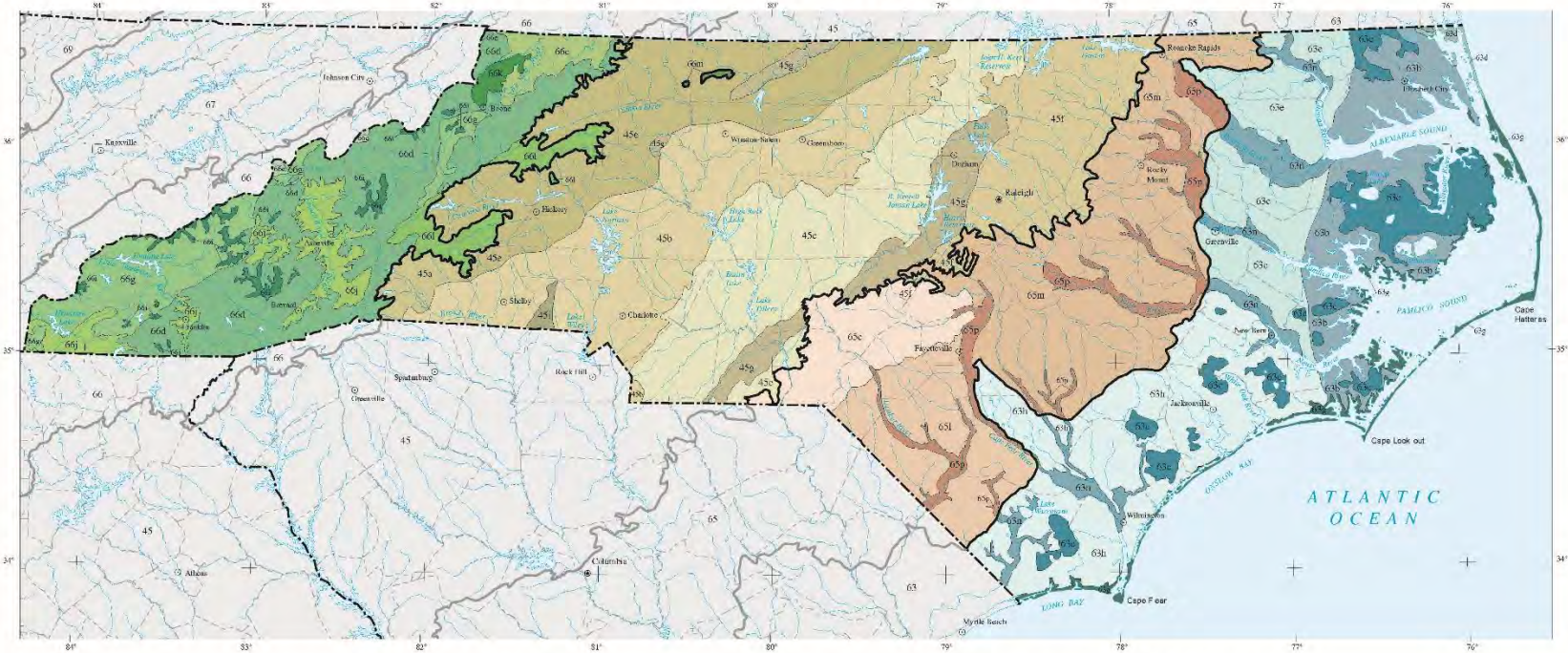
APPENDICES

Legal Documents: Deeds, plat maps, and easements are not included.

(See Page 5 & 6 for Appendix Listing.)

Appendix I: Ecoregions of NC Map

Ecoregions of North Carolina



45 Piedmont
- 45a Southern Inner Piedmont
- 45b Southern Outer Piedmont
- 45c Carolina Slate Belt
- 45e Northern Inner Piedmont
- 45f Northern Outer Piedmont
- 45g Triassic Basins
- 45i Kings Mountain

63 Middle Atlantic Coastal Plain
- 63b Chesapeake-Pamlico Lowlands and Tidal Marshes
- 63c Nonriverine Swamps and Peatlands
- 63d Virginian Barrier Islands and Coastal Marshes
- 63e Mid-Atlantic Flatwoods
- 63g Carolinian Barrier Islands and Coastal Marshes
- 63h Carolina Flatwoods
- 63n Mid-Atlantic Floodplains and Low Terraces

65 Southeastern Plains
- 65c Sand Hills
- 65l Atlantic Southern Loam Plains
- 65m Rolling Coastal Plain
- 65p Southeastern Floodplains and Low Terraces

66 Blue Ridge
- 66c New River Plateau
- 66d Southern Crystalline Ridges and Mountains
- 66e Southern Sedimentary Ridges
- 66g Southern Metasedimentary Mountains
- 66i High Mountains
- 66j Broad Basins
- 66k Amphibolite Mountains
- 66l Eastern Blue Ridge Foothills
- 66m Sauratown Mountains

Level III ecoregion — County boundary
Level IV ecoregion — State boundary

SCALE 1:1 500 000

15 10 5 0 30 60 mi

30 20 10 0 60 120 km

Albers Equal Area Projection

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COLLABORATORS AND CONTRIBUTORS: James E. Harrison (USEPA), David L. Penrose (NCDENR), Roy L.Vick, Jr. (NRCS), Gerard McMahon (USGS), Robert Peet (UNC), Chip Stralis (NRCS) and Tom Loveland (USGS).

CITING THIS MAP: Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., and MacPherson, T.F., 2002, Ecoregions of North Carolina, U.S. Environmental Protection Agency, Corvallis, OR, (map scale 1:1,500,000).

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregions are directly applicable to many state agency activities, including the selection of regional stream reference sites, the development of biological criteria and water quality standards, and the establishment of management goals for nonpoint-source pollution. They are also relevant to integrated ecosystem management, an ultimate goal of many federal and state resource management agencies.

The approach used to compile this map of North Carolina is based on the premise that ecological regions are hierarchical and can be identified through the analysis of the spatial patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Wiken 1986; Omernik 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I and Level II divide the North American continent into 15 and 52 regions, respectively (Commission for Environmental Cooperation Working Group 1997). At Level III, the continental United States contains 104 regions (United States Environmental Protection Agency [U.S. EPA] 2000). Level IV is a further subdivision of the Level III ecoregions. Explanations of the methods used to define the U.S. EPA's ecoregions are given in Omernik (1995), Omernik and others (2000), Griffith and others (1994, 1997), and Gallant and others (1989).

The Level III and IV ecoregions were compiled at a scale of 1:250,000 and depict revisions and subdivisions of earlier level III ecoregions that were originally compiled at a smaller scale (U.S. EPA 2000; Omernik 1987). Compilation of this map is part of a collaborative project primarily between the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), the U.S. EPA National Health and Environmental Effects Research Laboratory (NHEERL), U.S. EPA Region IV, and the North Carolina Department of Environment and Natural Resources. This project is also associated with an interagency effort to develop a common framework of ecological regions (McMahon and others 2001). Regional collaborative projects, such as this one in North Carolina where some agreement can be reached among multiple resource management agencies, are a step in the direction of attaining commonality and consistency in ecoregion frameworks for the entire nation.

Comments regarding the Level III and IV Ecoregions of North Carolina map should be addressed to Glenn Griffith, USDA-NRCS, 200 SW 35th Street, Corvallis, OR 97333, (541) 754-4465, FAX: (541) 754-4716, email: griffith.glenn@epa.gov, or to James Omernik, USGS, 200 SW 35th Street, Corvallis, OR 97333, (541) 754-4458, email: omernik.james@epa.gov.

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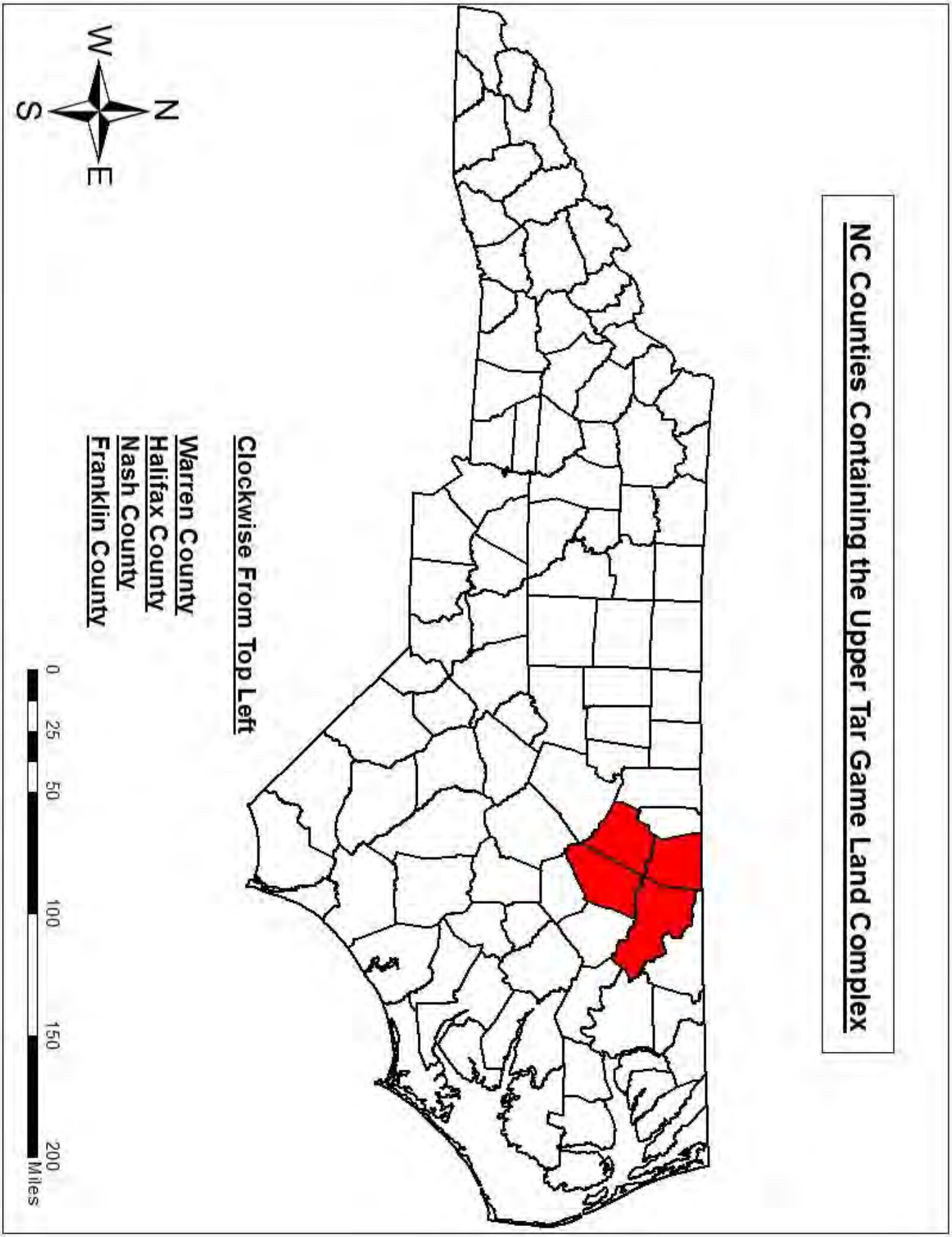
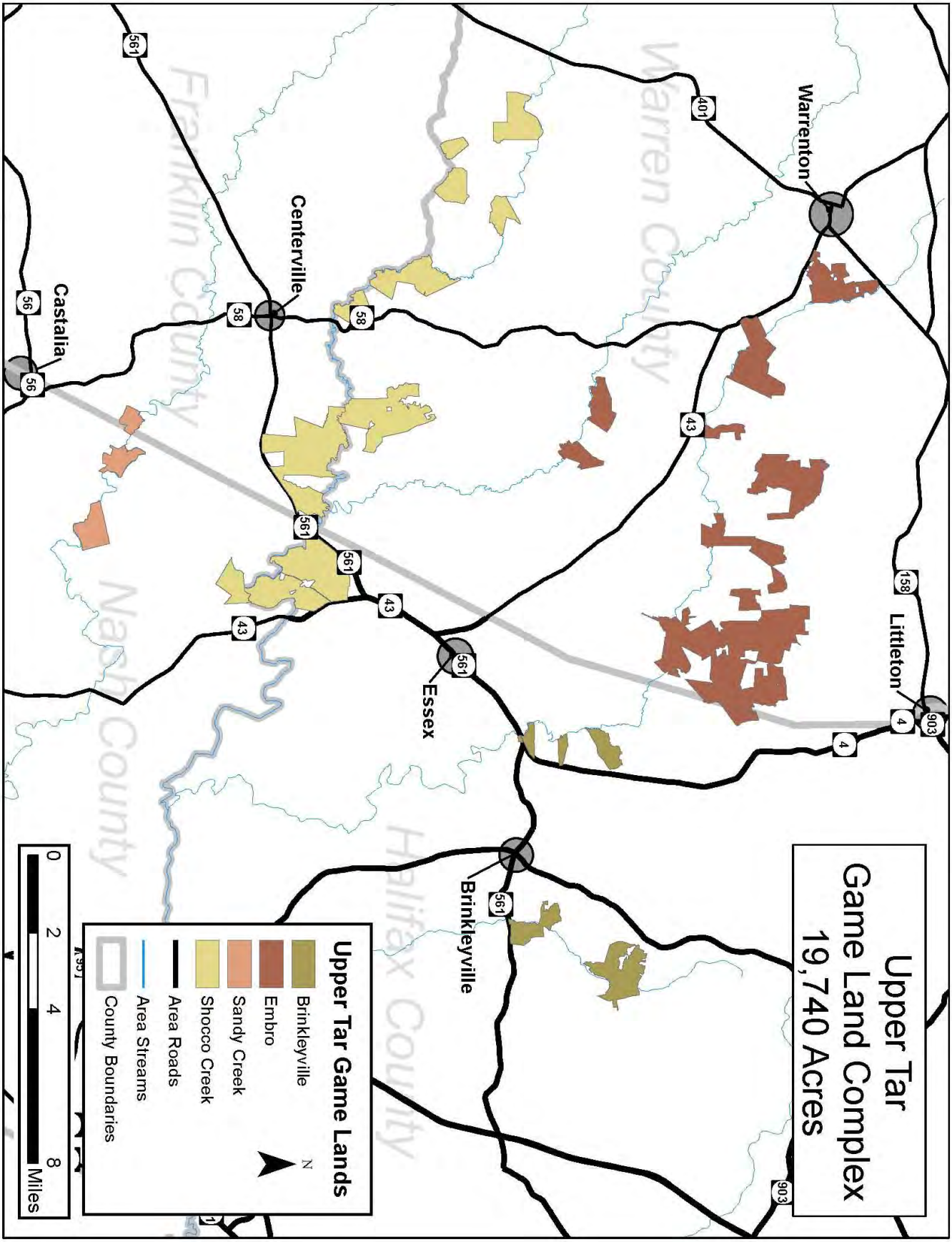
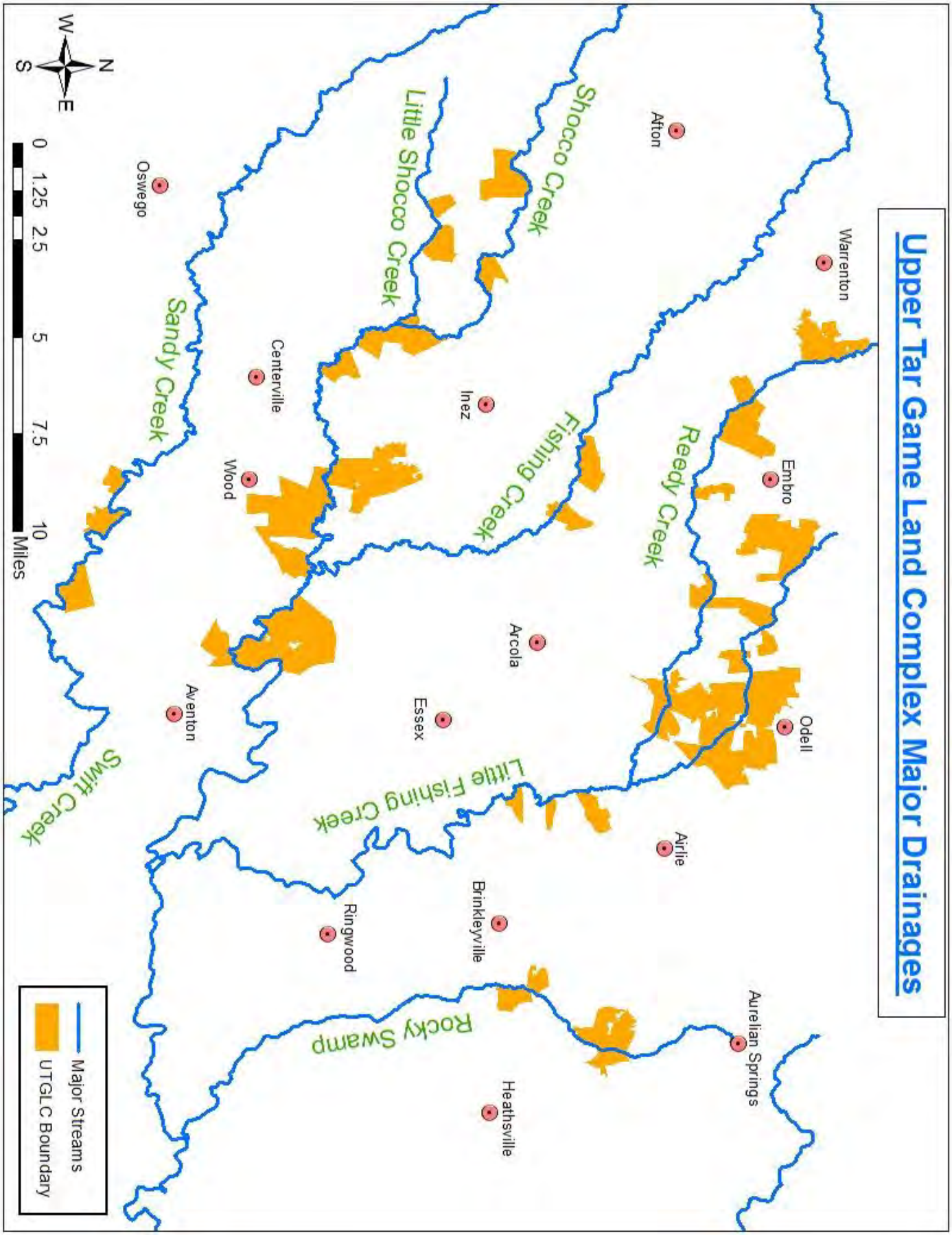
Appendix II: County Location Map (UTGLC Counties)



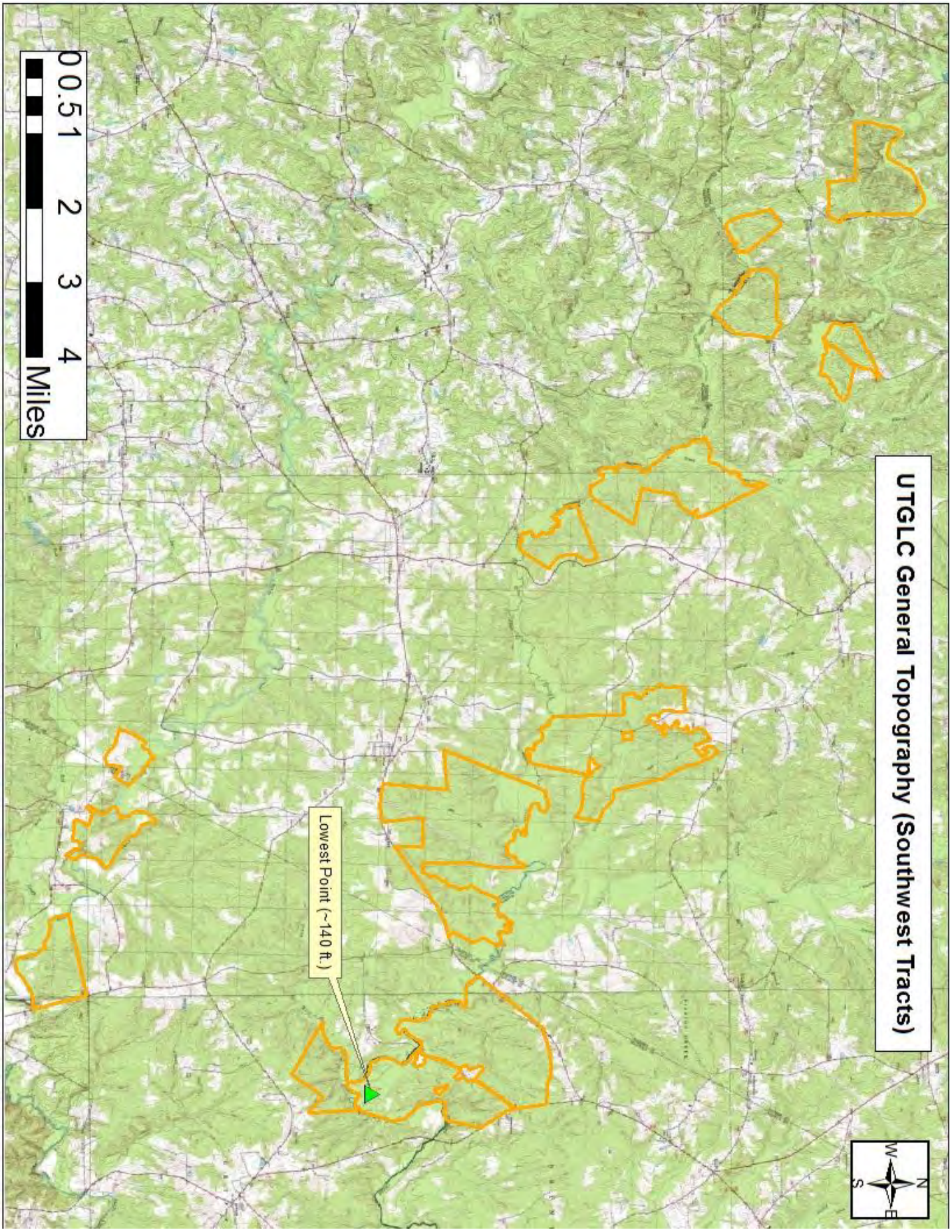
Appendix III: Game Lands Vicinity Map



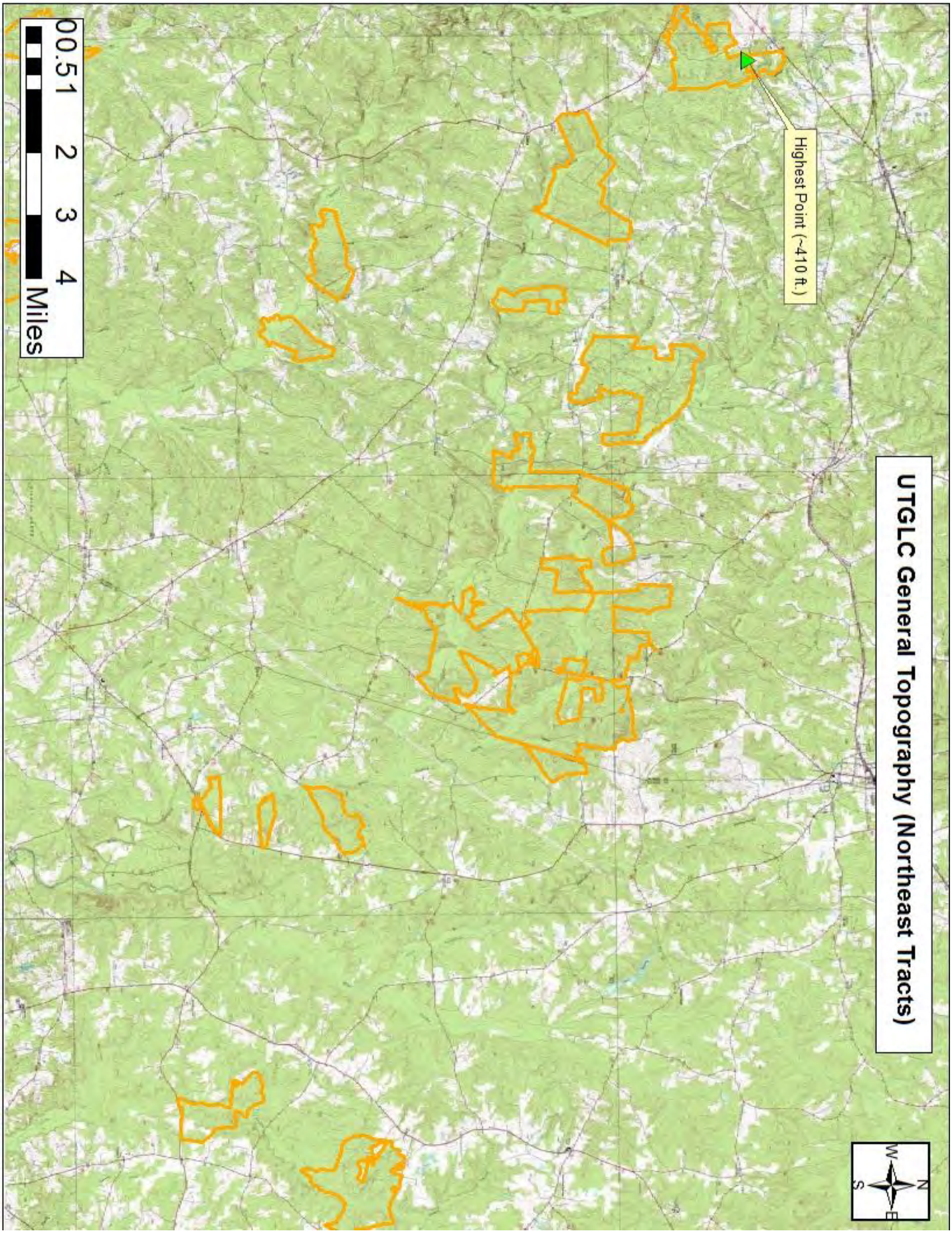
Appendix IV: Hydrology Map



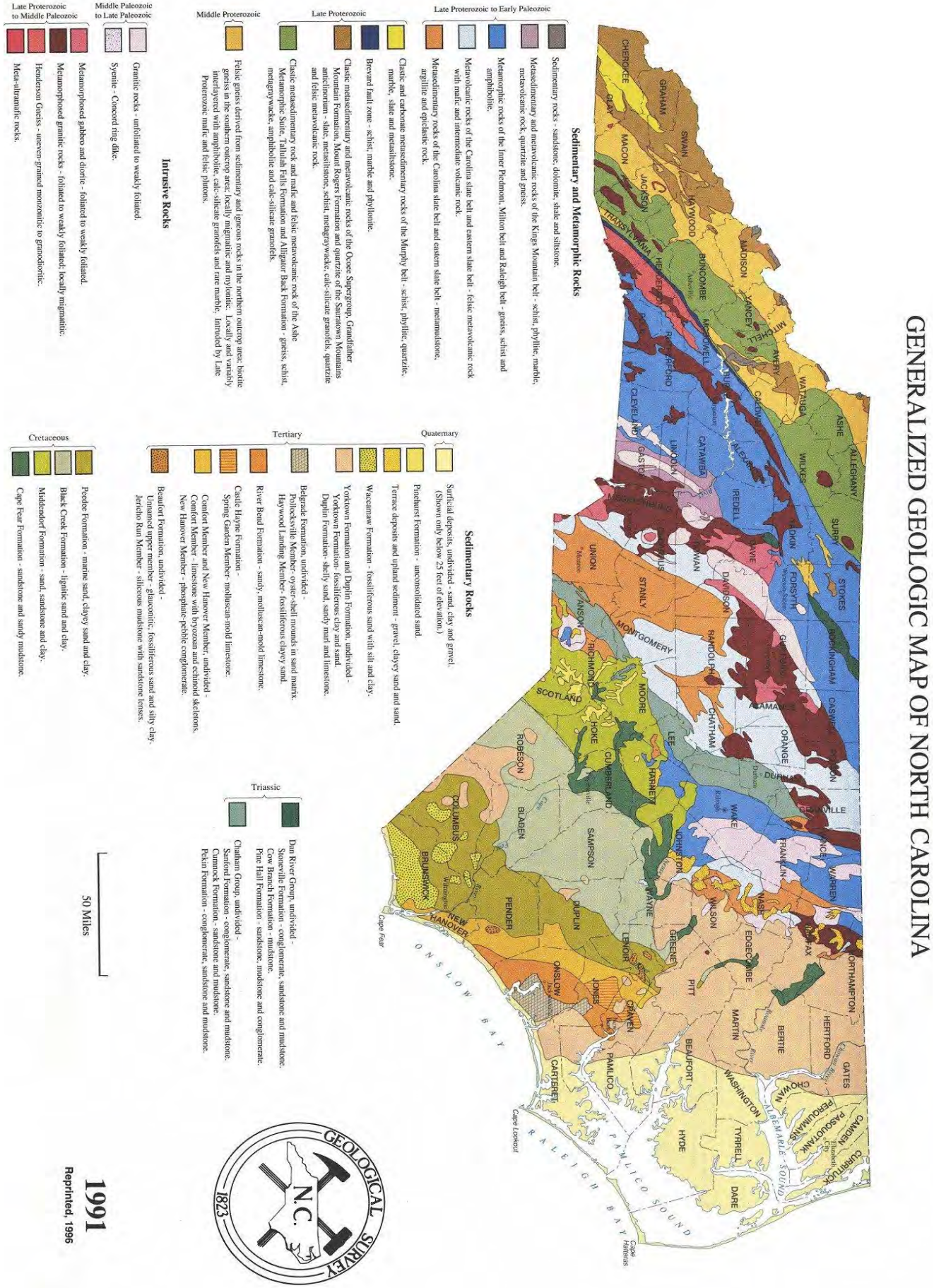
Appendix V: Topography Map (SW)



Appendix V: Topography Map (NE)



Appendix VI: Geologic Map



Listed Species on Upper Tar Game Land Complex

Element occurrences, known from Game Land property, or in the nearby vicinity of Game Lands from NCNHP database for Franklin, Halifax, Nash, and Warren Counties. Potential species occurrences, not documented as above, from NCWRC Aquatic Diversity data (personal communication) and those not known immediately adjacent to Game Lands, are in blue.

Freshwater Bivalve:
Dwarf Wedgemussel (*Alasmidonta heterdon*)
Triangle Floater (*Alasmidonta undulata*)
Atlantic Pigtoe (*Fusconaia masoni*)
Yellow Lance (*Elliptio lanceolata*)
Creeper (*Strophitus undulatus*)
Notched Rainbow (*Villosa constricta*)
Tar River Spinymussel (*Elliptio steinstansana*)
Chameleon Lampmussel (*Lampsilis sp. 2*)
Roanoke Slabshell (*Elliptio roanokensis*)
Eastern Lampmussel (*Lampsilis radiata*)
Yellow Lampmussel (*Lampsilis cariosa*)
Green Floater (*Lasmigona subviridis*)

Crustacean:
North Carolina Spiny Crayfish (*Orconectes carolinensis*)

Freshwater Fish:
Roanoke Bass (*Ambloplites cavifrons*)
Carolina Madtom (*Noturus furiosus*)
Least Brook Lamprey (*Lampetra aepyptera*)
Mimic Shiner (*Notropis volucellus*)
Pinewoods Shiner (*Lythrurus matutinus*)

Amphibian:
Neuse River Waterdog (*Necturus lewisi*)
Four-toed Salamander (*Hemidactylium scutatum*)

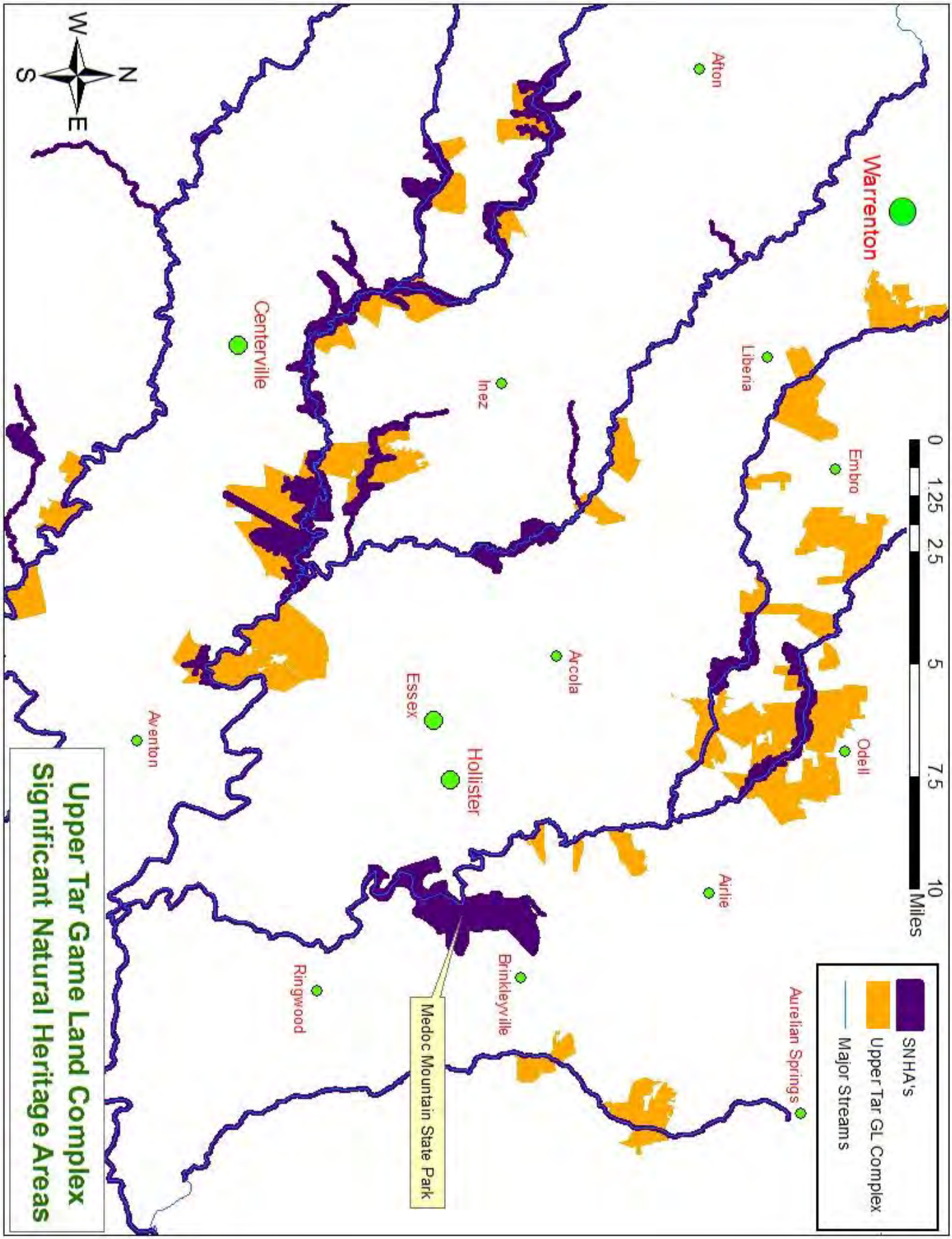
Butterfly:
Reversed Roadside Skipper (*Amblyscirtes reversa*)
Frosted Elfin (*Callophrys irus*)
Mottled Duskywing (*Erynnis martialis*)

Mayfly:
Uncertain/Improbable… *Baetisca becki* (Halifax & Nash Co.)

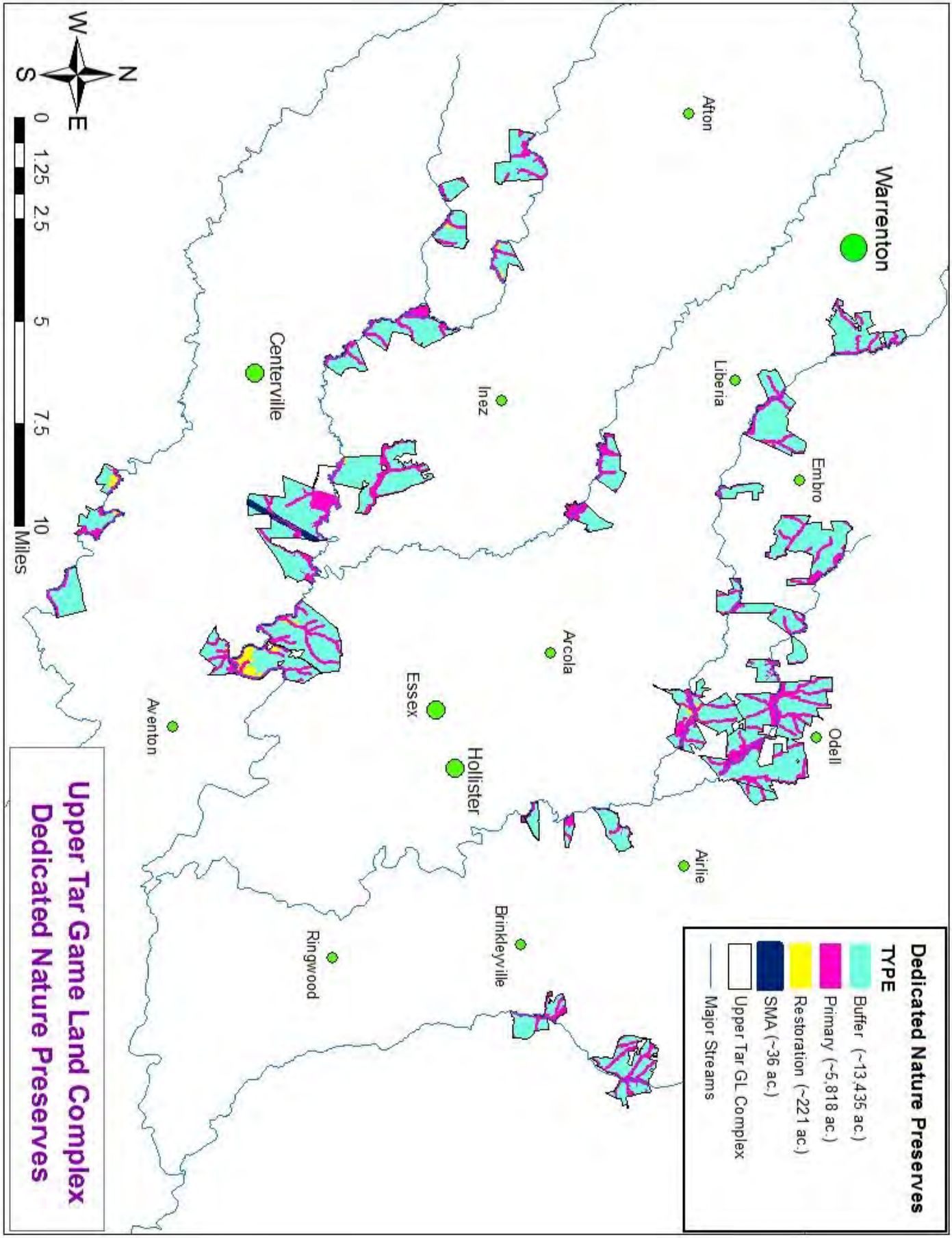
Vascular Plant:
Purple Fringless Orchid (*Platanathera permamoena*)
Tall Boneset (*Eupatorium saltuense*)
Cypress Knee Sedge (*Carex decomposita*)
Granite Flatsedge (*Cyperus granitophilus*)
Crested Coralroot (*Hexalectris spicata*)
Piedmont Quillwort (*Isoetes piedmontana*)
Small's Portulaca (*Portulaca smallii*)
Appalachian Golden-banner (*Thermopsis mollis*)
Water Purslane (*Didiplis diandra*)

Bird:
Red-cockaded Woodpecker (*Picoides borealis*) {last observed 1972}

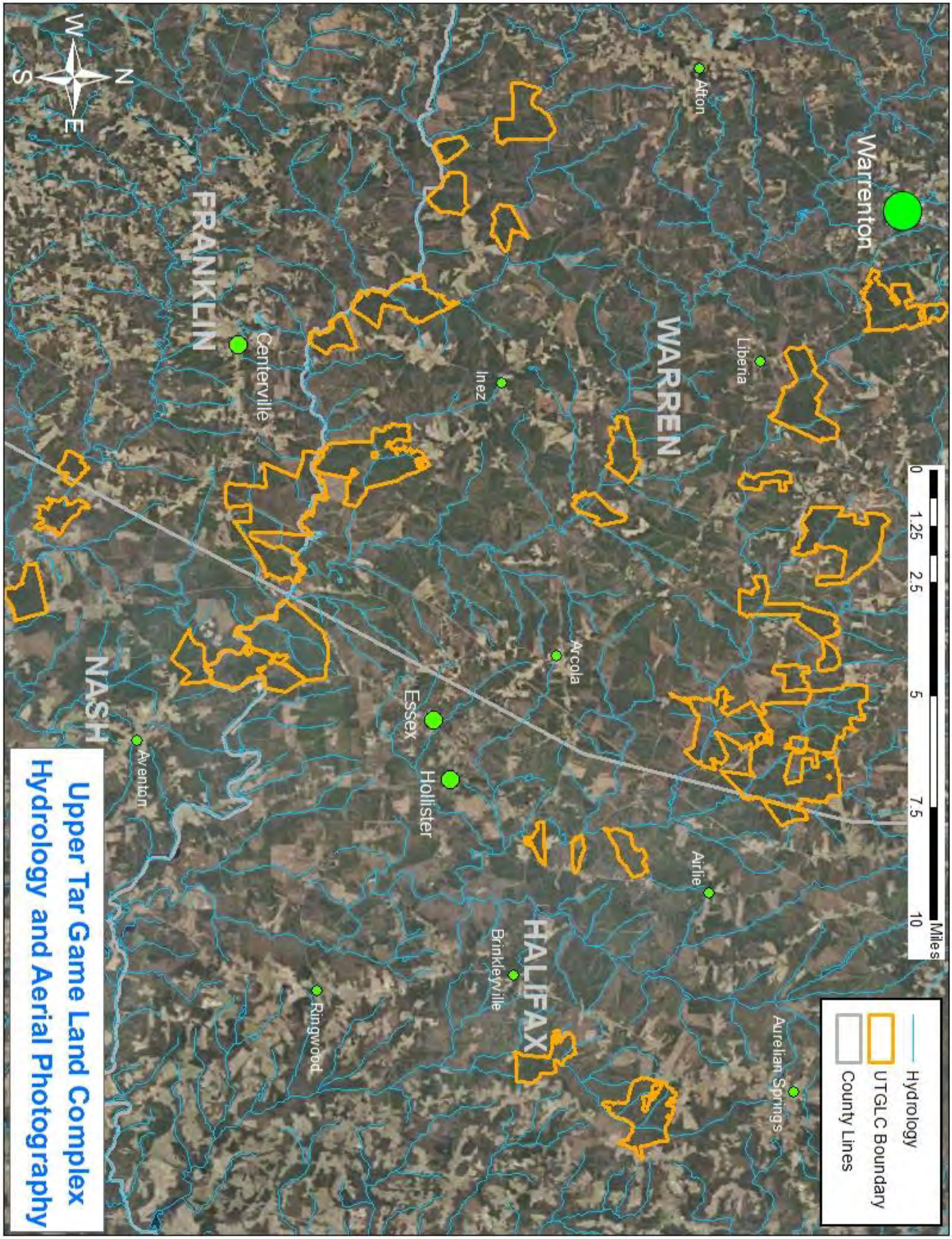
Appendix VIII: Significant Natural Heritage Areas Map



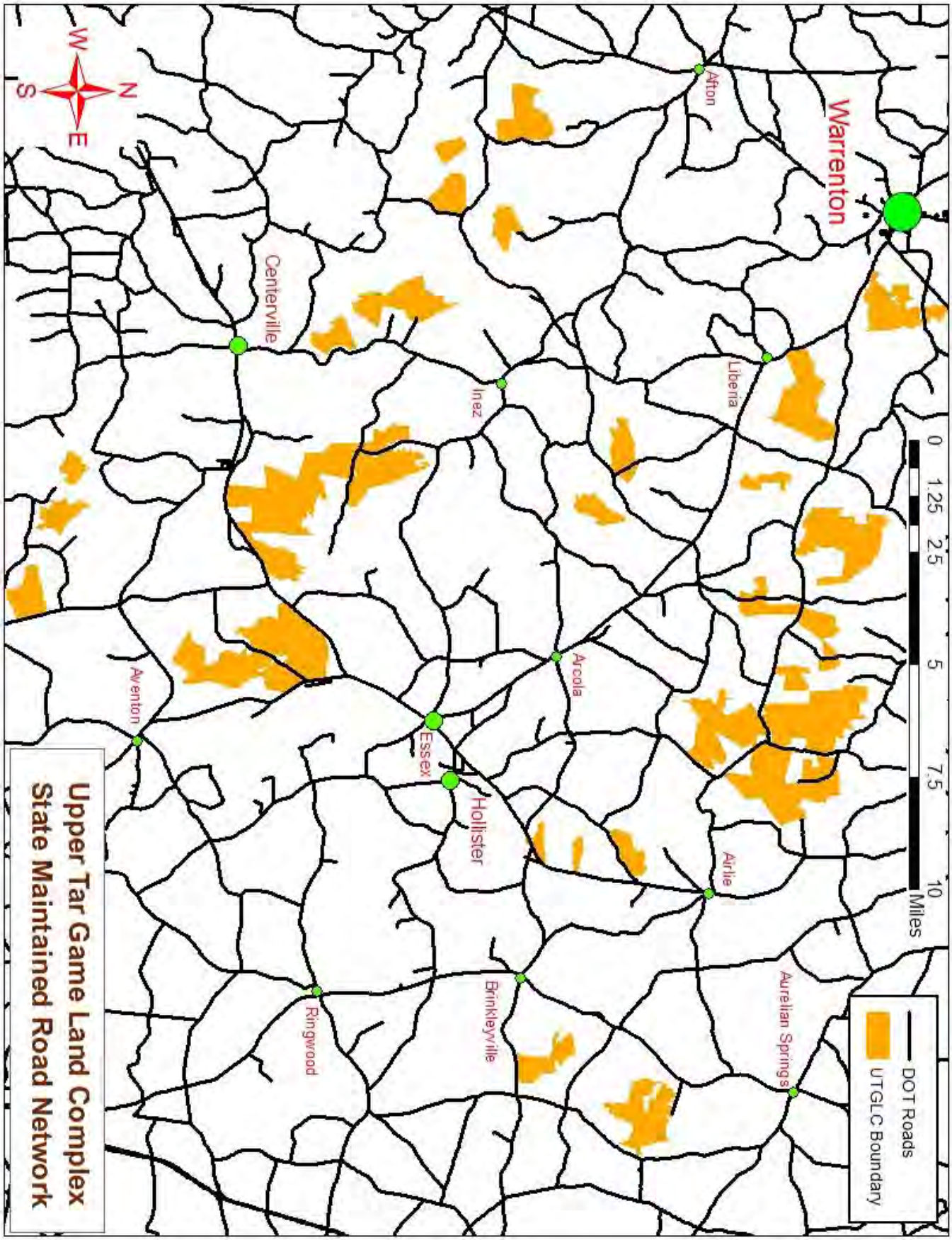
Appendix IX: Game Land Dedicated Nature Preserves



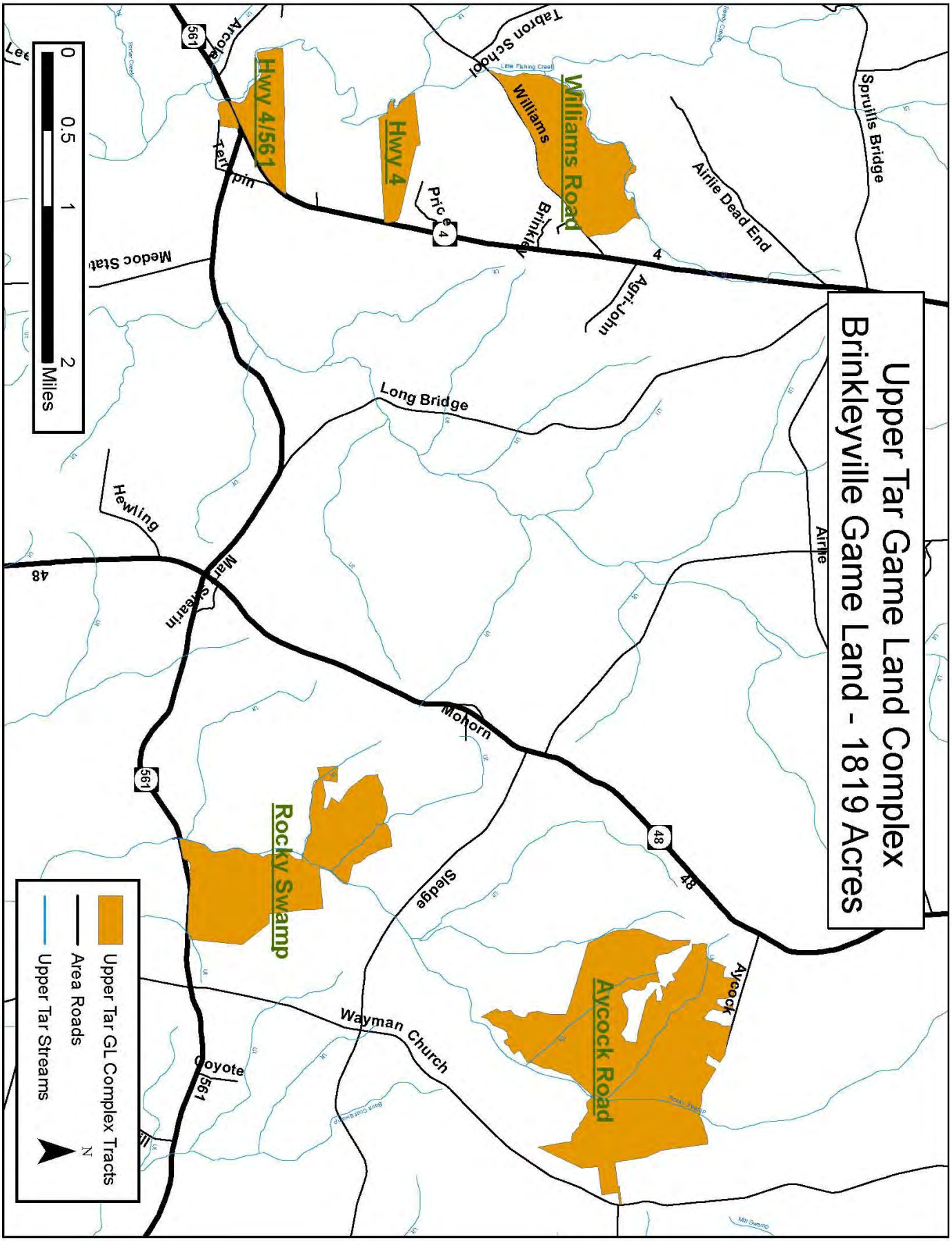
Appendix X: Game Lands Vicinity Aerial Photo



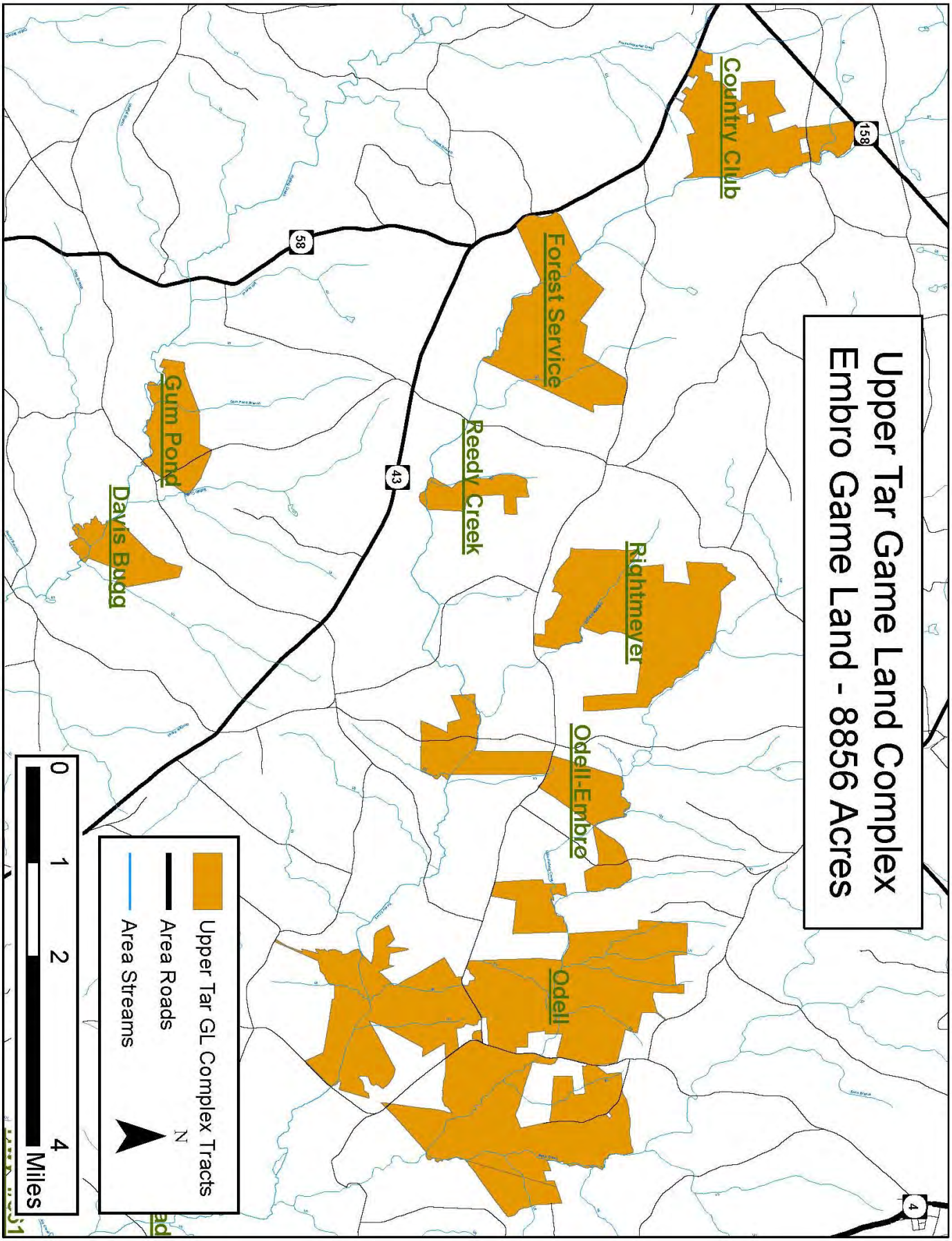
Appendix XI: State Maintained Road Network

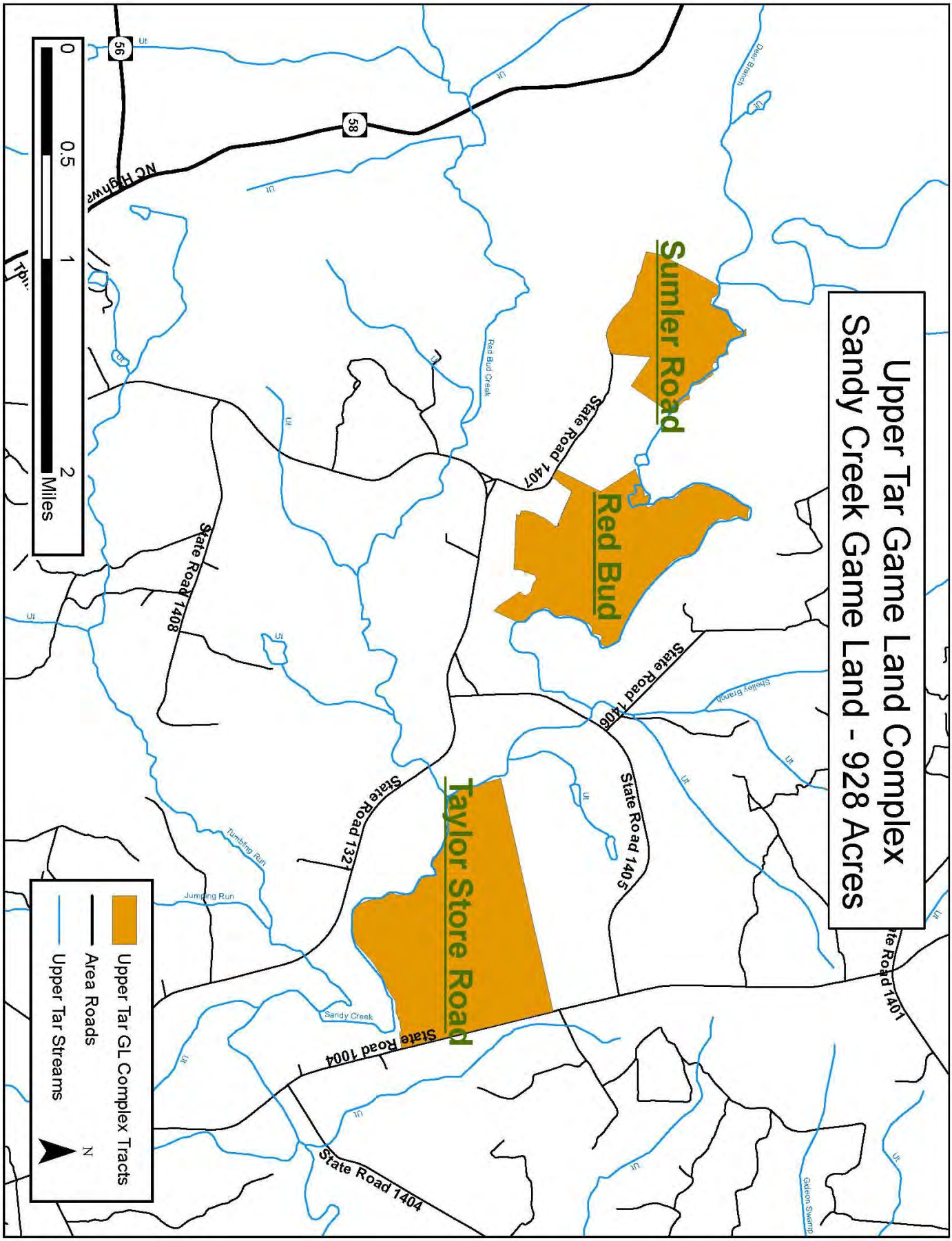


Appendix XII: Tract Distribution Maps by Game Land (Brinkleyville)

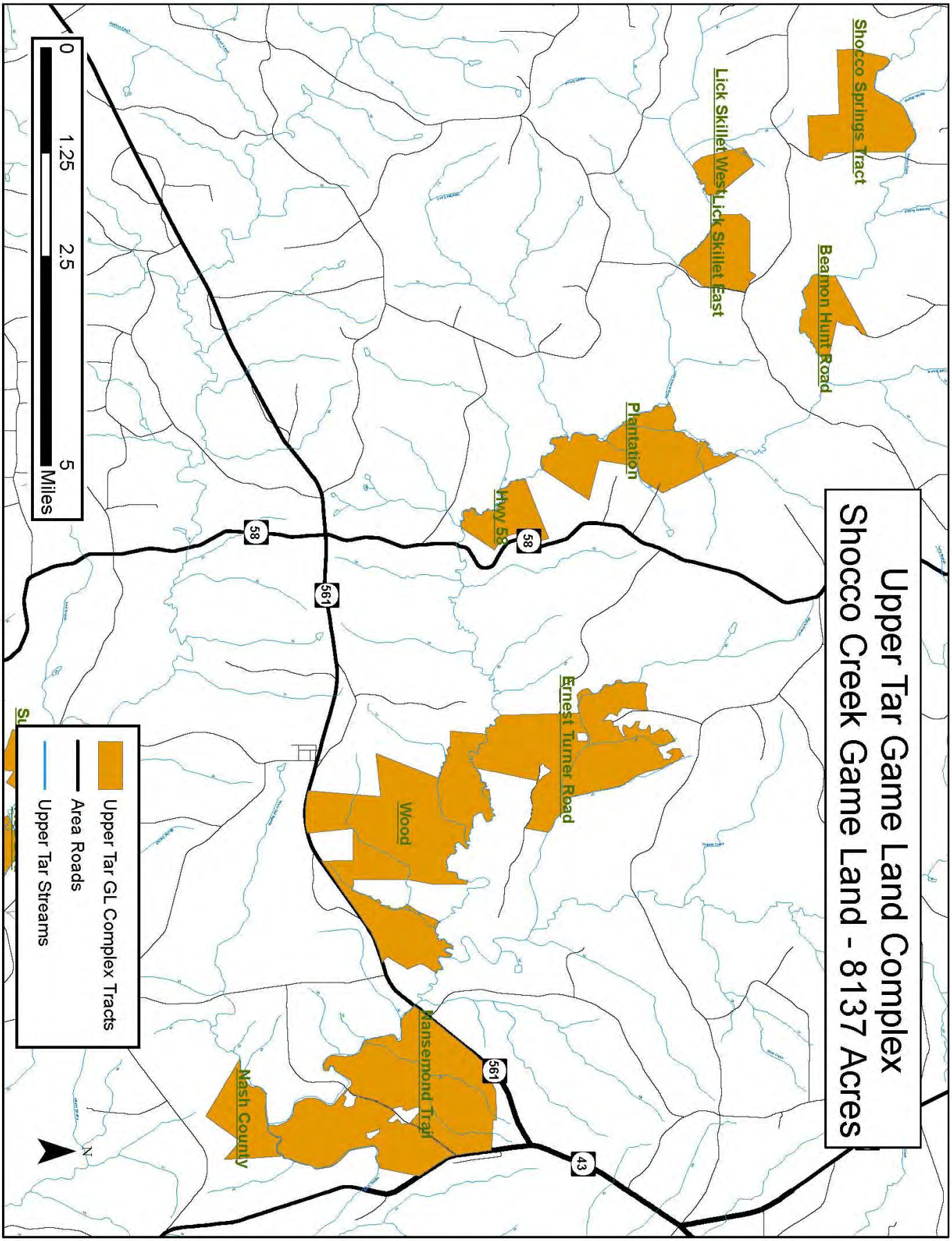


Appendix XII: Tract Distribution Maps by Game Land (Embro)

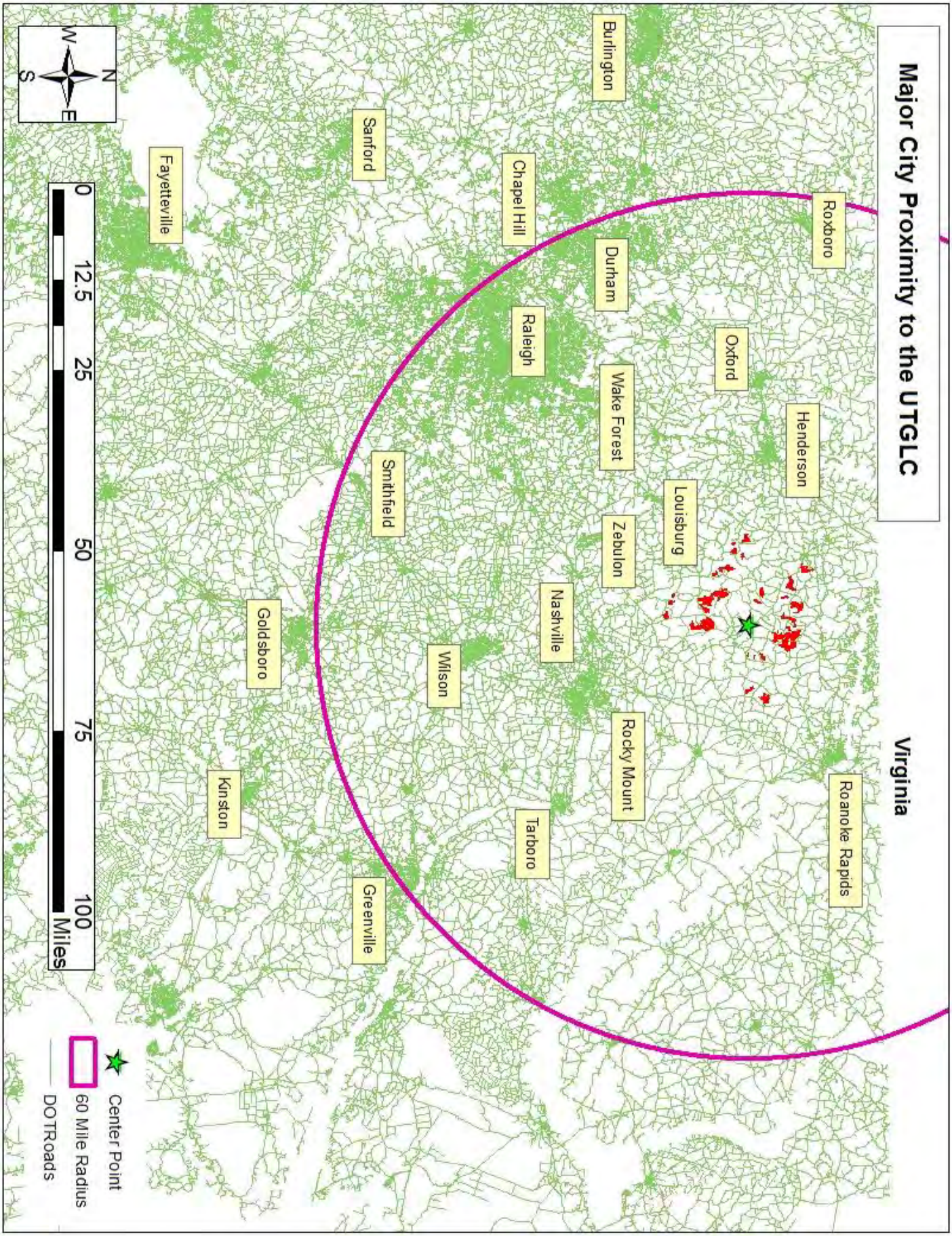



Upper Tar Game Land Complex
Sandy Creek Game Land - 928 Acres
Sumler Road
Red Bud
Taylor Store Road
State Road 1407
State Road 1406
State Road 1405
State Road 1408
State Road 1321
State Road 1004
State Road 1404
State Road 1401
NC Highway 58
56
58
Red Bud Creek
Deer Branch
Shelley Branch
Tumbling Run
Jumping Run
Sandy Creek
Goden Swamp
0
0.5
1
2
Miles
Upper Tar GL Complex Tracts
Area Roads
Upper Tar Streams
N

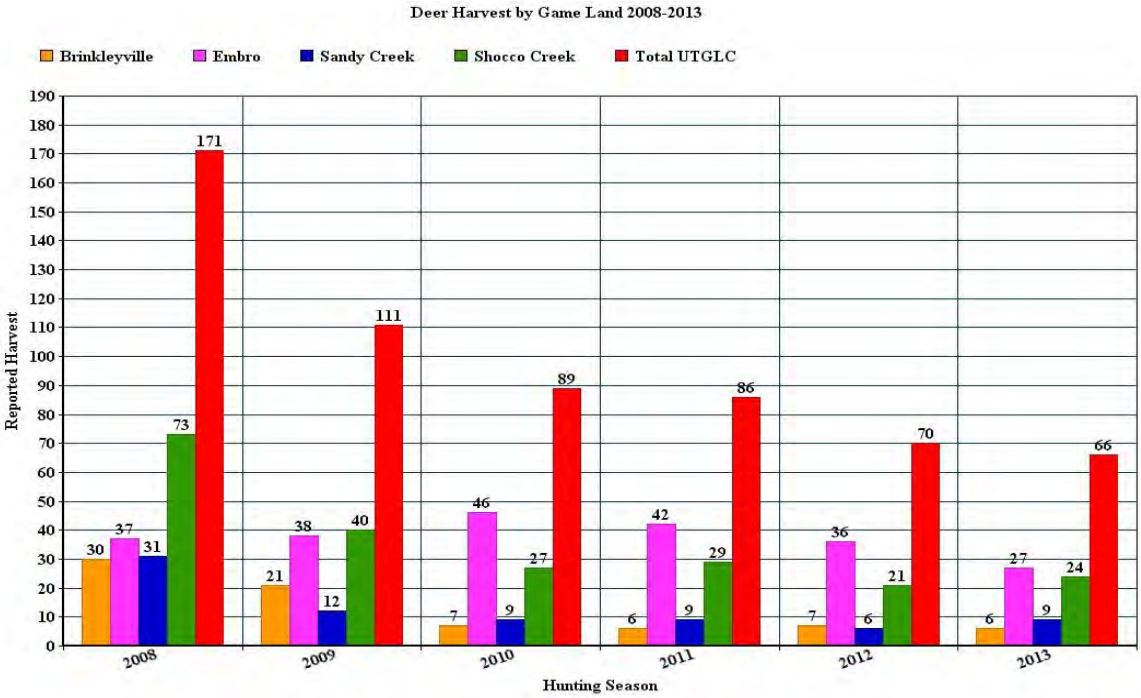
Appendix XII: Tract Distribution Maps by Game Land (Shocco Creek)

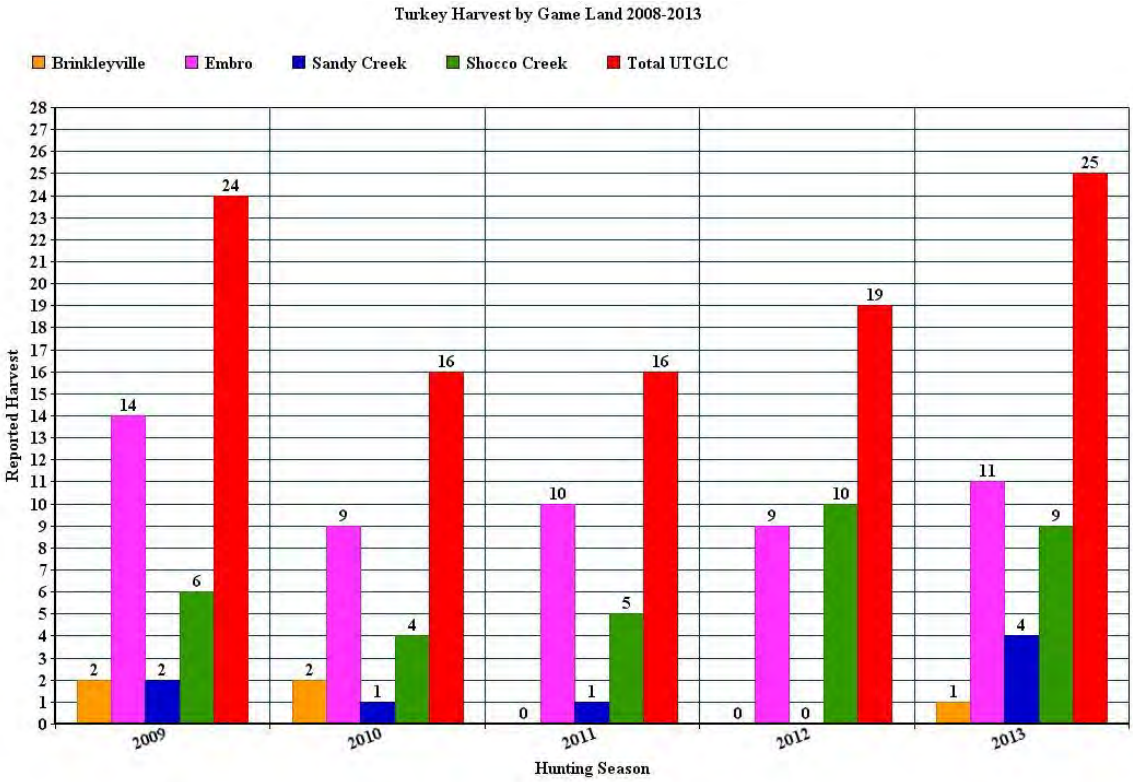


Appendix XIII: Major Cities Proximity Map



Appendix XIV: 5 Year Deer and Turkey Harvests





Priority species associated with piedmont dry coniferous woodlands:

Group	Scientific Name	Common Name	State Status (Federal Status)
Birds	*Accipiter cooperii*	Cooper's Hawk	SC
	Accipiter striatus	Sharp-shinned Hawk	SR
	Caprimulgus carolinensis	Chuck-will's-widow	
	Caprimulgus vociferus	Whip-poor-will	
	Colaptes auratus	Northern Flicker	
	Contopus virens	Eastern Wood-pewee	
	Falco sparverius	American Kestrel	
	Melanerpes erythrocephalus	Red-headed Woodpecker	
	Picoides villosus	Hairy Woodpecker	
	Sitta pusilla	Brown-headed Nuthatch	
Mammals	*Lasiurus seminolus*	Seminole Bat	
Reptiles	*Crotalus horridus*	Timber Rattlesnake	SC
	Sistrurus miliarius	Pigmy Rattlesnake	SC
	Tantilla coronata	Southeastern Crowned Snake	

Priority species associated with piedmont mesic forest:

Group	Scientific Name	Common Name	State Status (Federal Status)
Birds	*Accipiter cooperii*	Cooper's Hawk	SC
	Accipiter striatus	Sharp-shinned Hawk	SR
	Coccyzus americanus	Yellow-billed Cuckoo	
	Colaptes auratus	Northern Flicker	
	Contopus virens	Eastern Wood-pewee	
	Helmitheros vermivorus	Worm-eating Warbler	
	Hylocichla mustelina	Wood Thrush	
	Melanerpes erythrocephalus	Red-headed Woodpecker	
	Oporornis formosus	Kentucky Warbler	
	Picoides villosus	Hairy Woodpecker	
	Wilsonia citrina	Hooded Warbler	
Mammals	*Lasionycteris noctivagans*	Silver-haired Bat	SR
	Mustela frenata	Long-tailed Weasel	
	Scalopus aquaticus	Eastern Mole	
Amphibians	*Ambystoma maculatum*	Spotted Salamander	
	Ambystoma opacum	Marbled Salamander	
	Ambystoma talpoideum	Mole Salamander	SC
	Hemidactylium scutatum	Four-toed Salamander	SC
	Hyla gratiosa	Barking Treefrog	
	Hyla versicolor	Northern Gray Treefrog	SR
	Plethodon glutinosus sensustricto	Northern Slimy Salamander	
Reptiles	*Clemmys guttata*	Spotted Turtle	
	Crotalus horridus	Timber Rattlesnake	SC
	Elaphe guttata	Corn Snake	
	Eumeces laticeps	Broadhead Skink	
	Lampropeltis calligaster rhombomaculata	Mole Kingsnake	
	Terrapene carolina	Eastern Box Turtle	
	Virginia valeriae valeriae	Eastern Smooth Earthsnake	

Priority species associated with piedmont floodplain forest:

Group	Scientific Name	Common Name	State Status (Federal Status)
Birds	*Caprimulgus vociferus*	Whip-poor-will	
	Coccyzus americanus	Yellow-billed Cuckoo	
	Colaptes auratus	Northern Flicker	
	Contopus virens	Eastern Wood-pewee	
	Haliaeetus leucocephalus	Bald Eagle	T (T)
	Helmitheros vermivorous	Worm-eating Warbler	
	Hylocichla mustelina	Wood Thrush	
	Limnothlypis swainsonii	Swainson's Warbler	
	Melanerpes erythrocephalus	Red-headed Woodpecker	
	Nyctanassa violacea	Yellow-crowned Night-heron	
	Oporornis formosus	Kentucky Warbler	
	Picoides villosus	Hairy Woodpecker	
	Scolopax minor	American Woodcock	
	Wilsonia citrina	Hooded Warbler	
Mammals	*Corynorhinus rafinesquii*	Rafinesque's Big-eared Bat	T
	Lasiurus seminolus	Seminole Bat	
	Myotis austroriparius	Southeastern Bat	SC
Amphibians	*Ambystoma maculatum*	Spotted Salamander	
	Ambystoma opacum	Marbled Salamander	
	Ambystoma talpoideum	Mole Salamander	SC
	Eurycea guttolineata	Three-lined Salamander	
	Hemidactylium scutatum	Four-toed Salamander	SC
	Hyla versicolor	Northern Gray Treefrog	SR
	Plethodon glutinosus sensustricto	Northern Slimy Salamander	
Reptiles	*Clemmys guttata*	Spotted Turtle	
	Clemmys muhlenbergii	Bog Turtle	T (T)
	Crotalus horridus	Timber Rattlesnake	SC
	Elaphe guttata	Corn Snake	
	Eumeces laticeps	Broad-headed Skink	
	Heterodon platirhinos	Eastern Hog-nosed Snake	
	Lampropeltis getula getula	Eastern Kingsnake	
	Terrapene carolina	Eastern Box Turtle	
	Thamnophis sauritus sauritus	Common Ribbonsnake	

Priority species associated with piedmont riverine aquatic habitat:

Group	Scientific Name	Common Name	State Status (Federal Status)
Amphibians	*Eurycea guttolineata*	Three-lined Salamander	
Reptiles	*Apalone spinifera aspera*	Gulf Coast Spiny Softshell	
	Farancia abacura abacura	Eastern Mudsnake	
	Kinosternon baurii	Striped Mud Turtle	
	Thamnophis sauritus sauritus	Common Ribbonsnake	

Priority species associated with piedmont oak forests and mixed hardwood/pine stands:

Group	Scientific Name	Common Name	State Status (Federal Status)
Birds[2]	*Accipiter cooperii*	Cooper's Hawk	SC
	Caprimulgus vociferus	Whip-poor-will	
	Coccyzus americanus	Yellow-billed Cuckoo	
	Colaptes auratus	Northern Flicker	
	Contopus virens	Eastern Wood-pewee	
	Helmitheros vermivorous	Worm-eating Warbler	
	Hylocichla mustelina	Wood Thrush	
	Melanerpes erythrocephalus	Red-headed Woodpecker	
	Picoides villosus	Hairy Woodpecker	
	Wilsonia citrina	Hooded Warbler	
Mammals	*Mustela frenata*	Long-tailed Weasel	
	Scalopus aquaticus	Eastern Mole	
Amphibians	*Ambystoma maculatum*	Spotted Salamander	
	Ambystoma opacum	Marbled Salamander	
	Hemidactylium scutatum	Four-toed Salamander	SC
	Hyla versicolor	Northern Gray Treefrog	SR
	Plethodon glutinosus sensustricto	Northern Slimy Salamander	
	Scaphiopus holbrookii	Eastern Spadefoot	
Reptiles	*Cemophora coccinea copei*	Northern Scarletsnake	
	Crotalus horridus	Timber Rattlesnake	SC
	Elaphe guttata	Corn Snake	
	Eumeces laticeps	Broad-headed Skink	
	Lampropeltis calligaster rhombomaculata	Mole Kingsnake	
	Lampropeltis triangulum elapsoides	Scarlet Kingsnake	
	Ophisaurus attenuatus longicaudus	Eastern Slender Glass Lizard	
	Sistrurus miliarius	Pigmy Rattlesnake	SC
	Terrapene carolina	Eastern Box Turtle	
	Virginia valeriae valeriae	Eastern Smooth Earthsnake	

Priority species associated with piedmont small wetland communities:

Group	Scientific Name	Common Name	State Status (Federal Status)
Birds	*Melanerpes erythrocephalus*	Red-headed Woodpecker	
	Nyctanassa violacea	Yellow-crowned Night-heron	
Amphibians	*Ambystoma maculatum*	Spotted Salamander	
	Ambystoma opacum	Marbled Salamander	
	Ambystoma talpoideum	Mole Salamander	SC
	Ambystoma tigrinum	Eastern Tiger Salamander	T
	Eurycea guttolineata	Three-lined Salamander	
	Eurycea quadridigitata	Dwarf Salamander	SC
	Hemidactylium scutatum	Four-toed Salamander	SC
	Hyla gratiosa	Barking Treefrog	
	Hyla versicolor	Northern Gray Treefrog	SR
	Scaphiopus holbrookii	Eastern Spadefoot	
Reptiles	*Clemmys guttata*	Spotted Turtle	
	Thamnophis sauritus sauritus	Common Ribbonsnake	

Priority species associated with piedmont early successional habitats:

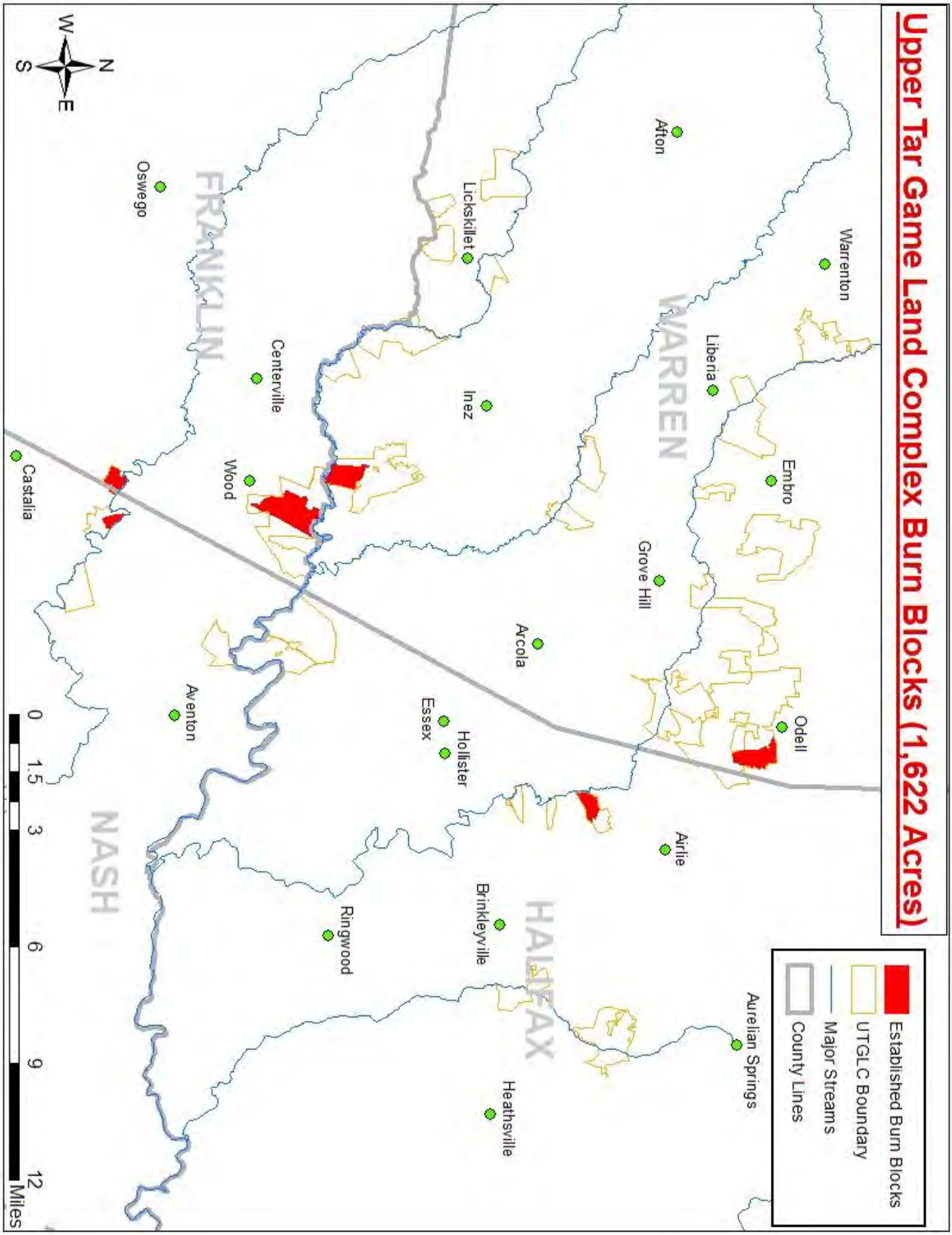
Group	Scientific Name	Common Name	State Status (Federal Status)
Birds	*Aimophila aestivalis*	Bachman's Sparrow	SC
	Ammodramus henslowii	Henslow's Sparrow	SR
	Ammodramus savannarum	Grasshopper Sparrow	
	Caprimulgus carolinensis	Chuck-will's-widow	
	Caprimulgus vociferus	Whip-poor-will	
	Chordeiles minor	Common Nighthawk	
	Colinus virginianus	Northern Bobwhite	
	Dendroica discolor	Prairie Warbler	
	Dolichonyx oryzivorus	Bobolink	
	Empidonax traillii	Willow Flycatcher	
	Falco sparverius	American Kestrel	
	Icterus spurius	Orchard Oriole	
	Lanius ludovicianus	Loggerhead Shrike	SC
	Scolopax minor	American Woodcock	
	Spiza americana	Dickcissel	
	Spizella pusilla	Field Sparrow	
	Sturnella magna	Eastern Meadowlark	
	Tyrannus tyrannus	Eastern Kingbird	
	Tyto alba	Barn Owl	
Mammals	*Cryptotis parva*	Least Shrew	
	Microtus pennsylvanicus	Meadow Vole	
	Mustela frenata	Long-tailed Weasel	
	Peromyscus polionotus	Old-field Mouse	SR
	Scalopus aquaticus	Eastern Mole	
	Zapus hudsonius	Meadow Jumping Mouse	
Reptiles	*Lampropeltis calligaster rhombomaculata*	Mole Kingsnake	
	Lampropeltis getula getula	Eastern Kingsnake	
	Ophisaurus attenuatus longicaudus	Eastern Slender Glass Lizard	
	Terrapene carolina	Eastern Box Turtle	

Appendix XVI: Aquatic Species of the Upper Tar

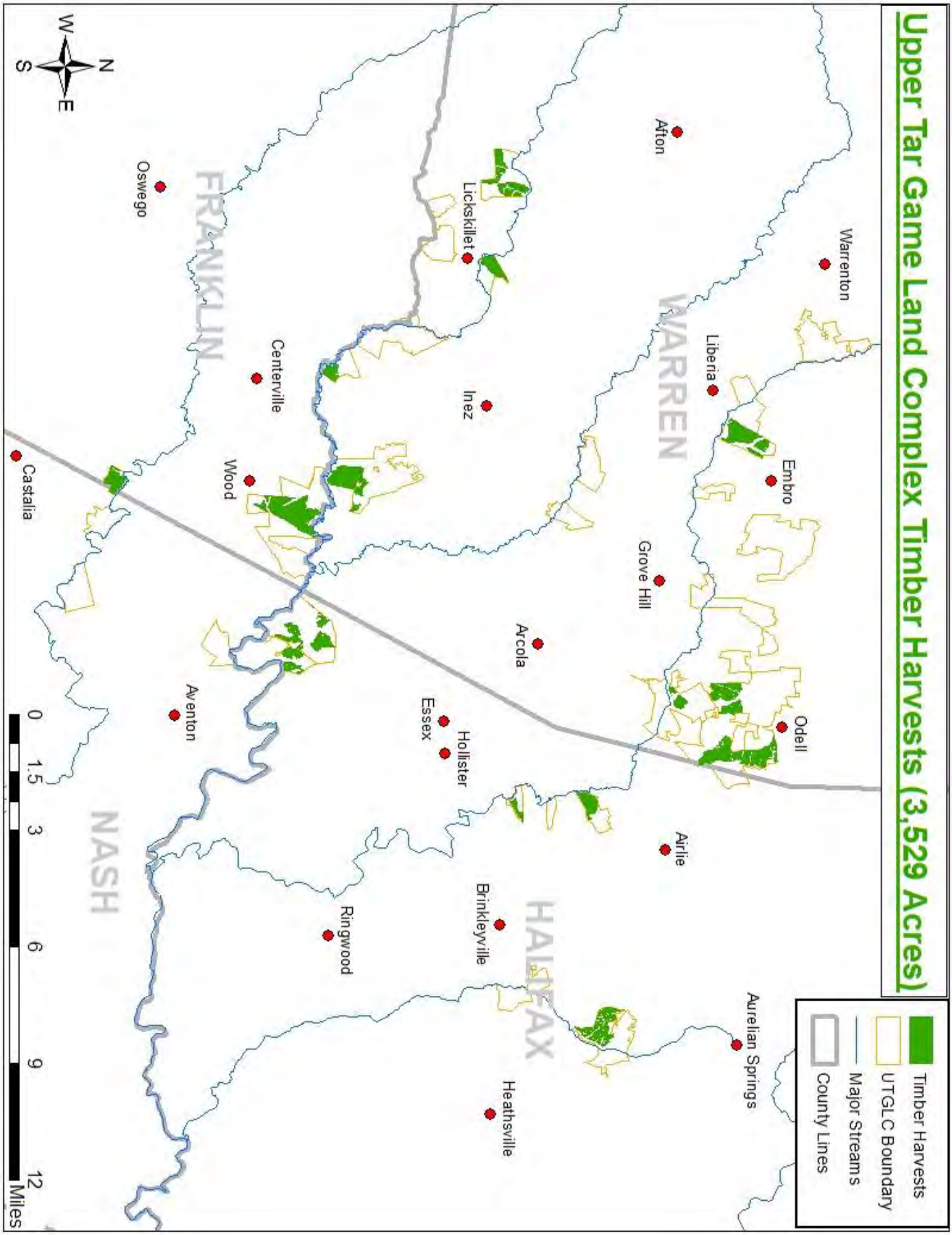
Taxa Group	Scientific Name	Common Name	State Status
CRAYFISH (6)	*Cambarus diogenes*	Devil Crawfish	
	Cambarus latimanus	Variable Crayfish	
	Cambarus sp. C	n/a	
	Fallicambarus fodiens	Digger Crayfish	
	Orconectes carolinensis	North Carolina Spiny Crayfish	**SC**
	Procambarus acutus	White River Crayfish	
FISH (51)	*Acantharchus pomotis*	Mud Sunfish	
	Ambloplites cavifrons	Roanoke Bass	**SC**
	Ameiurus natalis	Yellow Bullhead	
	Ameiurus nebulosus	Brown Bullhead	
	Ameiurus platycephalus	Flat Bullhead	
	*Amia calva**	Bowfin	
	Anguilla rostrata	American Eel	
	Aphredoderus sayanus	Pirate Perch	
	Catostomus commersonii	White Sucker	
	Centrarchus macropterus	Flier	
	Clinostomus funduloides	Rosyside Dace	
	Cyprinella analostana	Satinfin Shiner	
	*Cyprinus carpio **	Common Carp	
	Enneacanthus gloriosus	Bluespotted Sunfish	
	Erimyzon oblongus	Creek Chubsucker	
	Esox americanus	Redfin Pickerel	
	Esox niger	Chain Pickerel	
	Etheostoma flabellare	Fantail Darter	
	Etheostoma nigrum	Johnny Darter	
	Etheostoma vitreum	Glassy Darter	
	Gambusia holbrooki	Eastern Mosquitofish	
	Hybognathus regius	Eastern Silvery Minnow	
	Hypentelium nigricans	Northern Hogsucker	
	Lampetra aepyptera	Least Brook Lamprey	
	Lepisosteus osseus	Longnose Gar	
	Lepomis auritus	Redbreast Sunfish	
	Lepomis cyanellus	Green Sunfish	
	Lepomis gibbosus	Pumpkinseed	
	Lepomis gulosus	Warmouth	
	Lepomis macrochirus	Bluegill	
	Lepomis microlophus	Redear Sunfish	
	Luxilus albeolus	White Shiner	
	Lythrurus matutinus	Pinewoods Shiner	
	Micropterus salmoides	Largemouth Bass	
	Moxostoma collapsum	Notchlip Redhorse	
	Moxostoma macrolepidotum	Shorthead Redhorse	
	Moxostoma pappillosum	V-lip Redhorse	

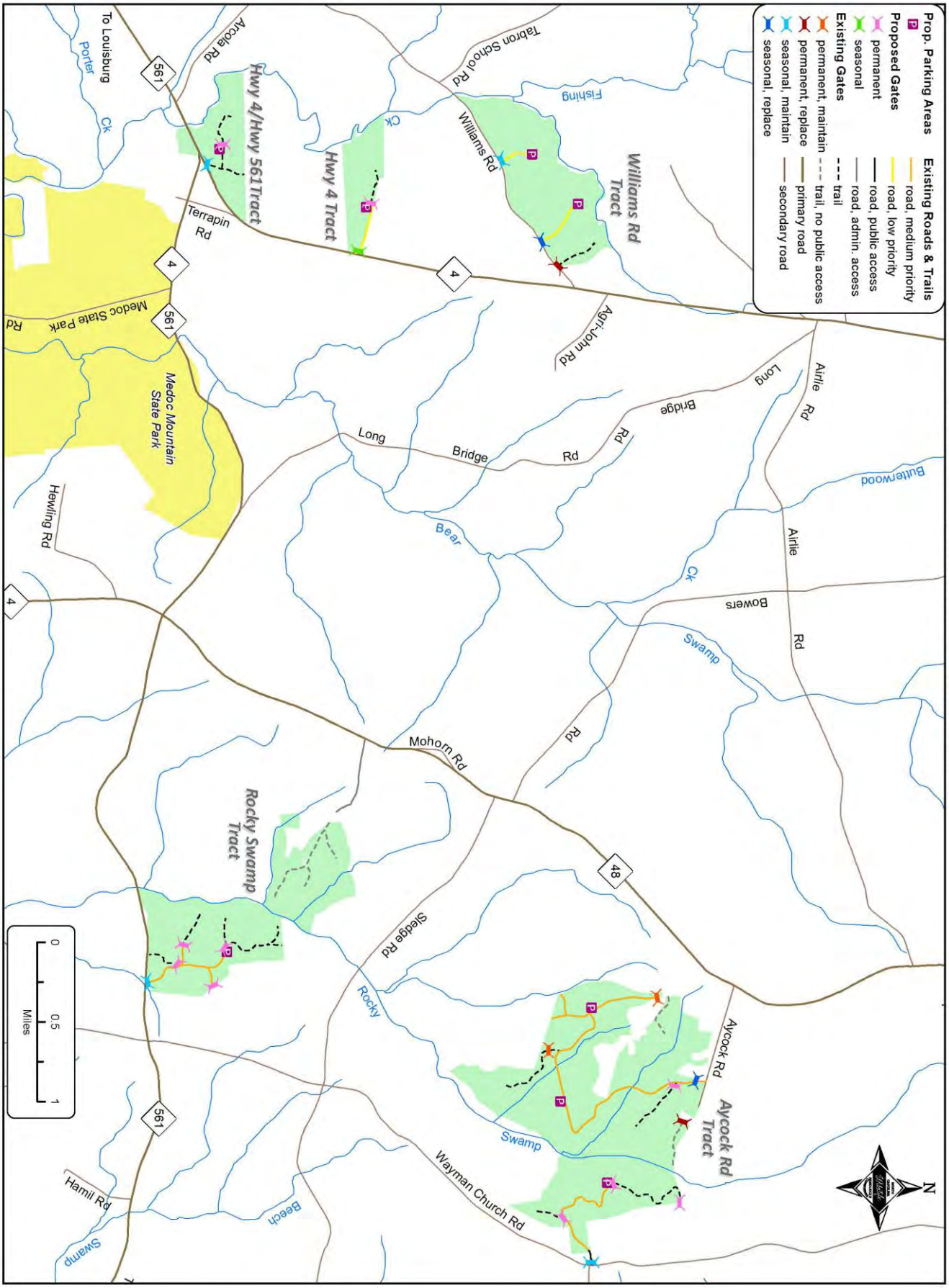
	Nocomis leptocephalus	Bluehead Chub	
	Nocomis raneyi	Bull Chub	
	Notemigonus crysoleucas	Golden Shiner	
	Notropis altipinnis	Highfin Shiner	
	Notropis amoenus	Comely Shiner	
	Notropis hudsonius	Spottail Shiner	
	Notropis procne	Swallowtail Shiner	
	Noturus furiosus	Carolina Madtom	T
	Noturus insignis	Margined Madtom	
	Percina nevisense	Chainback Darter	
	Percina roanoka	Roanoke Darter	
	Pomoxis nigromaculatus	Black Crappie	
	Scartomyzon cervinus	Black Jumprock	
	Semotilus atromaculatus	Creek Chub	
Mussels (16)	*Alasmidonta heterodon*	Dwarf Wedgemussel	E
	Alasmidonta undulata	Triangle Floater	T
	Elliptio complanata	Eastern Elliptio	
	Elliptio fisheriana	Northern Lance	
	Elliptio icterina	Variable Spike	
	Elliptio lanceolata	Yellow Lance	E
	Elliptio roanokensis	Roanoke Slabshell	T
	Elliptio steinstansana	Tar River Spinymussel	E
	Fusconaia masoni	Atlantic Pigtoe	E
	Lampsilis cariosa	Yellow Lampmussel	E
	Lampsilis radiata	Eastern Lampmussel	T
	Pyganodon cataracta	Eastern Floater	
	Strophitus undulatus	Creeper	T
	Uniomerus carolinianus	Florida Pondhorn	
	Utterbackia imbecillis	Paper Pondshell	
	Villosa constricta	Notched Rainbow	SC
Clam (3)	*Corbicula fluminea*	Asian Clam	
	Musculium securis	Pond Fingernailclam	
	Sphaerium striatinum	Striated Fingernailclam	
Snails (11)	*Amnicola granum*	Squat Duskysnail	
	Campeloma decisum	Pointed Campeloma	
	Elimia catenaria	Gravel Elimia	
	Elimia dislocata	Lapped Elimia	
	Elimia virginica	Piedmont Elimia	
	Gillia altilis	Buffalo Pebblesnail	
	Helisoma anceps	Two-ridged Rams-horn	
	Leptoxis carinata	Crested Mudalia	
	Lioplax subcarinata	Ridged Lioplax	
	Micromenetus dilatatus	Bugle Sprite	
	Physella sp.	n/a	

Appendix XVII: Established Burn Blocks Map

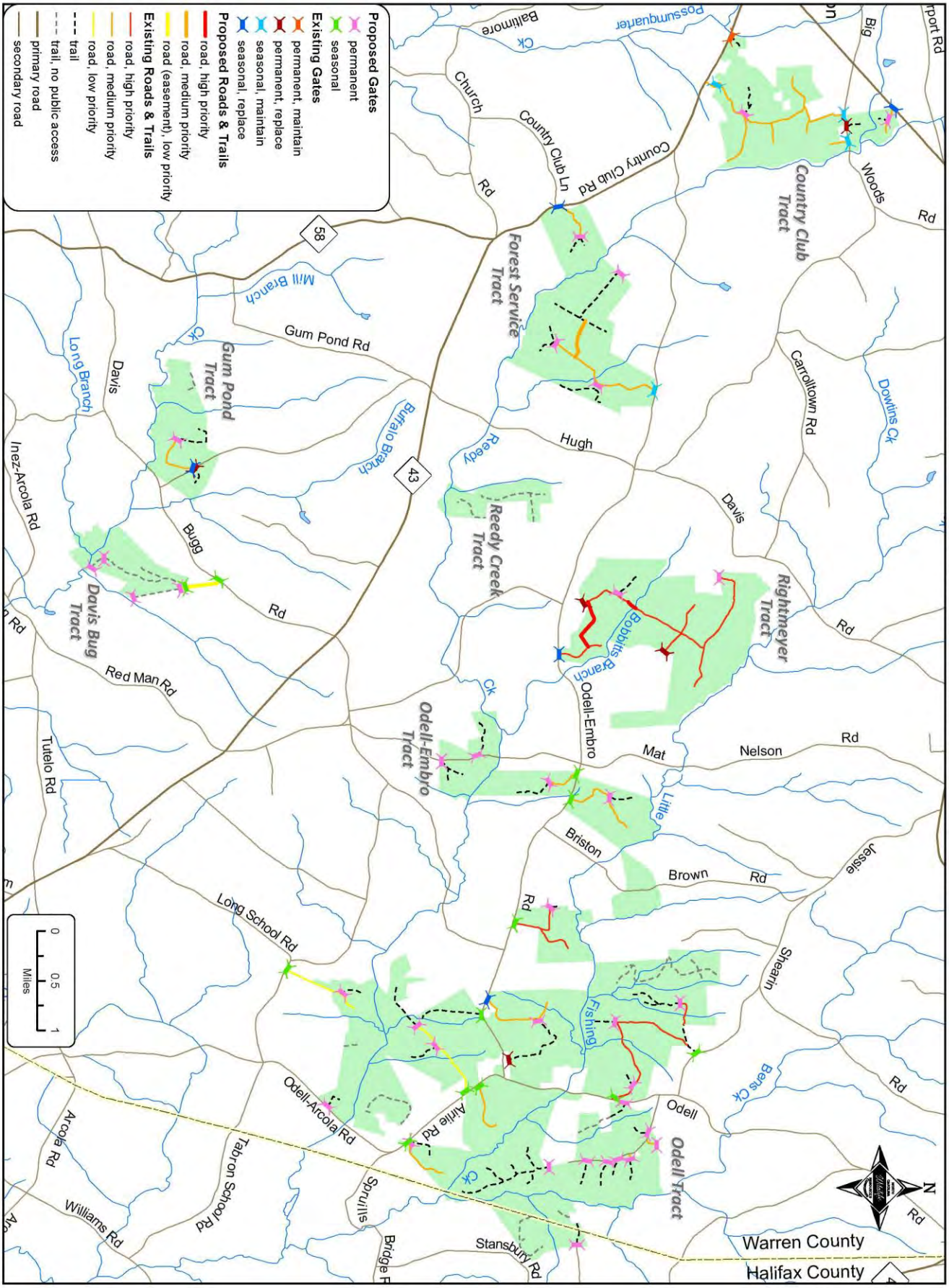


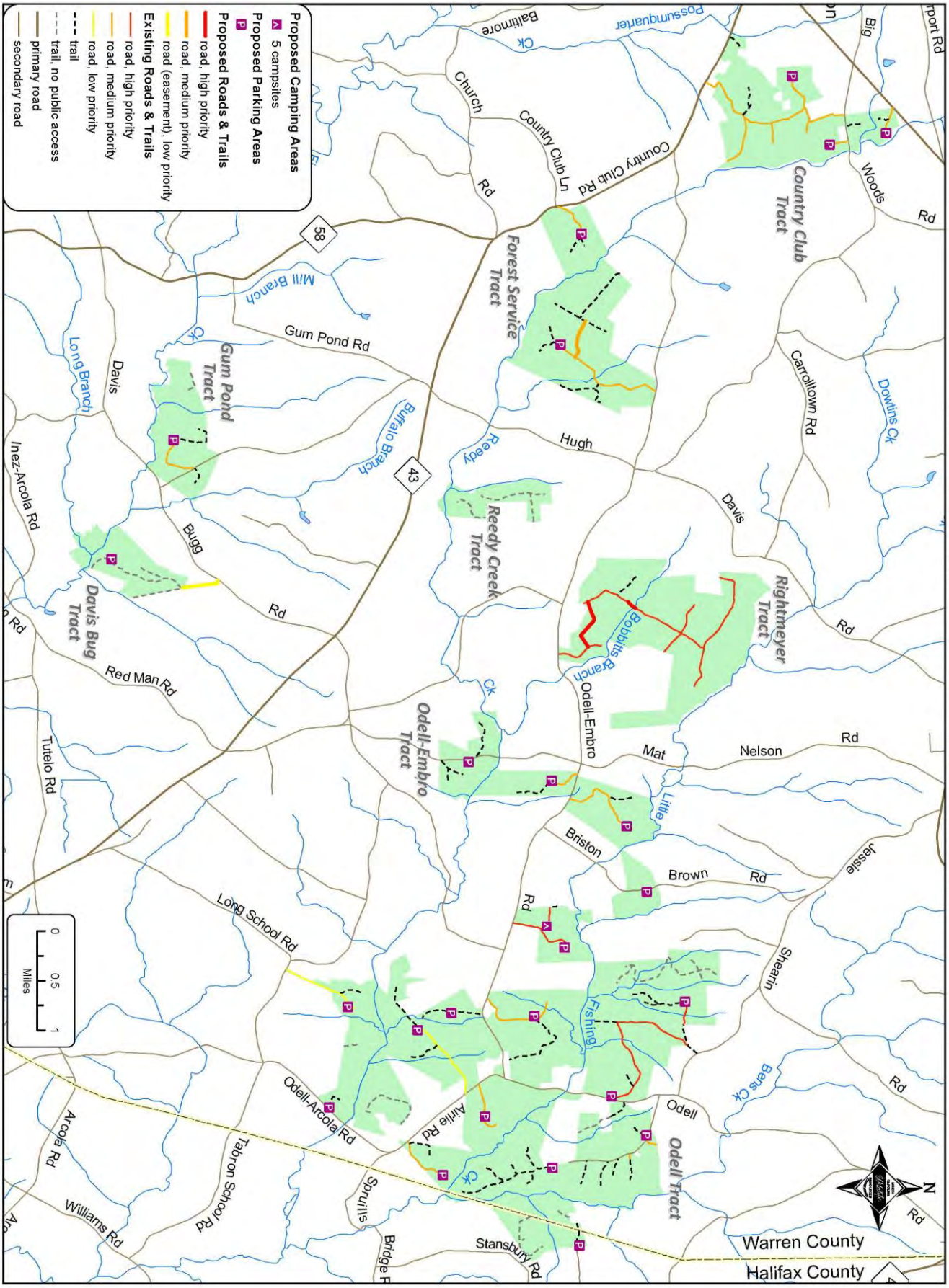
Appendix XVIII: Timber Sale History Map



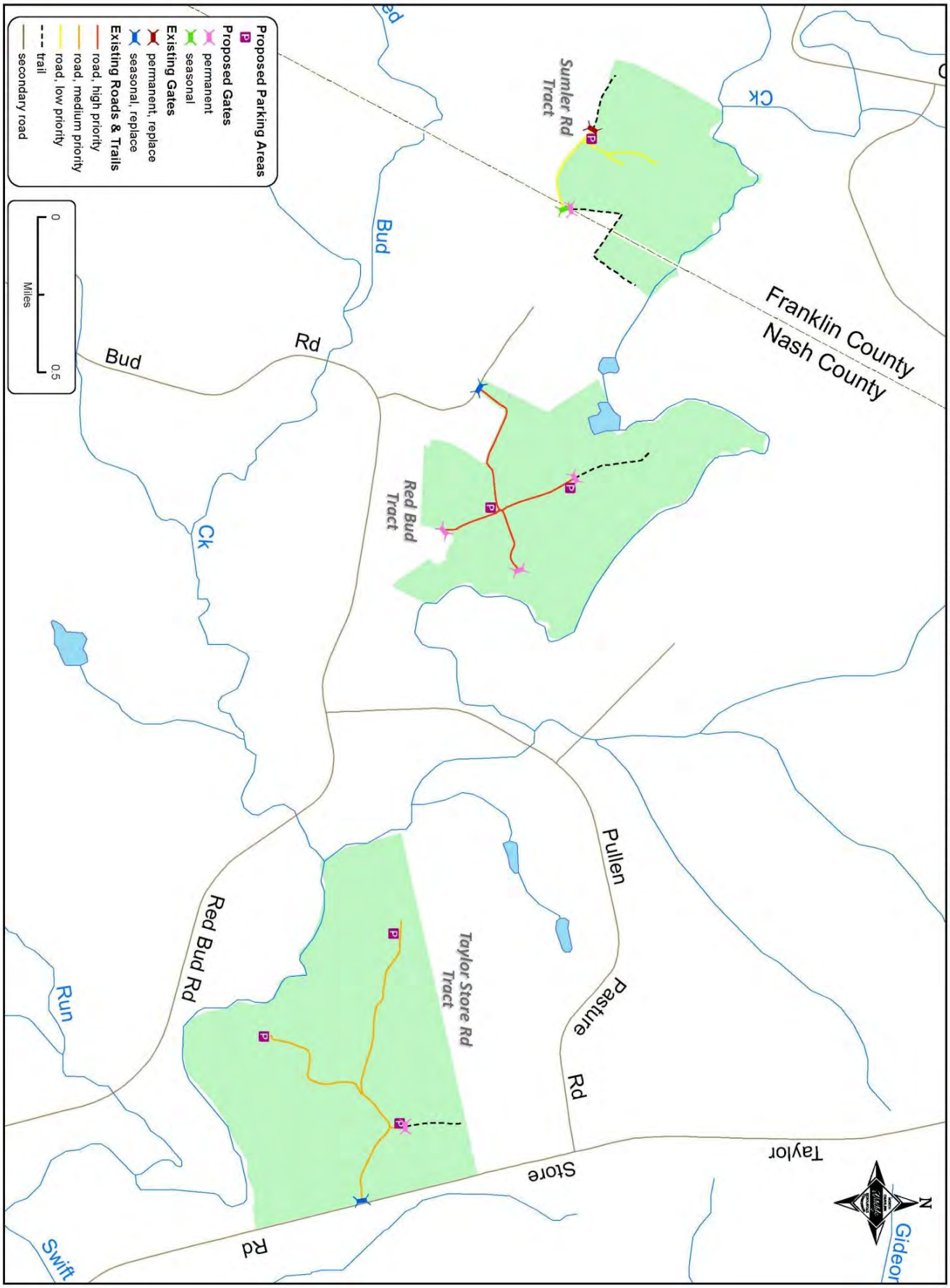


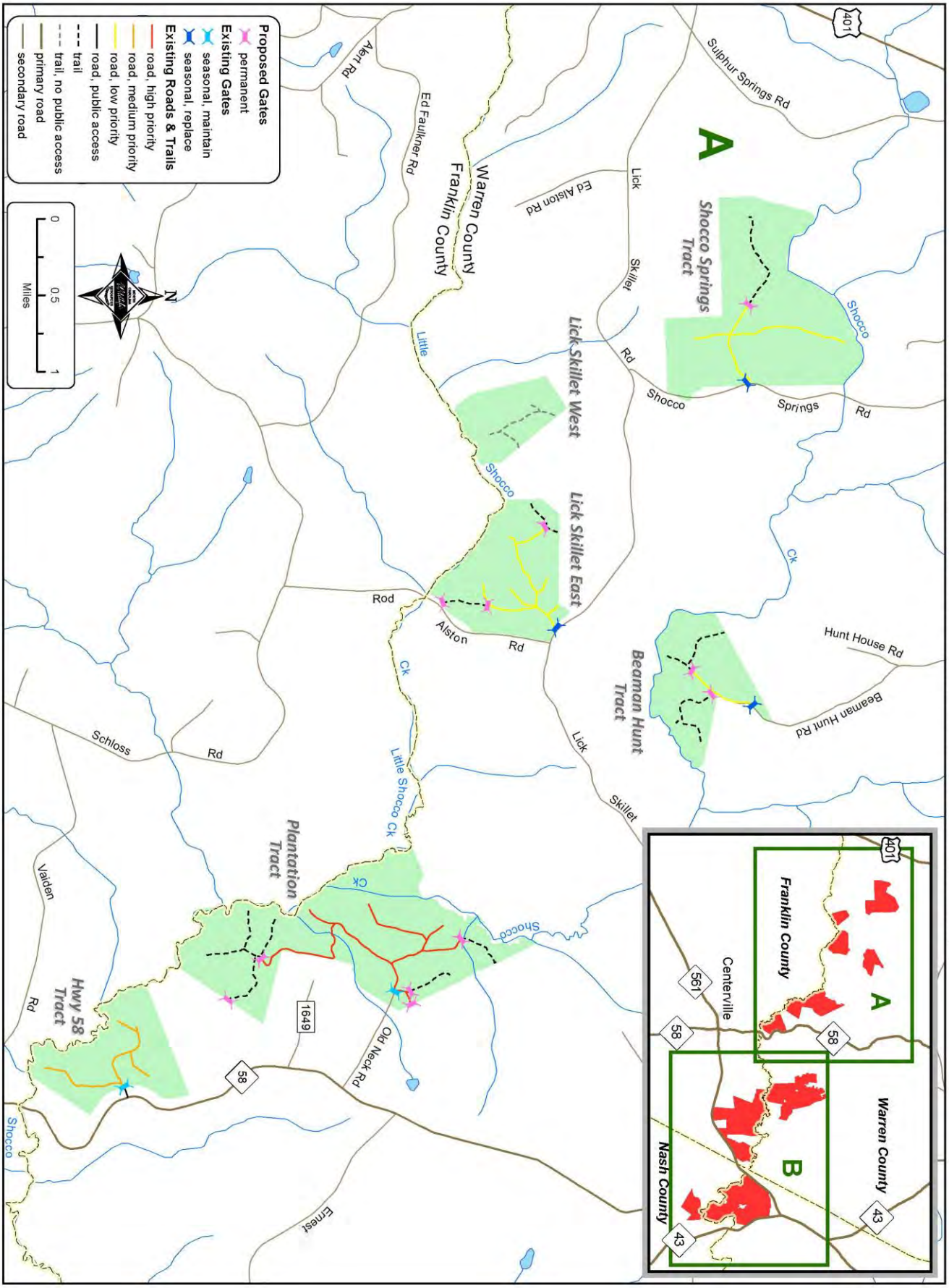
BRINKLEYVILLE GAME LAND - ACCESS & ROAD NETWORK
Northern Piedmont Ecoregion, Halifax County (1,819 acres)

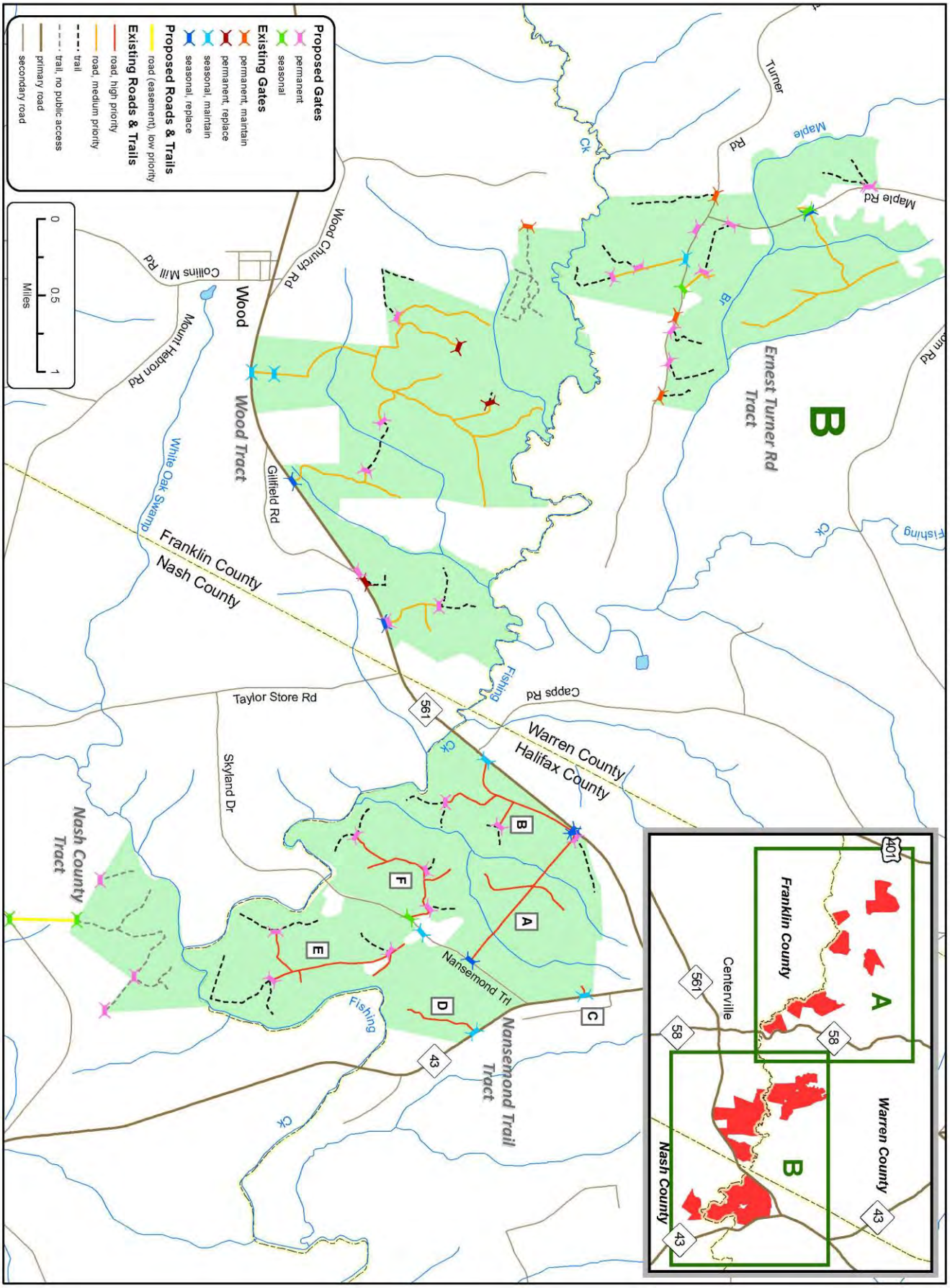

EMBRO GAME LAND - GATES & ROAD NETWORK
Northern Piedmont Ecoregion, Halifax and Warren Counties (8,856 acres)
Proposed Gates
permanent
seasonal
Existing Gates
permanent, maintain
permanent, replace
seasonal, maintain
seasonal, replace
Proposed Roads & Trails
road, high priority
road, medium priority
road (easement), low priority
Existing Roads & Trails
road, high priority
road, medium priority
road, low priority
trail
trail, no public access
primary road
secondary road
Country Club Tract
Forest Service Tract
Gum Pond Tract
Reedy Creek Tract
Rightmeyer Tract
Davis Bug Tract
Odell-Embro Tract
Odell Tract
Warren County
Halifax County
Country Club Rd
Country Club Ln
Church Rd
Gum Pond Rd
Hugh
Davis
Carrolltown Rd
Woods Rd
Big
Dowtins Ck
Possumquarter
Baltimore Ck
Mill Branch
Buffalo Branch
Reedy Ck
Long Branch
Inez-Arcola Rd
Bugg Rd
Red Man Rd
Tutelo Rd
Odell-Embro
Bobbitts Branch
Mat
Nelson Rd
Little
Briston
Brown Rd
Jessie
Long School Rd
Fishing
Shearin
Bens Ck
Odell
Odell-Arcola Rd
Allie Rd
Arcola Rd
Williams Rd
Tabron School Rd
Spruills
Bridge
Stansbury Rd
58
43
0
0.5
1
Miles
N

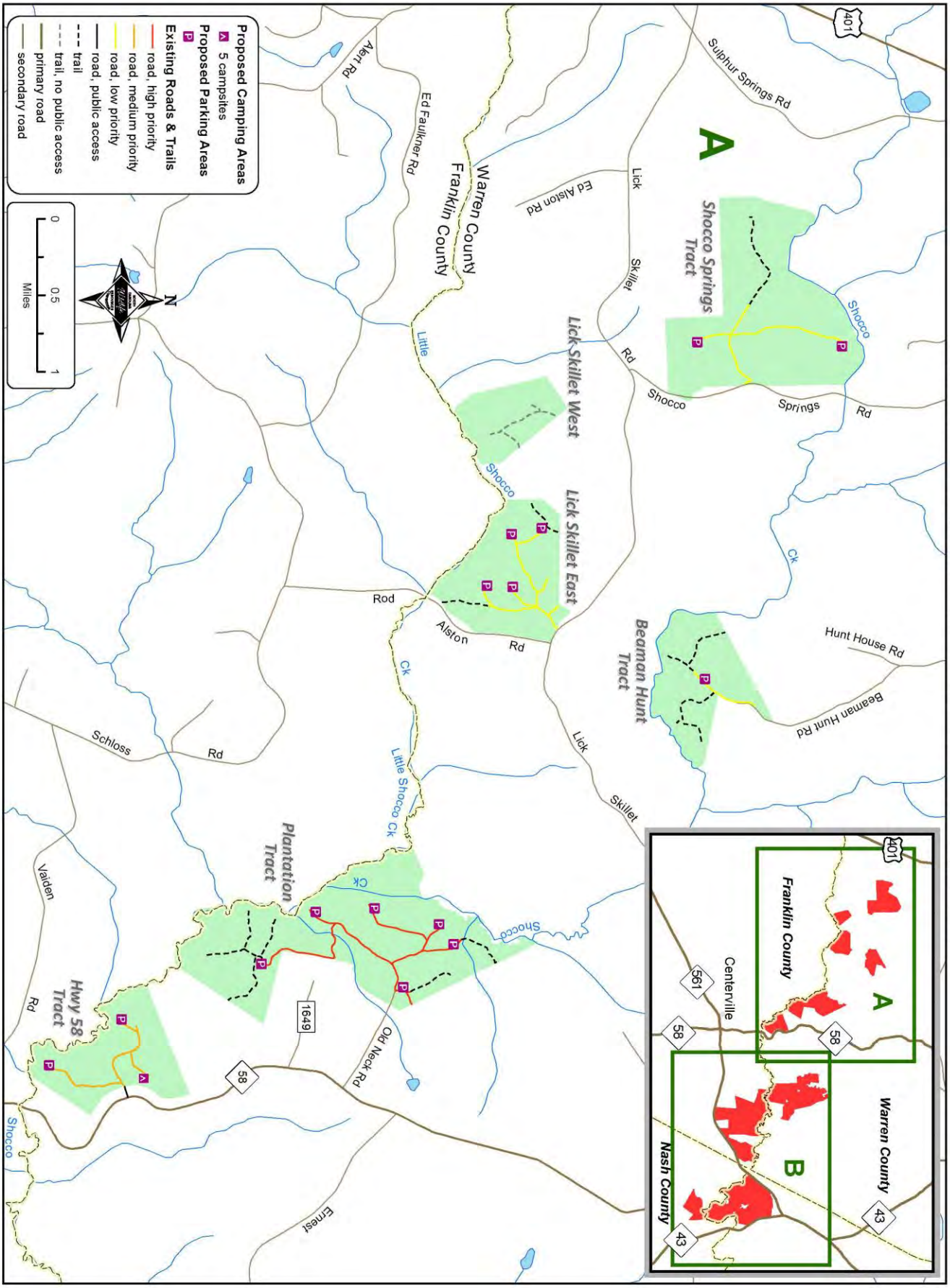

EMBRO GAME LAND - RECREATIONAL FACILITIES & ROAD NETWORK
Northern Piedmont Ecoregion, Halifax and Warren Counties (8,856 acres)
Proposed Camping Areas
5 campsites
Proposed Parking Areas
Proposed Roads & Trails
road, high priority
road, medium priority
road (easement), low priority
Existing Roads & Trails
road, high priority
road, medium priority
road, low priority
trail
trail, no public access
primary road
secondary road
Country Club Tract
Forest Service Tract
Gum Pond Tract
Reedy Creek Tract
Rightmeyer Tract
Odell-Embro Tract
Davis Bug Tract
Odell Tract
Country Club Rd
Country Club Ln
Church Rd
Baltimore Ck
Possumquarter Ck
Big Woods Rd
Carrolltown Rd
Dowlins Ck
Hugh Davis Rd
Mill Branch Ck
Gum Pond Rd
Long Branch Ck
Davis Bug Rd
Inez-Arcola Rd
Buffalo Branch
Reedy Ck
Bobbitts Branch
Odell-Embro Rd
Mat Nelson Rd
Little Briston Brown Rd
Jessie Swain Rd
Red Man Rd
Tutelo Rd
Long School Rd
Fishing Ck
Bans Ck
Odell Rd
Airlie Rd
Odell-Arcola Rd
Arcola Rd
Williams Rd
Tarron School Rd
Struills Bridge Rd
Stansbury Rd
Warren County
Halifax County
58
43
0 0.5 1 Miles
N

Appendix XIX: Infrastructure, Access and Road Network, and Recreational Facilities Maps (Sandy Creek)

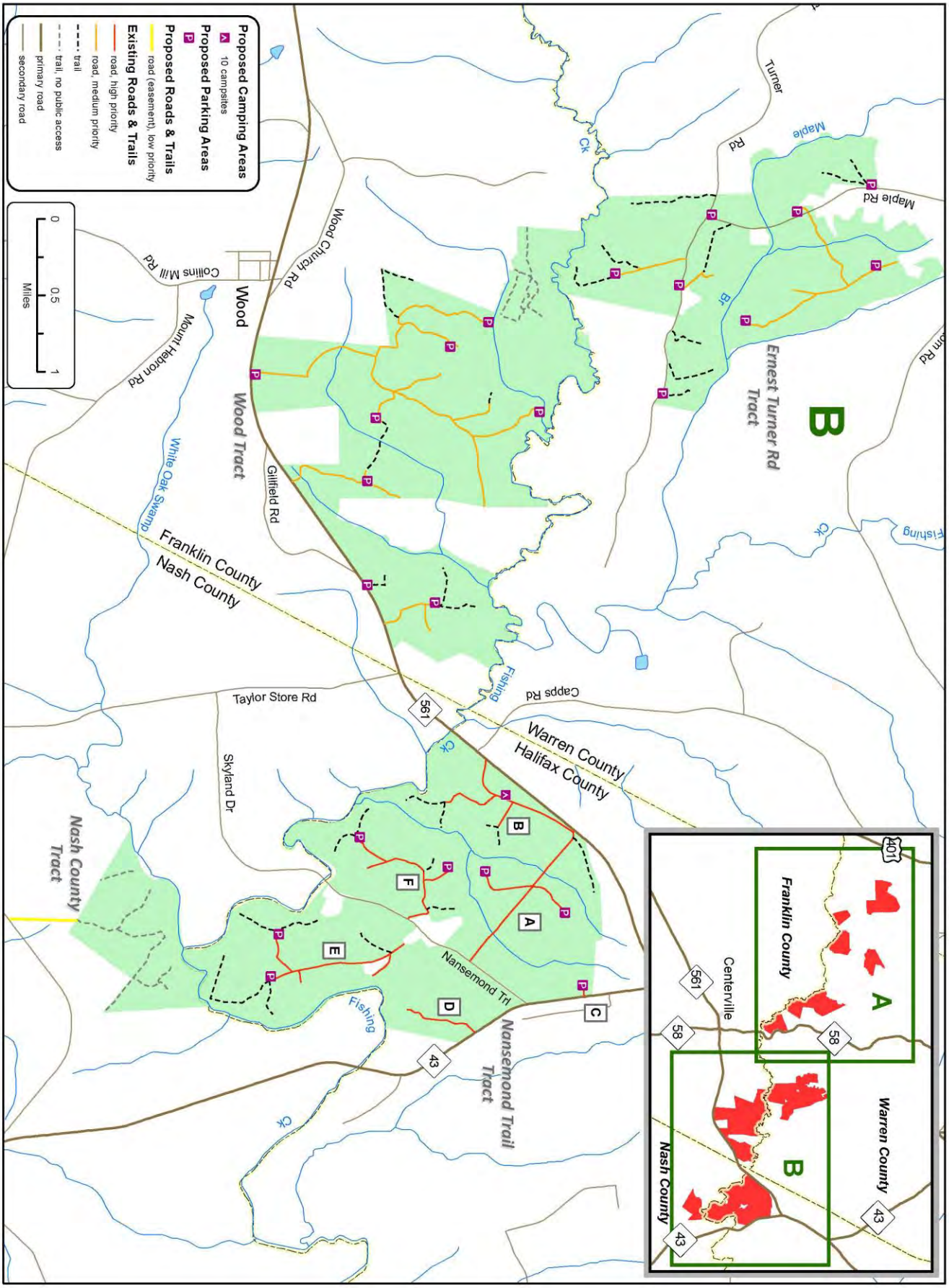



SHOCCO CREEK GAME LAND - GATES & ROAD NETWORK
Northern Piedmont Ecoregion, Franklin, Halifax, Nash and Warren Counties (8,137 acres)
Proposed Gates
permanent
Existing Gates
seasonal, maintain
seasonal, replace
Existing Roads & Trails
road, high priority
road, medium priority
road, low priority
road, public access
trail
trail, no public access
primary road
secondary road
0
0.5
1
Miles
N
A
B
Shocco Springs Tract
Lick Skillet West
Lick Skillet East
Beaman Hunt Tract
Plantation Tract
Hwy 58 Tract
Warren County
Franklin County
Nash County
Centerville
Sulphur Springs Rd
Shocco Springs Rd
Lick Skillet Rd
Ed Alston Rd
Ed Faulkner Rd
Alert Rd
Hunt House Rd
Beaman Hunt Rd
Alston Rd
Schloss Rd
Vaiden Rd
Little Shocco Ck
Old Neck Rd
Ernest
401
58
561
43
1649

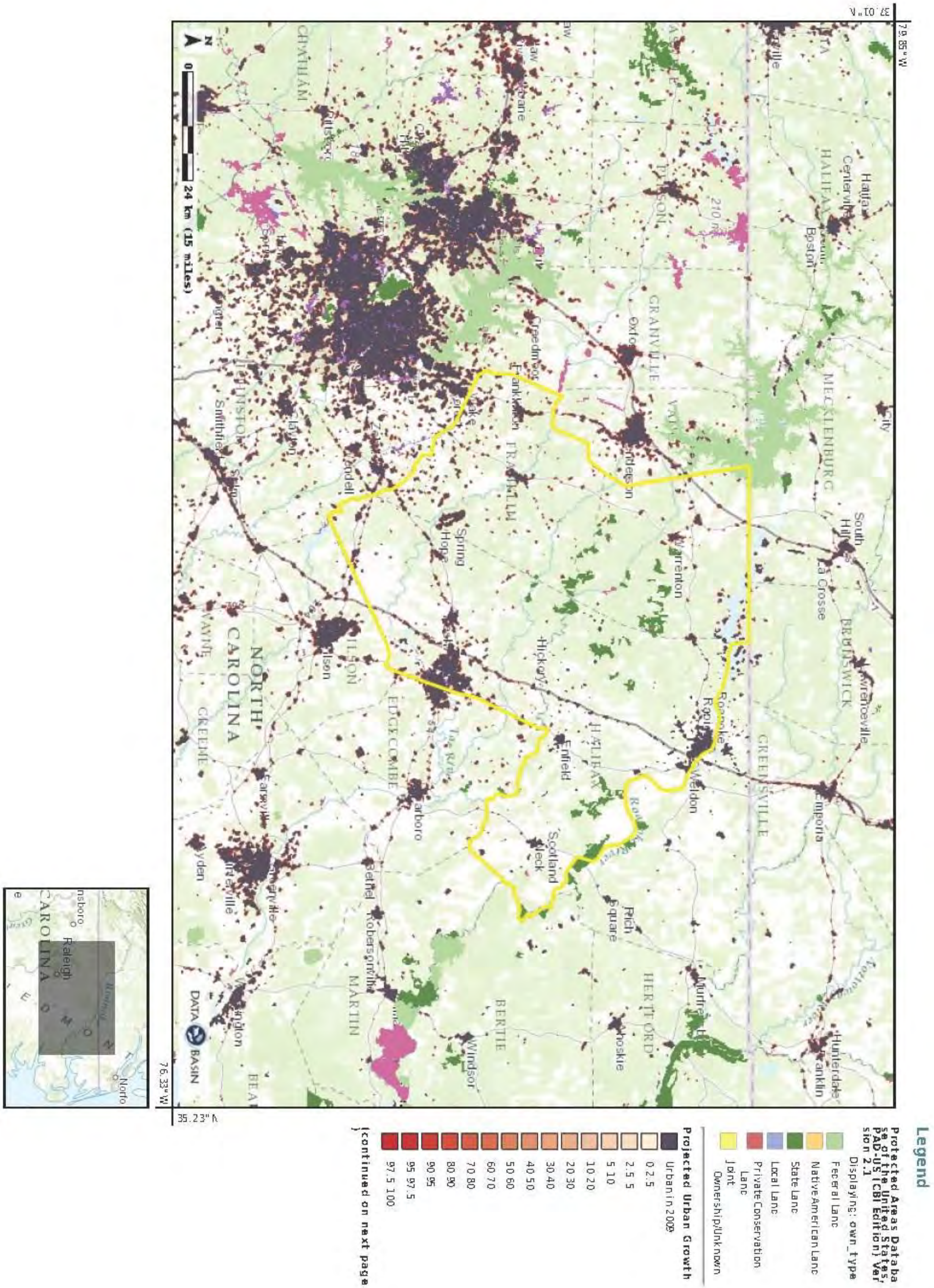

SHOCCO CREEK GAME LAND - GATES & ROAD NETWORK
Northern Piedmont Ecoregion, Franklin, Halifax, Nash and Warren Counties (8,137 acres)
Proposed Gates
permanent
seasonal
Existing Gates
permanent, maintain
permanent, replace
seasonal, maintain
seasonal, replace
Proposed Roads & Trails
road (easement), low priority
Existing Roads & Trails
road, high priority
road, medium priority
trail
trail, no public access
primary road
secondary road
0
0.5
1
Miles
Franklin County
Warren County
Nash County
Halifax County
Ernest Turner Rd Tract
Wood Tract
Nash County Tract
Nansemond Trail Tract
Wood Church Rd
Collins Mill Rd
Mount Hebron Rd
White Oak Swamp
Gillifield Rd
Taylor Store Rd
Skyland Dr
Nansemond Trl
Capps Rd
Maple Rd
Turner Rd
Fishing Ck
Centerville
401
561
58
43


SHOCCO CREEK GAME LAND - RECREATIONAL FACILITIES & ROAD NETWORK
Northern Piedmont Ecoregion, Franklin, Halifax, Nash and Warren Counties (8,137 acres)
Proposed Camping Areas
5 campsites
Proposed Parking Areas
Existing Roads & Trails
road, high priority
road, medium priority
road, low priority
road, public access
trail
trail, no public access
primary road
secondary road
0
0.5
1
Miles
N
Shocco Springs Tract
Lick Skillet West
Lick Skillet East
Beaman Hunt Tract
Plantation Tract
Hwy 58 Tract
Warren County
Franklin County
Nash County
Centerville
Sulphur Springs Rd
Shocco Springs Rd
Lick Skillet Rd
Ed Alston Rd
Ed Faulkner Rd
Alston Rd
Hunt House Rd
Beaman Hunt Rd
Schloss Rd
Vaiden Rd
Ernest
Old Neck Rd
Little Shocco Ck
Shocco Ck
401
58
43
561
1649

Appendix XIX: Infrastructure, Access and Road Network, and Recreational Facilities Maps (Shocco Creek)

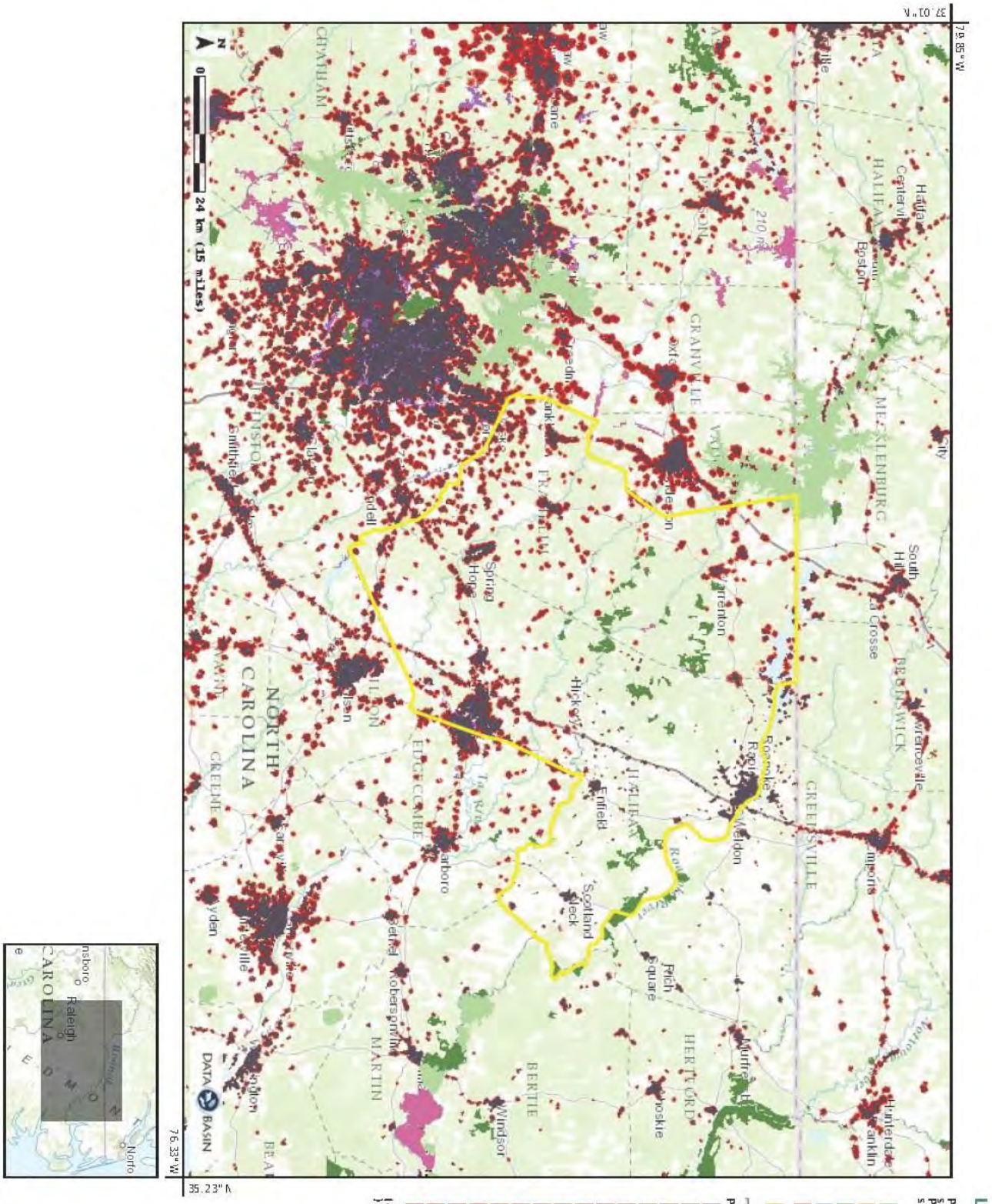


Appendix XX: Urban Expansion Projection Maps (2020)

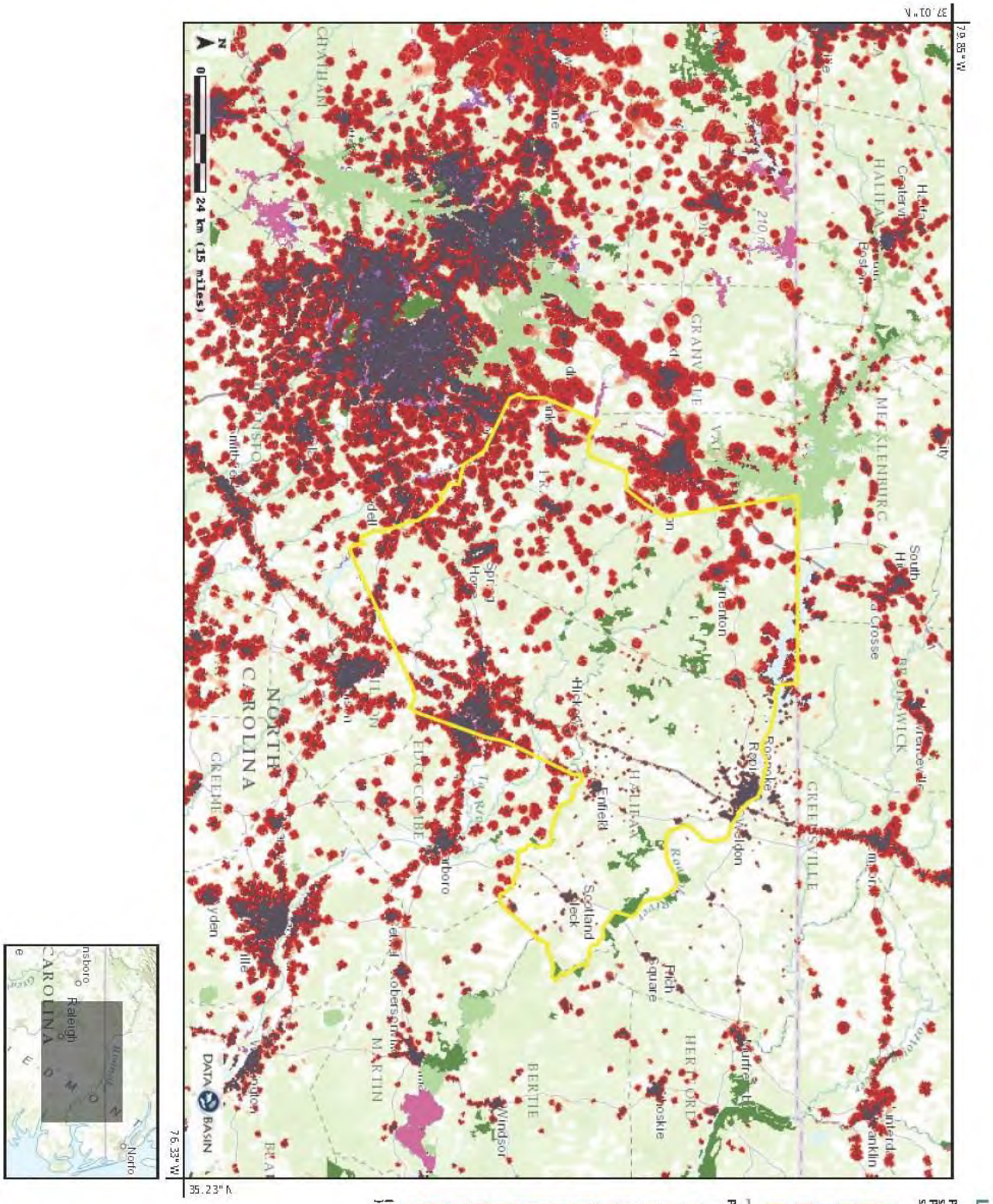


(continued on next page)

Appendix XX: Urban Expansion Projection Maps (2050)



Appendix XX: Urban Expansion Projection Maps (2100)



North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Moses Carey, Jr., Secretary

November 7, 2012

Secretary Dee Freeman
Department of Environment and Natural Resources
1615 Mail Service Center
Raleigh, North Carolina 27699-1615

Mr. Gordon S. Myers, Executive Director
N.C. Wildlife Resources Commission
1701 Mail Service Center
Raleigh, North Carolina 27699-1701

Re: Dedication of Portions of the **Brinkleyville Game Land**, Halifax County

Dear Secretary Freeman and Mr. Myers:

Pursuant to Article 9A, Chapter 113A of the North Carolina General Statutes, this letter of allocation is executed for the purpose of dedicating the State-owned lands hereinafter described as a North Carolina Nature Preserve

These real properties are currently administered by the North Carolina Wildlife Resources Commission as a portion of the Brinkleyville Game Land and consist of approximately 1,835 acres located in Halifax County, composed of:

1)	Brinkleyville Game Land (Primary Area)	636 acres
2)	Brinkleyville Game Land (Buffer Area)	1,199 acres

all of which are specifically described in Exhibit A, attached hereto and by reference made a part hereof. The dedicated land shall be known collectively as the Brinkleyville Game Land Dedicated Nature Preserve.

Mailing Address:
1301 Mail Service Center
Raleigh, N.C. 27699-1301

Telephone (919) 807-2425
Fax (919) 733-9571
State Courier #51-01-00
e-mail: moses.carey@doa.nc.gov

Location:
116 West Jones Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer

Dedication of the qualified portions of the tract fulfills the terms of any prior grant agreements, including those of the Natural Heritage Trust Fund and the Clean Water Management Trust Fund.

The Governor and Council of State have approved the dedication of the State-owned lands hereinabove described as the Brinkleyville Game Land to be held in trust by the Custodian for the uses and purposes expressed in the Nature Preserves Act at a meeting held in the City of Raleigh, North Carolina, on the 7th of August, 2012.

Sincerely,

Moses Carey, Jr.

MC

CONSENTED AND AGREED TO:

Secretary Dee Freeman
Department of Environment and Natural Resources

Gordon S. Myers, Executive Director
Wildlife Resources Commission

BRINKLEYVILLE GAME LAND
DEDICATED NATURE PRESERVE

DESCRIPTION

COUNTY: Halifax PHYSIOGRAPHIC PROVINCE: Piedmont

TOPOGRAPHIC MAPS: Aurelian Springs, Hollister

SIZE OF AREA: ca. 1,835 acres (primary area 636 acres; buffer area 1,199 acres)

OWNER/ADMINISTRATION: State of NC, Wildlife Resources Commission

LOCATION: Five separate tracts in the southwestern portion of Halifax County. Two tracts lie east of Brinkleyville, along Rocky Swamp, with Sledge Road running between the two tracts. Three tracts lie to the west of this community, just west of NC 4; Little Fishing Creek lies along the western boundary of each of these three.

DESCRIPTION: The two tracts adjoining Rocky Swamp are separated by 1.2 miles. Each of the tracts adjoining Rocky Swamp has a narrow hardwood forest zone along the creek. The northernmost tract also has several beaver ponds along the creek. A Watch List butterfly – Carolina roadside-skipper (*Amblyscirtes carolina*) – is present in this tract, near the western edge of its range.

These Rocky Swamp tracts are important is providing streamside buffer for the Nationally significant Rocky Swamp Aquatic Habitat. There is a large population of the Federally Endangered dwarf wedgemussel (*Alasmidonta heterodon*) in this creek, found at the NC 561 crossing, at the downstream end of the southernmost tract.

Each of the tracts adjoining Little Fishing Creek support hardwood buffers along the creek and along tributary streams. The northernmost tract has very little hardwood buffer along Little Fishing Creek, but does have a wider hardwood strip alongside an unnamed tributary stream along the northern boundary of the tract. A few swamp cottonwood (*Populus heterophylla*) trees are present near this tributary; this is a rare tree in the Piedmont. The southernmost tract, a small part of which lies south of NC 561, also has only a narrow hardwood buffer along Little Fishing Creek. The intermediate tract contains a 30- to 40-acre hardwood forest stand on slopes extending well away from the creek.

These three Little Fishing Creek tracts provide streamside buffer for the Nationally significant Little Fishing Creek Aquatic Habitat. Present in this stretch of the creek is an excellent population of the State Endangered and Federal Species of Concern Atlantic pigtoe (*Fusconaia masoni*). Other rare species present in this stretch of creek are the Neuse River waterdog (*Necturus lewisi*), the Roanoke bass (*Ambloplites cavifrons*), and the creeper [mussel] (*Strophitus undulatus*).

BOUNDARY JUSTIFICATIONS: The portions of the game land designated as primary area support fairly mature to mature stands of hardwood forest – both upland and wetland. The

primary area also includes all lands within 300 feet of both Rocky Swamp and Little Fishing Creek, as these streams are significant aquatic habitats, and all lands within 200 feet of perennial tributary streams. Areas of open water, such as beaver ponds, are also included within the primary area. Portions of the tracts designated as buffer areas include mixed pine-hardwood stands, pine stands (whether pine plantations or not), and clearcuts/early succession fields.

MANAGEMENT AND USE: These tracts are managed to provide habitat for a wide array of wildlife species, to be used by hunters as a game land. Other activities, such as trapping, nature study, and bird-watching, are expected to take place.

It is important to avoid, or highly limit, vehicular traffic in such areas, such as hunters driving trucks into the primary areas to be closer to deer stands, because mechanical disturbance can easily allow exotic plants to invade such areas. Japanese stiltgrass (*Microstegium vimineum*) is particularly aggressive along jeep roads and other disturbed areas, moving into undisturbed floodplains quite readily. Japanese honeysuckle (*Lonicera japonica*) and Chinese privet (*Ligustrum sinense*) are other aggressive exotic species that readily colonize disturbed areas. Fortunately, the latter species is relatively scarce in the game land, though honeysuckle is present and generally common on all tracts.

Burning of pine stands or early succession stands may be beneficial to many species of wildlife, especially those preferring thick herbaceous cover, as burning promotes a denser stand of grasses and forbs for a few years after the burn than would be present with simply cutting of woody growth but no fire. However, burns should not be allowed to move into hardwood forest stands, as burns often kill or knock back shrubs and saplings that are used for foraging, for cover, and for nesting by songbirds. Burns do yield a thicker herb layer in hardwood floodplains and slopes, for a few years, but the trade-off of less cover of shrubs and saplings might be an overall detriment to animal species in such a burned forested area.

MAP: attached

THIS DEDICATION OF THE BRINKLEYVILLE GAME LAND NATURE PRESERVE IS MADE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

1. As used in this Letter, the terms "natural area" and "nature preserve" shall have the same meaning as contained in North Carolina General Statutes, section 113A-164.3.

2. Pursuant to North Carolina General Statutes 113-164.8, all State-owned lands lying within the above designated area(s) are hereby dedicated as a nature preserve to be known collectively as the Brinkleyville Game Land Nature Preserve (hereinafter "preserve") for the purposes provided in the North Carolina Nature Preserves Act, as amended, and other applicable law, and said State-owned land, shall be held, maintained, and used exclusively for said purposes.

3. **Primary Custodian**: The primary custodian of the preserve will be the North Carolina Wildlife Resources Commission, which will be responsible for managing the preserve in accordance with State Administrative Code 15A NCAC 12H.0300 and .0400.

4. **Primary Classification**: The primary classifications and purposes of the preserve will be conservation, nature education, wildlife management, hunting, fishing, trapping, and other recreational uses authorized by the Primary Custodian. The ecological significance of the preserve is described in Exhibit A.

5. **Management Areas:** For the purposes of management, the preserve shall be considered to consist of a Primary Area (approximately 636 acres) and a Buffer Area (approximately 1,199 acres), as more particularly described in Exhibit A, attached thereto and by this reference made a part hereof. The Primary Area consists essentially of the significant aquatic habitats supporting numerous rare mussels, amphibians, and fish, including the federally listed dwarf wedgemussel (*Alasmidonta heterodon*). It also includes the adjoining high-quality hardwood forests and beaver ponds, and associated uncommon species.

   The Primary Area is deemed by the Secretary of the North Carolina Department of Environment and Natural Resources to qualify as an outstanding natural area under statutory criteria for nature preserve dedication (G.S. 113A-164.6) and further serves all of the public purposes for a dedicated preserve as stated in Administrative Rules 15A NCAC 12H.0301(b).

   The Buffer Area, which contributes to the management and protection of the Primary Area, consists of mixed pine-hardwood forests, pine forests and plantations, and fields.

6. **Rules for Management of the Primary Area(s)**:

   A. Character of Visitor Activity: The principal visitor activities in the preserve shall be hunting, fishing, trapping, walking, research, and observation. These activities shall be regulated by the Custodian to prevent significant disturbance of the preserve. These activities may specifically be regulated by the Custodian to protect and conserve the natural values of the preserve.

   Activities and uses unrelated to those listed above are prohibited except as otherwise provided in these Articles or unless necessary to carry out the purposes of the preserve. Prohibited activities include, but are not limited to: construction; commercial activities and development; commercial silviculture; agriculture and grazing; gathering of native species of plants or plant products; the removal, disturbance, molestation, or defacement of miner-

als, archaeological and natural resources, except for research purposes as approved by the Custodian; and those activities specifically restricted in these Articles.

There shall be no fires, except as necessary for ecological management of the preserve or in conjunction with supervised educational activities of the Custodian, or further excepted as herein provided or otherwise expressly permitted.

B. Consumptive Wildlife Uses: Hunting, fishing, and trapping shall be permitted on the preserve subject to regulations and management by the North Carolina Wildlife Resources Commission.

C. Orientation and Guidance of Visitors: The Custodian reserves the right to orient and guide visitors for educational programs, hunting and fishing uses, scientific research, and for preserve management. Exhibits, programs, and printed materials may be provided by the Custodian in service areas. The Custodian may restrict access to visitors in those instances or in such areas that restrictions may be determined necessary to safeguard sensitive environmental resources in the preserve.

D. Disturbance of Natural Resources: The cutting or removal of trees, dead or alive, or the disturbance of other natural resources is prohibited except as necessary for removal of hazards to visitors, control of disease or insect infestations that would damage or reduce the significance of the preserve, restoration after severe storm damage, trail clearance and maintenance, or for purposes of maintenance or restoration of natural communities or rare species populations as stipulated in the preserve management plan and that which is consistent with the purposes of these Articles. Salvage timber cuts which may be necessary due to natural catastrophe will be allowed in both Primary and Buffer Areas, but in a manner that will contribute to the recovery of the prevailing natural conditions of the forest and in consultation with the North Carolina Natural Heritage Program.

E. Wild Fire Control/Prescribed Burning: Wild fires may mimic natural processes historically occurring in an ecosystem on a landscape level. When the extent of a wild fire does not threaten human life or structures, it may be allowed to burn with minimal control. If wild fire control is necessary, firebreaks may need to be established. When possible, existing roads and firebreaks will be utilized for wild fire control. When new firebreaks need to be established, environmentally sensitive areas will be avoided when possible. Old firebreaks which affect the natural hydrology of wetlands will be filled and allowed to revegetate. Planning of firebreak restoration should occur in consultation with the North Carolina Natural Heritage Program.

F. Water Control: The purpose of water control shall be to maintain the preserve's natural water regime. Water levels that have been altered by man may be changed if necessary to restore the preserve to its natural condition. In a preserve with a long history of managed hydrology, water levels may be managed to perpetuate the ecosystems that have evolved around the hydrology or may be restored to natural condition. This decision should be made in consultation with the Natural Heritage Program. Millponds are an example of situations in which water levels have been historically managed.

G. Pollution and Dumping: There will be no storage or dumping of ashes, trash, garbage, hazardous substances, toxic waste, other unsightly or offensive material, or fill material, including dredge spoil in, on, or under the preserve. No underground storage tanks may

be placed within the preserve. No surface or ground waters of the preserve may have pollutants added within the preserve.

H. Control of Vegetational Succession: Control of vegetational succession may be undertaken if necessary to maintain or restore a particular natural ecosystem type or to preserve endangered, threatened, rare, or other unusual species. Controls will be done in the manner that best imitates the natural forces believed responsible for maintaining the natural ecosystem type, or that minimizes unnatural effects on non-target portions of the ecosystem. Prescribed burning is particularly essential to ecosystems where natural wild fire historically suppressed woody vegetation and promoted herbaceous diversity.

I. Control of Populations: Any control of animal or plant populations on the preserve shall be for the purpose of correcting those situations where those populations are significantly affecting natural conditions on the preserve, and in accordance with the Custodian's established regulations for hunting, trapping, or fishing of designated game animals. The Custodian may, in consultation with the North Carolina Natural Heritage Program, apply biological controls, herbicides and pesticides, and other means deemed necessary or appropriate to control or eradicate exotic or native species of plant or animal that are degrading the natural character of the preserve. Because of potential impacts on native species, no exotic flora or fauna shall be introduced into the preserve.

J. Research and Collecting Permits: Any person wishing to engage in scientific research requiring collecting or otherwise affecting anything within the preserve shall first secure written permission from the Custodian.

K. Roads and Trails: New roads shall not be constructed in the Primary Area. When necessary, the Custodian may construct and maintain access limited to staff use for management purposes, such as service paths (single lane vegetated paths) for patrol, right-of-way maintenance, and other management activities, within the Primary Area. Number and width of new paths will be minimized, and sensitive areas avoided when possible. Existing roads that occur within or form a boundary of the Primary Area may be maintained by grading of the roadbed, replacing culverts, or adding stone as needed in order to maintain the integrity of the road for vehicular use. Daylighting of roads within the Primary Area should be minimized, but may be used if necessary to maintain the condition of the road. Access management and construction will be part of the overall management planning process and will include consultation with the North Carolina Natural Heritage Program.

L. Other Structures and Improvements: Structures or facilities shall not be erected by the Custodian within a preserve, except as may be consistent with the purposes of the preserve as stated in this dedication. Site selection shall be consistent with this dedication.

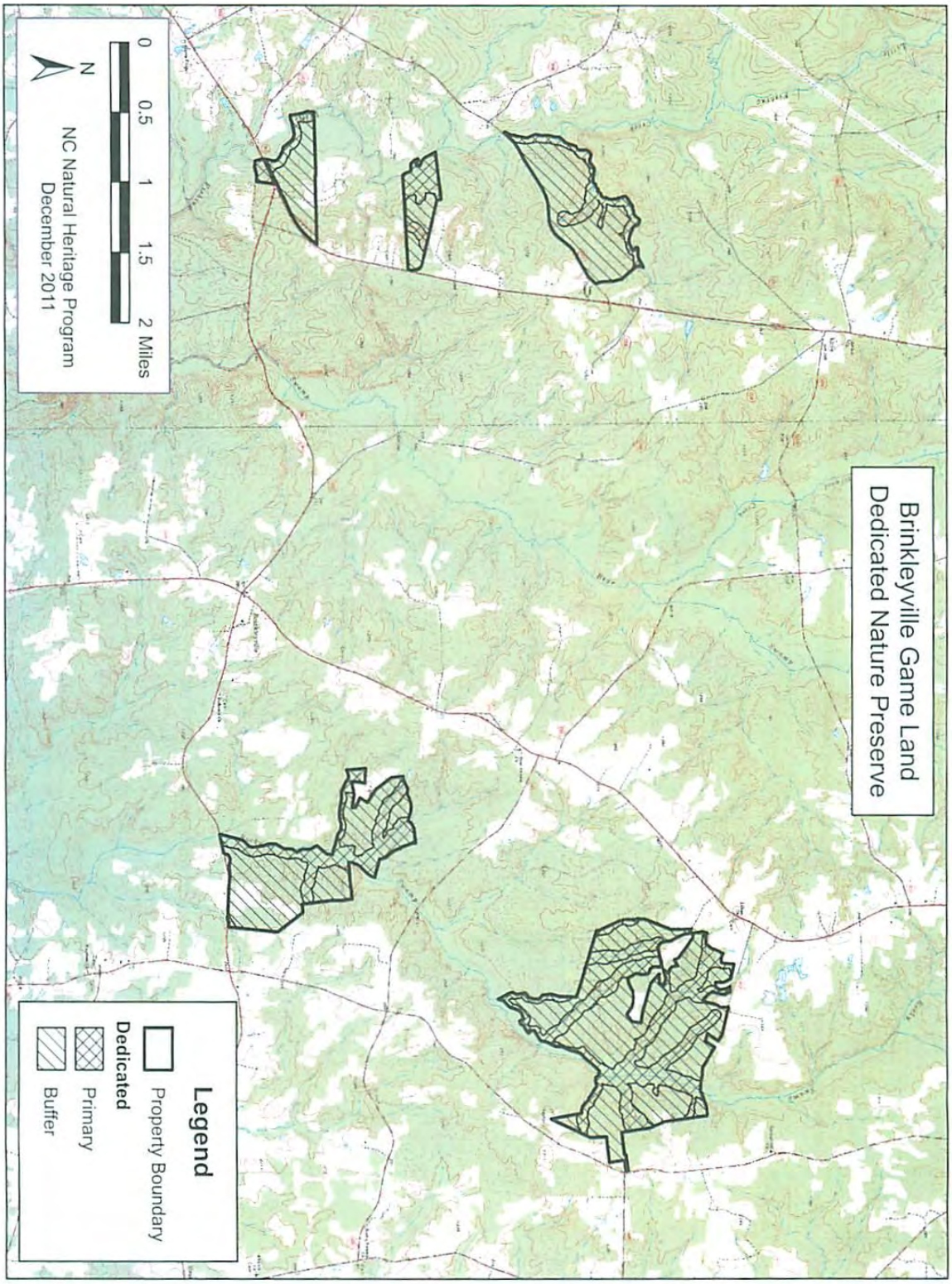
M. Management Plan: The **Wildlife Resources Commission**, as Primary Custodian of the preserve, shall develop a management plan for the broader managed area, including the preserve. This management plan should be subject to all the provisions of this dedication and with the management principles set forth in the North Carolina Administrative Code 15 NCAC 12H.0300 and .0400. In any case where contradictions may arise between this instrument of dedication and other management regulations, the terms of this dedication shall take precedence.

7. **Rules for Management of the Buffer Area(s)**: Primary area rules also apply except that additional forestry and wildlife management activities may be planned and carried out as needed. Construction and maintenance of roads, trails, and other access structures within buffer area(s) of the preserve will be limited to the level necessary to appropriately manage the preserve. These activities will be conducted in accordance with policy of the N.C. Wildlife Resources Commission and general management philosophy as outlined in Commission planning documents, in addition to providing for the buffer functions in relation to the primary area(s). WRC rules and guidelines require the protection and enhancement of wildlife populations and habitat so that hunting, fishing, trapping and other wildlife recreational opportunities are available to citizens of this State. Forest management is primarily conducted to enhance wildlife habitat.

   Buffer functions within the dedicated area may include protecting the primary area(s) from indirect detrimental ecological effects, providing additional area for species and ecological processes that require larger areas, and providing important successional stages and disturbance regimes and other habitat diversity for wildlife. Based on these general objectives, the following buffer functions will be addressed in the management plan.

   1) Landscape level function of community type and structure. (Buffer area management may involve timber harvest and other forms of stand manipulation, but will not involve forest canopy type conversion over more than limited areas, other than to restore stands to types suited for the site. Introduction of exotic species known to be invasive in natural communities will be avoided.)
   2) Maintenance of habitat connectivity and continuity among primary areas.
   3) Providing for habitat diversity.
   4) Management needs of rare animal and plant species populations occurring within the buffer area; and
   5) Protection of soil and hydrologic resources and processes within the primary area and extending into the buffer. (Buffers will be retained along streams, and watersheds of primary areas will be protected from hydrologic alteration.)

8. **Amendment and Modification**: The terms and conditions of this dedication may be amended or modified upon agreement of the Wildlife Resources Commission and Secretary of the Department of Environment and Natural Resources, and approved by the Council of State. Any portion of the tract dedicated pursuant to this instrument may be removed from dedication in accordance with the provisions of North Carolina General Statutes 113A-164.8.


Brinkleyville Game Land
Dedicated Nature Preserve
Legend
Property Boundary
Dedicated
Primary
Buffer
0
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1
1.5
2 Miles
N
NC Natural Heritage Program
December 2011

North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Moses Carey, Jr., Secretary

February 20, 2012

Secretary Dee Freeman
Department of Environment and Natural Resources
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Mr. Gordon S. Myers, Executive Director
N.C. Wildlife Resources Commission
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Re: Dedication of Portions of the **Embro Game Land**, Warren and Halifax Counties

Dear Secretary Freeman and Mr. Myers:

Pursuant to Article 9A, Chapter 113A of the North Carolina General Statutes, this letter of allocation is executed for the purpose of dedicating the State-owned lands hereinafter described as a North Carolina Nature Preserve.

This real property is currently administered by the North Carolina Wildlife Resources Commission as a portion of the Embro Game Land and consists of approximately 8,844 acres located in Warren and Halifax Counties, composed of:

1.	Embro Game Land (Primary Area)	2,646 acres
2.	Embro Game Land (Buffer Area)	6,198 acres

all of which are specifically described in Exhibit A, attached hereto and by reference made a part hereof. The dedicated land shall be known collectively as the Embro Game Land Dedicated Nature Preserve.

Mailing Address:
1301 Mail Service Center
Raleigh, N.C. 27699-1301

Telephone (919) 807-2425
Fax (919) 733-9571
State Courier #51-01-00
e-mail: moses.carey@doa.nc.gov

Location:
116 West Jones Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer

Dedication of the qualified portions of the tract fulfills the terms of any prior grant agreements, including those of the Natural Heritage Trust Fund and the Clean Water Management Trust Fund.

The Governor and Council of State have approved the dedication of the State-owned lands hereinabove described as the Embro Game Land Dedicated Nature Preserve to be held in trust by the Custodian for the uses and purposes expressed in the Nature Preserves Act at a meeting held in the City of Raleigh, North Carolina, on the 13th of September, 2011.

Sincerely,

Moses Carey, Jr.

MC

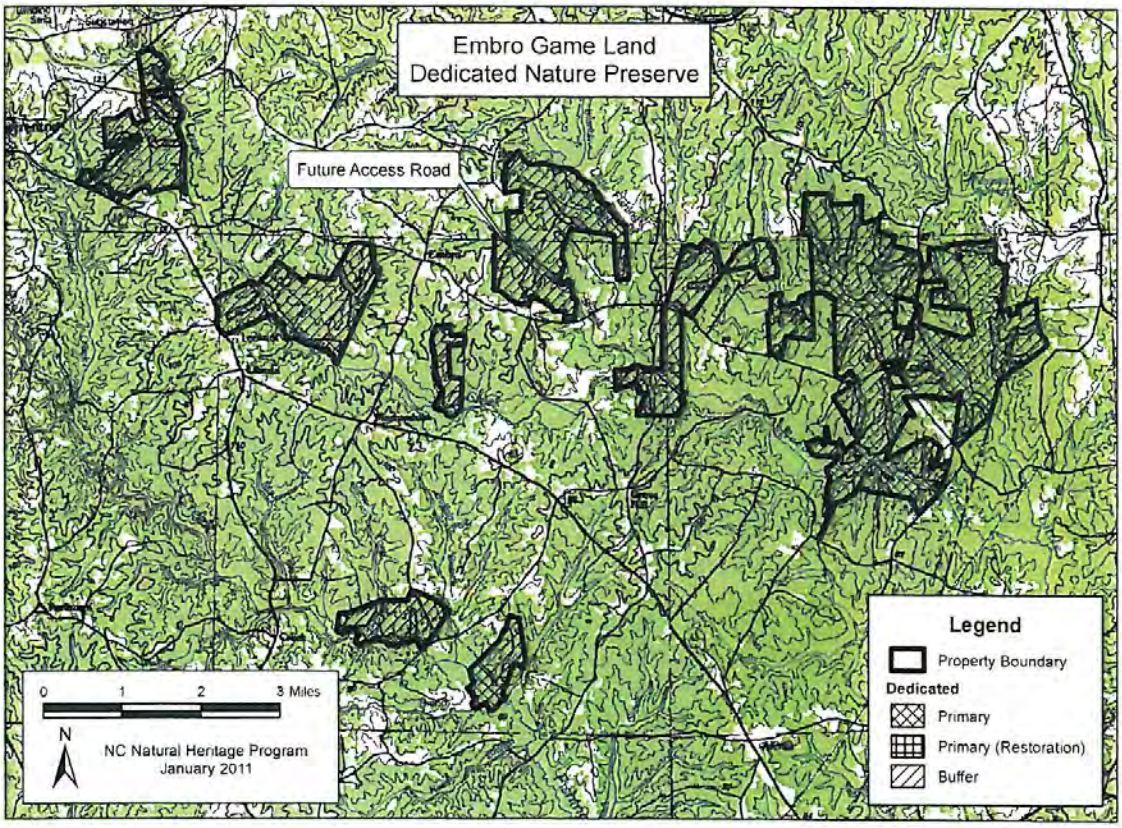
Attachment

CONSENTED AND AGREED TO:

Secretary Dee Freeman
Department of Environment and Natural Resources

Gordon S. Myers, Executive Director
Wildlife Resources Commission

Appendix XXII: Dedicated Nature Preserves, Embro GL, 2012 Dedication (cont.)



EMBRO GAME LAND
DEDICATED NATURE PRESERVE

DESCRIPTION

COUNTIES: Warren, Halifax PHYSIOGRAPHIC PROVINCE: Piedmont

TOPOGRAPHIC MAPS: Hollister, Inez, Littleton, Macon

SIZE OF AREA: ca. 8,844 acres (primary area 2,646 acres, including several restoration areas totaling 23 acres; buffer area 6,198 acres)

OWNER/ADMINISTRATION: State of North Carolina, Wildlife Resources Commission

LOCATION: The eastern and southeastern portions of Warren County, and the extreme western portion of Halifax County; the site lies south of US 158, southeast of US 158 Business, and mostly north of NC 43. The site consists of roughly ten separate tracts, with two being located south of NC 43. Little Fishing Creek passes through or alongside many of the northeastern tracts, Reedy Creek passes along the western tracts, and Fishing Creek passes along the two southern tracts.

DESCRIPTION: State-listed aquatic animals found in creeks – Little Fishing, Reedy, and Fishing – within Embro Game Land are the Neuse River waterdog (*Necturus lewisi*), Atlantic pigtoe (*Fusconaia masoni*), creeper (*Strophitus undulatus*), notched rainbow (*Villosa constricta*), and North Carolina spiny crayfish (*Orconectes carolinensis*). The broader aquatic habitat also contains federally listed aquatic species. Protection of floodplains within the game land will also protect the water quality of these creeks and thus greatly benefit the populations of these and other animals in the waters.

Most of the area surveyed consists of loblolly pine plantations and recently clearcut pine plantations, essentially all of which lie in uplands. A few upland areas contain hardwood forests, but these are found on moderate to steep slopes. The remainder of the area surveyed consist of floodplains, most of which are in good to excellent condition and contain a variety of natural communities.

The most widespread of the intact natural communities is Piedmont Alluvial Forest. Where not thinned (to harvest oaks) in past decades, the canopy is dominated by a mix of swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Q. pagoda*), willow oak (*Q. phellos*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), and many others. Areas slightly younger in age often show more sycamore (*Platanus occidentalis*) and river birch (*Betula nigra*). American hornbeam (*Carpinus caroliniana*) is the most common understory tree, but box-elder (*Acer negundo*) can be common on richer floodplains. Tall pawpaw (*Asimina triloba*), spicebush (*Lindera benzoin*), and cane (*Arundinaria gigantea*) are among the numerous shrub species. The herb layer in relatively pristine areas is lush, with species such as spring beauty (*Claytonia virginica*), trout lily (*Erythronium umbilicatum*), and a variety of grasses and sedges.

A small percentage of the floodplains support the Piedmont Swamp Forest natural community type. This is a rather scarce community, almost always being less than ten acres in size. These wet areas are dominated by green ash (*Fraxinus pensylvanica*) and red maple (*Acer rubrum*). The often muddy ground contains shrubs such as swamp dogwood (*Cornus amomum*) and elderberry (*Sambucus canadensis*), and herbs such as false-nettle (*Boehmeria cylindrica*), lizard's-tail (*Saururus cernuus*), and netted chain-fern (*Woodwardia areolata*). Somewhat more numerous than swamps are Floodplain Pools, which seldom are larger than one to two acres in size. These areas usually contain standing water in winter and early spring but are dry for most of the year. Willow oak is normally present, as well as sweetgum; a few overcup oaks (*Q. lyrata*) are present at some pools. Highbush blueberry (*Vaccinium corymbosum*), common greenbrier (*Smilax rotundifolia*), and common winterberry (*Ilex verticillata*) are usual woody species, and herbs are dominated by various sedges (*Carex* spp.). These pools are important breeding sites for frogs and salamanders. A few Low Elevation Seep communities are also present on several of the tracts.

Beaver ponds are frequently found in the floodplains. These Piedmont Semipermanent Impoundments come in an array of types, mostly depending on the age of the ponds; they range from those with some standing water, to extensive marshes, to wet shrub thickets, to large areas of standing dead trees. This is a very important wildlife habitat, home to various turtles, frogs, and birds, among others; the dead trees are important foraging habitat for woodpeckers.

Few of the areas surveyed contain significant hardwood slopes, as most slopes were timbered and planted in pines several decades ago. However, some slopes on the southwest side of Little Fishing Creek (east of Odell-Arcola Road) and on the south side of this creek (east of Briston Brown Road) contain extensive mature hardwood stands, essentially Mesic Mixed Hardwood Forest, with small areas of Basic Mesic Forest, Intermediate Subtype also present. Common canopy trees are northern red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), and tuliptree (*Liriodendron tulipifera*). The understory and shrub layers are somewhat sparse; species include viburnums (*Viburnum rafinesquianum, V. dentatum*), spicebush, and American hazelnut (*Corylus americana*). The very diverse herb layer contains wildflowers such as mayapple (*Podophyllum peltatum*), perfoliate bellwort (*Uvularia perfoliata*), black cohosh (*Cimicifuga racemosa*), bloodroot (*Sanguinaria canadensis*), wild geranium (*Geranium maculatum*), devil's-bit (*Chamaelirium luteum*), and dwarf crested iris (*Iris cristata*). Christmas fern (*Polystichum acrostichoides*) is common, and some maidenhair fern (*Adiantum pedatum*) is present.

The tract that lies along Reedy Creek above Hugh Davis Road contains a remarkable, isolated 25' high knoll in that creek's floodplain. Though the community is a Mesic Mixed Hardwood Forest, it is quite diverse and contains locally unusual plants such as Indian cucumber-root (*Medeola virginiana*) and mountain holly (*Ilex montana*).

The hardwood forests provide good to excellent wildlife habitat for many species, especially for Neotropical migrant bird species that breed in the region, as well as for wild turkeys. Though the pine plantations are poor wildlife habitats, the recent clearcuts of the pine stands are important habitats for birds and mammals using early succession habitats, even if such habitats are available at a particular site for just a few years.

BOUNDARY JUSTIFICATIONS: Many of the primary areas defined are those with fairly

BOUNDARY JUSTIFICATIONS: Many of the primary areas defined are those with fairly mature to mature stands of hardwood forest – both upland and wetland, plus open water, marsh, and wet thickets associated with beaver ponds. A minimum 300-foot primary area is defined along each side of any riparian areas defined as part of the Significant Aquatic Habitat, supporting the numerous federally listed and rare aquatic species. A minimum 200-foot primary area is defined on each side of any tributaries draining into the Significant Aquatic Habitat. Several areas within the 100-year floodplain have been designated specifically as restoration areas, with the goal of restoring natural floodplain communities. Mixed pine-hardwood stands, pine stands (whether pine plantations or not), and clearcuts/early succession fields are included within buffer areas.

MANAGEMENT AND USE: The preserve is managed to provide habitat for a wide array of wildlife species, to be used by hunters as a game land. Other activities, such as trapping, nature study, and bird-watching, are expected to take place.

Little management is needed within the primary areas. It is important to avoid, or highly limit, vehicular traffic in such areas, such as hunters driving trucks into the primary areas to be closer to deer stands, because mechanical disturbance can easily allow exotic plants to invade such areas. Japanese stiltgrass (*Microstegium vimineum*) is particularly aggressive along jeep roads and other disturbed areas, moving into undisturbed floodplains quite readily. Japanese honeysuckle (*Lonicera japonica*) and Chinese privet (*Ligustrum sinense*) are other aggressive exotic species that readily colonize disturbed areas. Fortunately, the latter species is relatively scarce in the game land, though honeysuckle is present and generally common on all tracts.

Within the buffer areas, burning of pine stands or early succession stands may be beneficial to many species of wildlife, especially those preferring thick herbaceous cover, as burning promotes a denser stand of grasses and forbs for a few years after the burn than would be present with simply cutting of woody growth but no fire. However, burns should not be allowed to move into hardwood forest stands, as burns often kill or knock back shrubs and saplings that are used for foraging, for cover, and for nesting by songbirds. Burns do yield a thicker herb layer in hardwood floodplains and slopes, for a few years, but the trade-off of less cover of shrubs and saplings might be an overall detriment to animal species in such a burned forested area.

MAP: attached

(October 2009, NC NHP)

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1. As used in this Letter, the terms "natural area" and "nature preserve" shall have the same meaning as contained in North Carolina General Statutes, section 113A-164.3.

2. Pursuant to North Carolina General Statutes 113-164.8, all State-owned lands lying within the above designated area(s) are hereby dedicated as a nature preserve to be known collectively as the Embro Game Land Nature Preserve (hereinafter "preserve") for the purposes provided in the North Carolina Nature Preserves Act, as amended, and other applicable law, and said State-owned land, shall be held, maintained, and used exclusively for said purposes.

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5. **Management Areas:** For the purposes of management, the preserve shall be considered to consist of a Primary Area (approximately 2,646 acres) and a Buffer Area (approximately 6,198 acres), as more particularly described in Exhibit A, attached thereto and by this reference made a part hereof. The Primary Area consists essentially of significant aquatic habitat supporting numerous rare mussels, amphibians, and crayfish in the vicinity, and federally listed species in the broader habitat. It also includes the adjoining high-quality Piedmont Alluvial Forest and Piedmont Swamp Forest, with scattered Floodplain Pools and Piedmont Semipermanent Impoundments. Uplands support examples of Mesic Mixed Hardwood Forest and Basic Mesic Forest.

   The Primary Area is deemed by the Secretary of the North Carolina Department of Environment and Natural Resources to qualify as an outstanding natural area under statutory criteria for nature preserve dedication (G.S. 113A-164.6) and further serves all of the public purposes for a dedicated preserve as stated in Administrative Rules 15A NCAC 12H.0301(b).

   The Buffer Area, which contributes to the management and protection of the Primary Area, consists of mixed pine-hardwood stands, pine forests and plantations, and fields.

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serve. These activities may specifically be regulated by the Custodian to protect and conserve the natural values of the preserve.

Activities and uses unrelated to those listed above are prohibited except as otherwise provided in these Articles or unless necessary to carry out the purposes of the preserve. Prohibited activities include, but are not limited to: construction; commercial activities and development; commercial silviculture; agriculture and grazing; gathering of native species of plants or plant products; the removal, disturbance, molestation, or defacement of minerals, archaeological and natural resources, except for research purposes as approved by the Custodian; and those activities specifically restricted in these Articles.

There shall be no fires, except as necessary for ecological management of the preserve or in conjunction with supervised educational activities of the Custodian, or further excepted as herein provided or otherwise expressly permitted.

B. Consumptive Wildlife Uses: Hunting, fishing, and trapping shall be permitted on the preserve subject to regulations and management by the North Carolina Wildlife Resources Commission.

C. Orientation and Guidance of Visitors: The Custodian reserves the right to orient and guide visitors for educational programs, hunting and fishing uses, scientific research, and for preserve management. Exhibits, programs, and printed materials may be provided by the Custodian in service areas. The Custodian may restrict access to visitors in those instances or in such areas that restrictions may be determined necessary to safeguard sensitive environmental resources in the preserve.

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Specifically, a component of the management plan will address the restoration areas located as mapped in Exhibit A within the 100-year floodplain. The goal within these areas will be to restore natural community structure, composition, and function, in consultation with the North Carolina Natural Heritage Program.

E. Wild Fire Control/Prescribed Burning: Wild fires may mimic natural processes historically occurring in an ecosystem on a landscape level. When the extent of a

wild fire does not threaten human life or structures, it may be allowed to burn with minimal control. If wild fire control is necessary, firebreaks may need to be established. When possible, existing roads and firebreaks will be utilized for wild fire control. When new firebreaks need to be established, environmentally sensitive areas will be avoided when possible. Old firebreaks which affect the natural hydrology of wetlands will be filled and allowed to revegetate. Planning of firebreak restoration should occur in consultation with the North Carolina Natural Heritage Program.

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J. Research and Collecting Permits: Any person wishing to engage in scientific research requiring collecting or otherwise affecting anything within the preserve shall first secure written permission from the Custodian.

K. Roads and Trails: New roads shall generally not be constructed in the Primary Area. Due to limited access, several new roads for public access shall be constructed in the Buffer Area, but only one of these will cross the designated Primary Area (as shown on the map in Exhibit A). Fragmentation of the Primary Area and impacts during construction of this road will be minimized. When necessary, the Custodian may construct and maintain access limited to staff use for management purposes, such as service paths (single lane vegetated paths) for patrol, right-of-way maintenance, and other management activities, within the Primary Area. Number and width of new paths will be minimized, and sensitive areas avoided when possible. Existing roads that occur within or form a boundary of the Primary Area may be maintained by grading of the roadbed, replacing culverts, or adding stone as needed in order to maintain the integrity of the road for vehicular use. Daylighting of roads within the Primary Area should be minimized, but may be used if necessary to maintain the condition of the road. Access management and construction will be part of the overall management planning process and will include consultation with the North Carolina Natural Heritage Program.

L. Other Structures and Improvements: Structures or facilities shall not be erected by the Custodian within a preserve, except as may be consistent with the purposes of the preserve as stated in this dedication. Site selection shall be consistent with this dedication.

M. Management Plan: The Wildlife Resources Commission, as Primary Custodian of the preserve, shall be required to prepare and submit for approval to the Secretary of the Department of Environment and Natural Resources a management plan for the preserve. The management plan will be part of the larger management plan developed for the gamelands. This plan shall be subject to all the provisions of this dedication and shall additionally be consistent with the management principles set forth in the North Carolina Administrative Code 15A NCAC 12H.0300 and .0400, and such other regulations as may be established from time to time by the Secretary of the Department of Environment and Natural Resources. In any case where contradictions may arise between this instrument of dedication and other management regulations, the terms of this dedication shall take precedence.

7. **Rules for Management of the Buffer Area(s)**: Primary area rules also apply except that additional forestry and wildlife management activities may be planned and carried out as needed. Construction and maintenance of roads, trails, and other access structures within buffer area(s) of the preserve will be limited to the level necessary to appropriately manage the preserve. These activities will be conducted in accordance with policy of the N.C. Wildlife Resources Commission and general management philosophy as outlined in Commission planning documents, in addition to providing for the buffer functions in relation to the primary area(s). WRC rules and guidelines require the protection and en-

hancement of wildlife populations and habitat so that hunting, fishing, trapping and other wildlife recreational opportunities are available to citizens of this State. Forest management is primarily conducted to enhance wildlife habitat.

Buffer functions within the dedicated area may include protecting the primary area(s) from indirect detrimental ecological effects, providing additional area for species and ecological processes that require larger areas, and providing important successional stages and disturbance regimes and other habitat diversity for wildlife. Based on these general objectives, the following buffer functions will be addressed in the management plan.

1) Landscape level function of community type and structure. (Buffer area management may involve timber harvest and other forms of stand manipulation, but will not involve forest canopy type conversion over more than limited areas, other than to restore stands to types suited for the site. Introduction of exotic species known to be invasive in natural communities will be avoided.)
2) Maintenance of habitat connectivity and continuity among primary areas.
3) Providing for habitat diversity.
4) Management needs of rare animal and plant species populations occurring within the buffer area; and
5) Protection of soil and hydrologic resources and processes within the primary area and extending into the buffer. (Buffers will be retained along streams, and watersheds of primary areas will be protected from hydrologic alteration.)

8. **Amendment and Modification**: The terms and conditions of this dedication may be amended or modified upon agreement of the Wildlife Resources Commission and Secretary of the Department of Environment and Natural Resources, and approved by the Council of State. Any portion of the tract dedicated pursuant to this instrument may be removed from dedication in accordance with the provisions of North Carolina General Statutes 113A-164.8.

9. **Permanent Plaque**: The Custodian should erect and maintain a permanent plaque or other appropriate marker at a prominent location within the preserve bearing the following statement: "This Area is Dedicated as a State Nature Preserve."

North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Moses Carey, Jr., Secretary

February 20, 2012

Secretary Dee Freeman
Department of Environment and Natural Resources
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Mr. Gordon S. Myers, Executive Director
N.C. Wildlife Resources Commission
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Re: Dedication of Portions of the **Sandy Creek Game Land**, Franklin and Nash Counties

Dear Secretary Freeman and Mr. Myers:

Pursuant to Article 9A, Chapter 113A of the North Carolina General Statutes, this letter of allocation is executed for the purpose of dedicating the State-owned lands hereinafter described as a North Carolina Nature Preserve

This real property is currently administered by the North Carolina Wildlife Resources Commission as a portion of the Sandy Creek Game Land, and consists of approximately 923 acres located in Franklin and Nash Counties, composed of:

1.	Sandy Creek Game Land (Primary Area)	277 acres
2.	Sandy Creek Game Land (Buffer Area)	646 acres

all of which are specifically described in Exhibit A, attached hereto and by reference made a part hereof. The dedicated land shall be known collectively as the Sandy Creek Game Land Dedicated Nature Preserve.

Mailing Address:
1301 Mail Service Center
Raleigh, N.C. 27699-1301

Telephone (919) 807-2425
Fax (919) 733-9571
State Courier #51-01-00
e-mail: moses.carey@doa.nc.gov

Location:
116 West Jones Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer

Dedication of the qualified portions of the tracts fulfills the terms of any prior grant agreements, including those of the Natural Heritage Trust Fund and the Clean Water Management Trust Fund.

The Governor and Council of State have approved the dedication of the State-owned lands hereinabove described as the Sandy Creek Game Land Dedicated Nature Preserve to be held in trust by the Custodian for the uses and purposes expressed in the Nature Preserves Act at a meeting held in the City of Raleigh, North Carolina, on the 13th of September, 2011.

Sincerely,

Moses Carey, Jr.

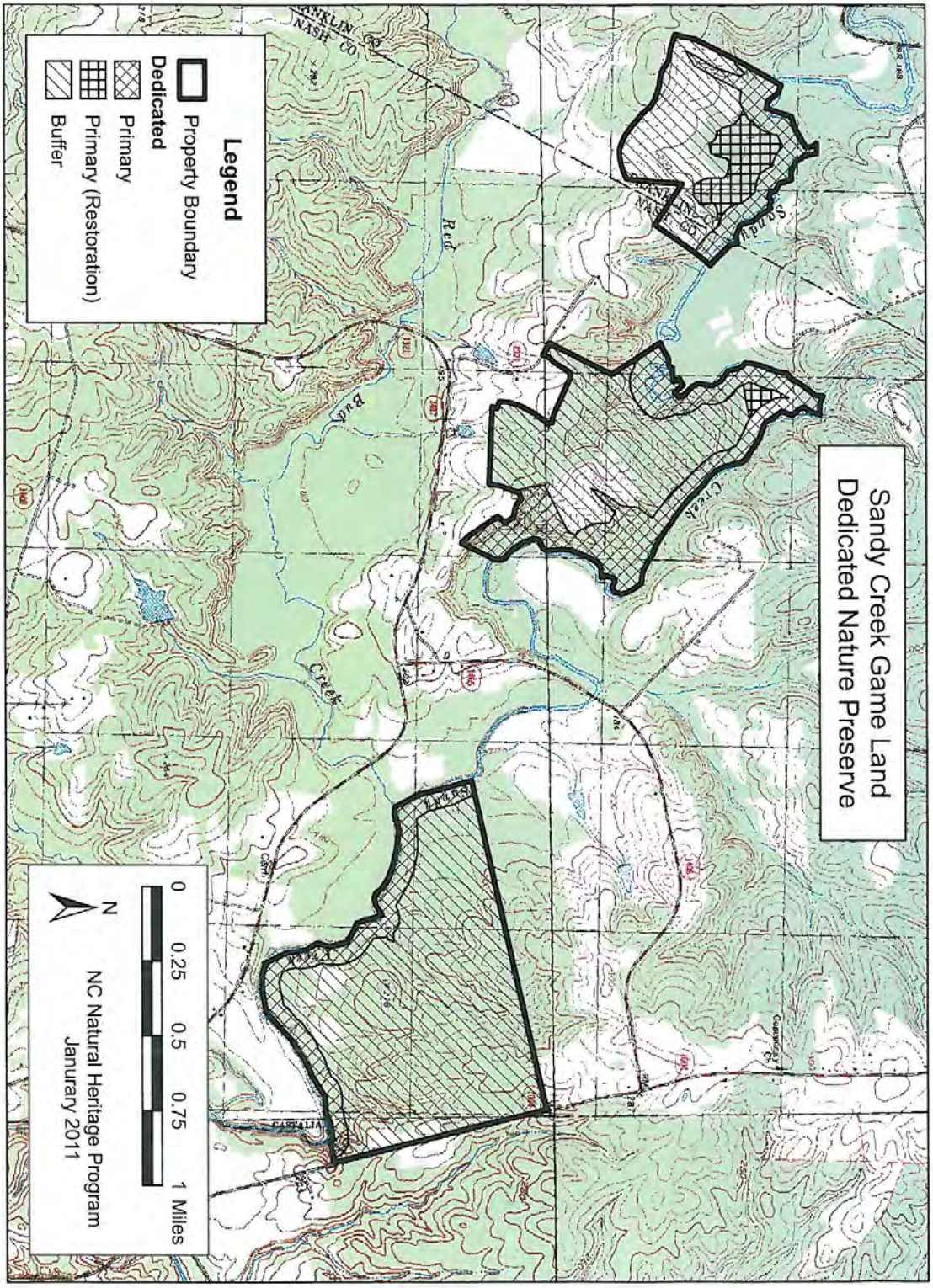
MC

Attachment

CONSENTED AND AGREED TO:

Secretary Dee Freeman
Department of Environment and Natural Resources

Gordon S. Myers, Executive Director
Wildlife Resources Commission


Sandy Creek Game Land
Dedicated Nature Preserve
Legend
Property Boundary
Dedicated
Primary
Primary (Restoration)
Buffer
0
0.25
0.5
0.75
1 Miles
N
NC Natural Heritage Program
Janurary 2011

SANDY CREEK GAME LAND
DEDICATED NATURE PRESERVE

DESCRIPTION

COUNTIES: Franklin, Nash PHYSIOGRAPHIC PROVINCE: Piedmont

TOPOGRAPHIC MAPS: Castalia, Centerville, Red Oak

SIZE OF AREA: ca. 923 acres (primary area 277 acres, including restoration areas totaling 37 acres; buffer area 646 acres)

OWNER/ADMINISTRATION: State of North Carolina, Wildlife Resources Commission

LOCATION: The northwestern portion of Nash County, and the extreme northeastern portion of Franklin County; the site lies about 3 miles northeast and north of the town of Castalia. The three tracts are all located along Sandy Creek, with the creek forming the northern boundaries of the two westernmost tracts, and forming the southern boundary of the eastern tract.

DESCRIPTION: There are a number of State-listed aquatic animals found in Sandy Creek both upstream and downstream of this game land and thus can be assumed to occur alongside it: the Neuse River waterdog (*Necturus lewisi*), Atlantic pigtoe (*Fusconaia masoni*), creeper (*Strophitus undulatus*), notched rainbow (*Villosa constricta*), yellow lampmussel (*Lampsilis cariosa*), and triangle floater (*Alasmidonta undulata*). The broader aquatic habitat also contains federally listed aquatic species. Protection of floodplains within the game land will also protect the water quality of these creeks and thus greatly benefit the populations of these and other animals in the waters.

Most of the area surveyed consists of loblolly pine plantations and recently clearcut pine plantations, essentially all of which lie in uplands. A few upland areas contain hardwood forests, but these are found on moderate to steep slopes. The remainder of the area surveyed consist of floodplains, most of which are in good to excellent condition and contain a variety of natural communities.

The most significant of the intact natural communities is an uncommon subtype – Mesic Mixed Hardwood Forest, Floodplain subtype, which is practically the entirety of the floodplain of Sandy Creek in the eastern tract. The canopy is dominated by American beech (*Fagus grandifolia*), along with white oak (*Quercus alba*), a variety of other oak species, and a variety of hickory (*Carya* spp.) species. The understory is moderate in density; American holly (*Ilex opaca*) and American hornbeam (*Carpinus caroliniana*) are numerous. The shrub layer is open in many areas, but moderate in density in others. Characteristic shrubs are witch-hazel (*Hamamelis virginiana*) and sweetleaf (*Symplocos tinctoria*), along with a good mix of viburnum (*Viburnum* spp.) and blueberry (*Vaccinium* spp.) species. The herb layer is generally not dense. Drier areas contain much partridge-berry (*Mitchella repens*); lower areas contain much river-oats (*Chasmanthium latifolium*) and trend more toward Piedmont Alluvial Forest natural community.

The second significant natural community is Piedmont Boggy Streamhead, which is found in the

western portion of the western tract, along a tributary to Sandy Creek. Common species at this site include cinnamon fern (*Osmunda cinnamomea*), spicebush (*Lindera benzoin*), cane (*Arundinaria gigantea*), several species of greenbriers (*Smilax* spp.), and lizard's-tail (*Saururus cernuus*). Of interest are the locally rare bamboo-vine (*Smilax laurifolia*) and the Watch List crested woodfern (*Dryopteris cristata*). This tract also contains a variety of "Coastal Plain" plant species in a low portion of the Buffer Area: notable are inkberry (*Ilex glabra*), Virginia chain-fern (*Woodwardia virginica*), bog-buttons (*Lachnocaulon anceps*), and especially golden colicroot (*Aletris aurea*).

More typical floodplain and lower slope communities are present, but they are not of significance because of small acreage. These include Piedmont Alluvial Forest, Low Elevation Seep, Floodplain Pool, and Mesic Mixed Hardwood Forest, Typic subtype. A few small bluffs contain mountain laurel (*Kalmia latifolia*), but they are not of sufficient height to be Heath Bluff communities.

No obvious beaver ponds are present in the preserve. The value of the wetlands for wildlife species is probably not great; however, a number of "Coastal Plain" plant species are present (see above paragraph), as are several animals that are primarily found in that province – such as cottonmouth (*Agkistrodon piscivorus*), bluespotted sunfish (*Enneacanthus gloriosus*), and lace-winged roadside-skipper (*Amblyscirtes aesculapius*).

BOUNDARY JUSTIFICATIONS: The primary area contains all the fairly mature to mature stands of hardwood forest – both upland and wetland. A minimum 300-foot primary area is defined along each side of any riparian areas defined as part of the Significant Aquatic Habitat, supporting the numerous federally listed and rare aquatic species. A minimum 200-foot primary area is defined on each side of any tributaries draining into the Significant Aquatic Habitat. Mixed pine-hardwood stands, pine stands (whether pine plantations or not), and clearcuts/early succession fields are included within buffer areas.

MANAGEMENT AND USE: The preserve is managed to provide habitat for a wide array of wildlife species, to be used by hunters as a game land. Other activities, such as trapping, nature study, and bird-watching, are expected to take place.

Little management is needed within the primary areas. It is important to avoid, or highly limit, vehicular traffic in such areas, such as hunters driving trucks into the primary areas to be closer to deer stands, because mechanical disturbance can easily allow exotic plants to invade such areas. Japanese stiltgrass (*Microstegium vimineum*) is particularly aggressive along jeep roads and other disturbed areas, moving into undisturbed floodplains quite readily. Japanese honeysuckle (*Lonicera japonica*) and Chinese privet (*Ligustrum sinense*) are other aggressive exotic species that readily colonize disturbed areas. Fortunately, the latter species is relatively scarce in the game land, though honeysuckle is present and generally common on all tracts.

Within the buffer areas, burning of pine stands or early succession stands may be beneficial to many species of wildlife, especially those preferring thick herbaceous cover, as burning promotes a denser stand of grasses and forbs for a few years after the burn than would be present with simply cutting of woody growth but no fire. However, burns should not be allowed to move into

hardwood forest stands, as burns often kill or knock back shrubs and saplings that are used for foraging, for cover, and for nesting by songbirds. Burns do yield a thicker herb layer in hardwood floodplains and slopes, for a few years, but the trade-off of less cover of shrubs and saplings might be an overall detriment to animal species in such a burned forested area. Burning of the portion of the western tract where there are a number of Coastal Plain plant species is certainly recommended to promote this "savanna/flatwoods" floral element.

MAP: attached

(October 2009, NC NHP)

THIS DEDICATION OF THE SANDY CREEK GAME LAND NATURE PRESERVE IS MADE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

1. As used in this Letter, the terms "natural area" and "nature preserve" shall have the same meaning as contained in North Carolina General Statutes, section 113A-164.3.

2. Pursuant to North Carolina General Statutes 113-164.8, all State-owned lands lying within the above designated area(s) are hereby dedicated as a nature preserve to be known collectively as the Sandy Creek Game Land Nature Preserve (hereinafter "preserve") for the purposes provided in the North Carolina Nature Preserves Act, as amended, and other applicable law, and said State-owned land, shall be held, maintained, and used exclusively for said purposes.

3. **Primary Custodian**: The primary custodian of the preserve will be the North Carolina Wildlife Resources Commission, which will be responsible for managing the preserve in accordance with State Administrative Code 15A NCAC 12H.0300 and .0400.

4. **Primary Classification**: The primary classifications and purposes of the preserve will be conservation, nature education, wildlife management, hunting, fishing, trapping, and other recreational uses authorized by the Primary Custodian. The ecological significance of the preserve is described in Exhibit A.

5. **Management Areas:** For the purposes of management, the preserve shall be considered to consist of a Primary Area (approximately 277 acres) and a Buffer Area (approximately 646 acres), as more particularly described in Exhibit A, attached thereto and by this reference made a part hereof. The Primary Area consists essentially of the significant aquatic habitat supporting numerous rare mussels and amphibians in the vicinity, and federally listed species in the broader habitat. It also includes the adjoining high-quality Piedmont Alluvial Forest and Piedmont Swamp Forest, with scattered Floodplain Pools and Piedmont Semipermanent Impoundments. Uplands support examples of Mesic Mixed Hardwood Forest and Basic Mesic Forest.

   The Primary Area is deemed by the Secretary of the North Carolina Department of Environment and Natural Resources to qualify as an outstanding natural area under statutory criteria for nature preserve dedication (G.S. 113A-164.6) and further serves all of the public purposes for a dedicated preserve as stated in Administrative Rules 15A NCAC 12H.0301(b).

   The Buffer Area, which contributes to the management and protection of the Primary Area, consists of mixed pine-hardwood stands, pine forests and plantations, and fields.

6. **Rules for Management of the Primary Area(s)**:

   A. Character of Visitor Activity: The principal visitor activities in the preserve shall be hunting, fishing, trapping, walking, research, and observation. These activities shall be regulated by the Custodian to prevent significant disturbance of the pre-

serve. These activities may specifically be regulated by the Custodian to protect and conserve the natural values of the preserve.

Activities and uses unrelated to those listed above are prohibited except as otherwise provided in these Articles or unless necessary to carry out the purposes of the preserve. Prohibited activities include, but are not limited to: construction; commercial activities and development; commercial silviculture; agriculture and grazing; gathering of native species of plants or plant products; the removal, disturbance, molestation, or defacement of minerals, archaeological and natural resources, except for research purposes as approved by the Custodian; and those activities specifically restricted in these Articles.

There shall be no fires, except as necessary for ecological management of the preserve or in conjunction with supervised educational activities of the Custodian, or further excepted as herein provided or otherwise expressly permitted.

B. Consumptive Wildlife Uses: Hunting, fishing, and trapping shall be permitted on the preserve subject to regulations and management by the North Carolina Wildlife Resources Commission.

C. Orientation and Guidance of Visitors: The Custodian reserves the right to orient and guide visitors for educational programs, hunting and fishing uses, scientific research, and for preserve management. Exhibits, programs, and printed materials may be provided by the Custodian in service areas. The Custodian may restrict access to visitors in those instances or in such areas that restrictions may be determined necessary to safeguard sensitive environmental resources in the preserve.

D. Disturbance of Natural Resources: The cutting or removal of trees, dead or alive, or the disturbance of other natural resources is prohibited except as necessary for removal of hazards to visitors, control of disease or insect infestations that would damage or reduce the significance of the preserve, restoration after severe storm damage, trail clearance and maintenance, or for purposes of maintenance or restoration of natural communities or rare species populations as stipulated in the preserve management plan and that which is consistent with the purposes of these Articles. Salvage timber cuts which may be necessary due to natural catastrophe will be allowed in both Primary and Buffer Areas, but in a manner that will contribute to the recovery of the prevailing natural conditions of the forest and in consultation with the North Carolina Natural Heritage Program.

Specifically, a component of the management plan will address the restoration areas located as mapped in Exhibit A within the 100-year floodplain. The goal within these areas will be to restore natural community structure, composition, and function, in consultation with the North Carolina Natural Heritage Program.

E. Wild Fire Control/Prescribed Burning: Wild fires may mimic natural processes historically occurring in an ecosystem on a landscape level. When the extent of a

wild fire does not threaten human life or structures, it may be allowed to burn with minimal control. If wild fire control is necessary, firebreaks may need to be established. When possible, existing roads and firebreaks will be utilized for wild fire control. When new firebreaks need to be established, environmentally sensitive areas will be avoided when possible. Old firebreaks which affect the natural hydrology of wetlands will be filled and allowed to revegetate. Planning of firebreak restoration should occur in consultation with the North Carolina Natural Heritage Program.

F. Water Control: The purpose of water control shall be to maintain the preserve's natural water regime. Water levels that have been altered by man may be changed if necessary to restore the preserve to its natural condition. In a preserve with a long history of managed hydrology, water levels may be managed to perpetuate the ecosystems that have evolved around the hydrology or may be restored to natural condition. This decision should be made in consultation with the Natural Heritage Program. Millponds are an example of situations in which water levels have been historically managed.

G. Pollution and Dumping: There will be no storage or dumping of ashes, trash, garbage, hazardous substances, toxic waste, other unsightly or offensive material, or fill material, including dredge spoil in, on, or under the preserve. No underground storage tanks may be placed within the preserve. No surface or ground waters of the preserve may have pollutants added within the preserve.

H. Control of Vegetational Succession: Control of vegetational succession may be undertaken if necessary to maintain or restore a particular natural ecosystem type or to preserve endangered, threatened, rare, or other unusual species. Controls will be done in the manner that best imitates the natural forces believed responsible for maintaining the natural ecosystem type, or that minimizes unnatural effects on non-target portions of the ecosystem. Prescribed burning is particularly essential to ecosystems where natural wild fire historically suppressed woody vegetation and promoted herbaceous diversity.

I. Control of Populations: Any control of animal or plant populations on the preserve shall be for the purpose of correcting those situations where those populations are significantly affecting natural conditions on the preserve, and in accordance with the Custodian's established regulations for hunting, trapping, or fishing of designated game animals. The Custodian may, in consultation with the North Carolina Natural Heritage Program, apply biological controls, herbicides and pesticides, and other means deemed necessary or appropriate to control or eradicate exotic or native species of plant or animal that are degrading the natural character of the preserve. Because of potential impacts on native species, no exotic flora or fauna shall be introduced into the preserve.

J. Research and Collecting Permits: Any person wishing to engage in scientific research requiring collecting or otherwise affecting anything within the preserve shall first secure written permission from the Custodian.

K. Roads and Trails: New roads shall not be constructed in the Primary Area. When necessary, the Custodian may construct and maintain access limited to staff use for management purposes, such as service paths (single lane vegetated paths) for patrol, right-of-way maintenance, and other management activities, within the Primary Area. Number and width of new paths will be minimized, and sensitive areas avoided when possible. Existing roads that occur within or form a boundary of the Primary Area may be maintained by grading of the roadbed, replacing culverts, or adding stone as needed in order to maintain the integrity of the road for vehicular use. Daylighting of roads within the Primary Area should be minimized, but may be used if necessary to maintain the condition of the road. Access management and construction will be part of the overall management planning process and will include consultation with the North Carolina Natural Heritage Program.

L. Other Structures and Improvements: Structures or facilities shall not be erected by the Custodian within a preserve, except as may be consistent with the purposes of the preserve as stated in this dedication. Site selection shall be consistent with this dedication.

M. Management Plan: The Wildlife Resources Commission, as Primary Custodian of the preserve, shall be required to prepare and submit for approval to the Secretary of the Department of Environment and Natural Resources a management plan for the preserve. The management plan will be part of the larger management plan developed for the gamelands. This plan shall be subject to all the provisions of this dedication and shall additionally be consistent with the management principles set forth in the North Carolina Administrative Code 15A NCAC 12H.0300 and .0400, and such other regulations as may be established from time to time by the Secretary of the Department of Environment and Natural Resources. In any case where contradictions may arise between this instrument of dedication and other management regulations, the terms of this dedication shall take precedence.

7. **Rules for Management of the Buffer Area(s)**: Primary area rules also apply except that additional forestry and wildlife management activities may be planned and carried out as needed. Construction and maintenance of roads, trails, and other access structures within buffer area(s) of the preserve will be limited to the level necessary to appropriately manage the preserve. These activities will be conducted in accordance with policy of the N.C. Wildlife Resources Commission and general management philosophy as outlined in Commission planning documents, in addition to providing for the buffer functions in relation to the primary area(s). WRC rules and guidelines require the protection and enhancement of wildlife populations and habitat so that hunting, fishing, trapping and other wildlife recreational opportunities are available to citizens of this State. Forest management is primarily conducted to enhance wildlife habitat.

Buffer functions within the dedicated area may include protecting the primary area(s) from indirect detrimental ecological effects, providing additional area for species and ecological processes that require larger areas, and providing important successional stages and disturbance regimes and other habitat diversity for wildlife. Based on these general objectives, the following buffer functions will be addressed in the management plan.

1) Landscape level function of community type and structure. (Buffer area management may involve timber harvest and other forms of stand manipulation, but will not involve forest canopy type conversion over more than limited areas, other than to restore stands to types suited for the site. Introduction of exotic species known to be invasive in natural communities will be avoided.)
2) Maintenance of habitat connectivity and continuity among primary areas.
3) Providing for habitat diversity.
4) Management needs of rare animal and plant species populations occurring within the buffer area; and
5) Protection of soil and hydrologic resources and processes within the primary area and extending into the buffer. (Buffers will be retained along streams, and watersheds of primary areas will be protected from hydrologic alteration.)

8. **Amendment and Modification**: The terms and conditions of this dedication may be amended or modified upon agreement of the Wildlife Resources Commission and Secretary of the Department of Environment and Natural Resources, and approved by the Council of State. Any portion of the tract dedicated pursuant to this instrument may be removed from dedication in accordance with the provisions of North Carolina General Statutes 113A-164.8.

9. **Permanent Plaque**: The Custodian should erect and maintain a permanent plaque or other appropriate marker at a prominent location within the preserve bearing the following statement: "This Area is Dedicated as a State Nature Preserve."

North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Moses Carey, Jr., Secretary

February 20, 2012

Secretary Dee Freeman
Department of Environment and Natural Resources
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Mr. Gordon S. Myers, Executive Director
N.C. Wildlife Resources Commission
512 N. Salisbury Street
Raleigh, North Carolina 27603-8003

Re: Dedication of Portions of the **Shocco Creek Game Land**, Franklin and Warren Counties

Dear Secretary Freeman and Mr. Myers:

Pursuant to Article 9A, Chapter 113A of the North Carolina General Statutes, this letter of allocation is executed for the purpose of dedicating the State-owned lands hereinafter described as a North Carolina Nature Preserve. These articles of dedication replace the articles of dedication dated February 28, 2005.

These real properties are currently administered by the North Carolina Wildlife Resources Commission as a portion of the Shocco Creek Game Land and consist of approximately 7,928 acres located in Franklin and Warren Counties, composed of:

1. Shocco Creek tracts (Primary Area)	2,536 acres
2. Shocco Creek tracts (Buffer Area)	5,392 acres

which are specifically described in Exhibit A, attached hereto and by reference made a part hereof. The dedicated land shall be known collectively as the Shocco Creek Game Land Nature Preserve.

Mailing Address:
1301 Mail Service Center
Raleigh, N.C. 27699-1301

Telephone (919) 807-2425
Fax (919) 733-9571
State Courier #51-01-00
e-mail: moses.carey@doa.nc.gov

Location:
116 West Jones Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer

Dedication of the qualified portions of the tracts fulfills the terms of any prior grant agreements, including those of the Natural Heritage Trust Fund and the Clean Water Management Trust Fund.

The Governor and Council of State have approved the dedication of the State-owned lands hereinabove described as the Shocco Creek Game Land Dedicated Nature Preserve to be held in trust by the Custodian for the uses and purposes expressed in the Nature Preserves Act at a meeting held in the City of Raleigh, North Carolina, on the 13th of September, 2011.

Sincerely,

Moses Carey, Jr.

MC

Attachment

CONSENTED AND AGREED TO:

Secretary Dee Freeman
Department of Environment and Natural Resources

Gordon S. Myers, Executive Director
Wildlife Resources Commission

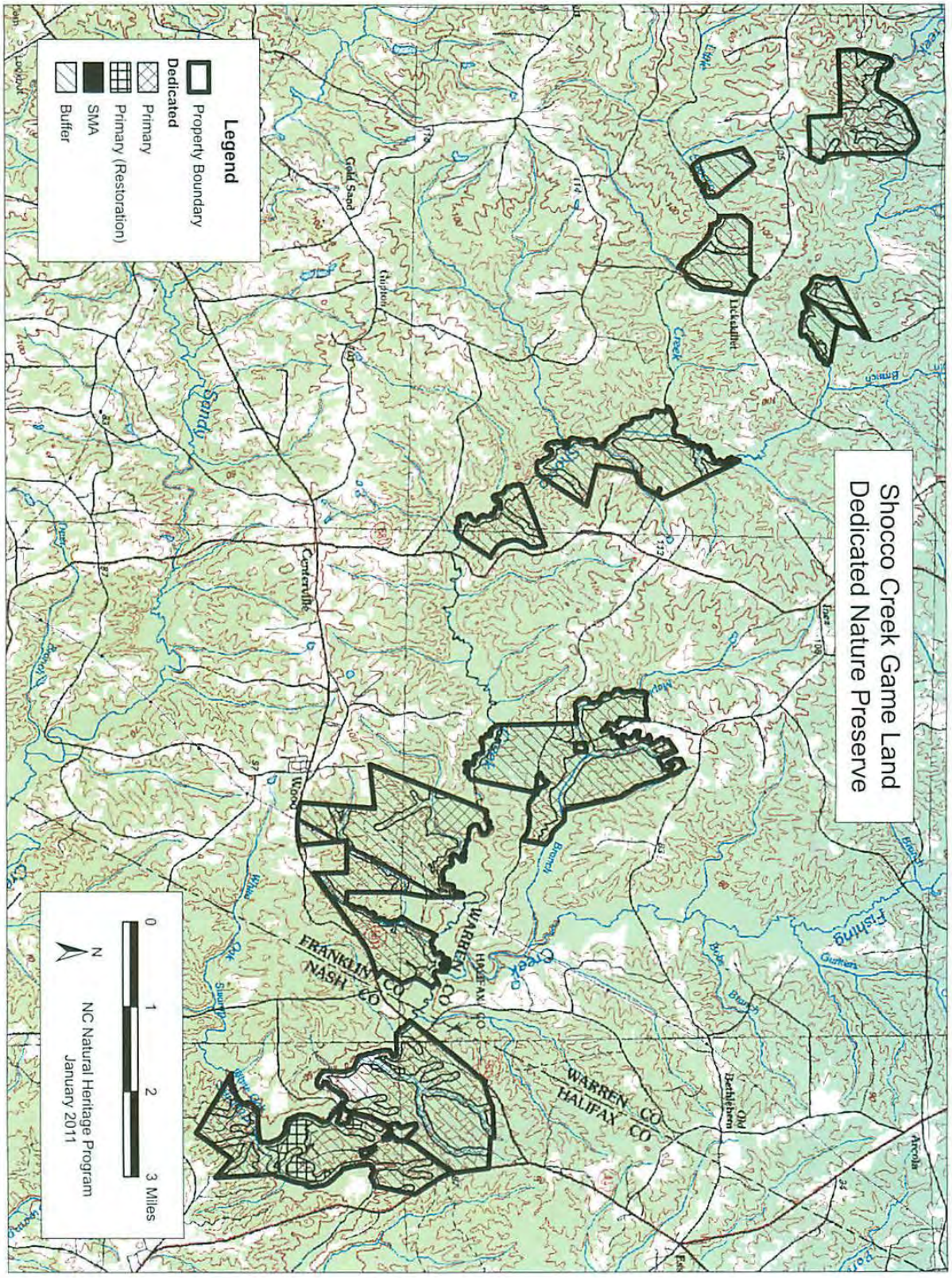

Shocco Creek Game Land
Dedicated Nature Preserve
Legend
Property Boundary
Dedicated
Primary
Primary (Restoration)
SMA
Buffer
0
1
2
3 Miles
N
NC Natural Heritage Program
January 2011
FRANKLIN CO
NASH CO
WARREN CO
HALIFAX CO
Centerville
Wood
Sandy
Fishing
Creek
Bethlehem
Old
Arcola
Gold Sand
Clayton
Lickskillet

EXHIBIT A

SHOCCO CREEK GAME LAND
DEDICATED NATURE PRESERVE

COUNTIES: Franklin, Halifax, Nash, and Warren PHYSIOGRAPHIC PROVINCE: Piedmont

TOPOGRAPHIC QUADS: Afton, Centerville, Essex, Gold Sand, Inez

SIZE OF AREA: ca. 7,928 acres (primary area 2,536, including restoration areas totaling 180 acres and a Special Management Area totaling 36 acres; buffer area 5,392 acres)

OWNER/ADMINISTRATION: State of North Carolina, Wildlife Resources Commission

DESCRIPTION: Riparian areas along Shocco Creek, Little Shocco Creek, Maple Branch, and Fishing Creek are designated as primary areas to protect water quality for rare mussel populations. These creeks contain several healthy populations of the Federally Endangered dwarf wedgemussel (*Alasmidonta heterodon*), in addition to two State Endangered and Federal Species of Concern mussels -- Atlantic pigtoe (*Fusconaia masoni*) and yellow lance (*Elliptio lanceolata*). Also present in the creeks are two State Threatened species – least brook lamprey [fish] (*Lampetra aepyptera*) and creeper [mussel] (*Strophitus undulatus*), and one State Significantly Rare species – Roanoke bass (*Ambloplites cavifrons*). In addition to streamside riparian areas, the preserve encompasses a number of good to excellent quality hardwood forests, mostly in the floodplains, but also on some of the adjacent slopes.

The floodplains contain a number of natural communities, though the most extensive is Piedmont/Low Mountain Alluvial Forest; some is perhaps better called Piedmont/Mountain Bottomland Forest. The canopy is dominated by a mix of swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Q. pagoda*), willow oak (*Q. phellos*), sweetgum (*Liquidambar styraciflua*), and American elm (*Ulmus americana*); in the younger stands, sycamore (*Platanus occidentalis*) and river birch (*Betula nigra*) are more numerous. American hornbeam (*Carpinus caroliniana*) is the most common understory tree, whereas tall pawpaw (*Asimina triloba*) and spicebush (*Lindera benzoin*) often abound in the shrub layer. Smaller portions of the floodplains are Piedmont/Mountain Swamp Forest, which contains mainly two canopy species – green ash (*Fraxinus pennsylvanica*) and red maple (*Acer rubrum*). Uncommon canopy species include swamp cottonwood (*Populus heterophylla*) and overcup oak (*Q. lyrata*). There are numerous Floodplain Pools scattered within the floodplains on most of the tracts. Willow oak and sweetgum are the main trees at such pools; these wetlands are important sites for amphibian breeding, though no rare species of animals are known to be present. A few Low Elevation Seeps are present, and one example of the very rare Piedmont Boggy Streamhead is present. This latter community contains the locally scarce sweetbay magnolia (*Magnolia virginiana*). Lastly, a few of the tracts contain beaver ponds – the Piedmont Semipermanent Impoundment natural community.

A number of rare or uncommon plant species are found in these wetlands. The most notable is the State Significantly Rare purple fringeless orchid (*Platanthera peramoena*); a moderate population is located along Maple Branch, and a tiny population is found along Shocco Creek. Others of interest include several population of the Watch List crested woodfern (*Dryopteris cristata*), turk's-cap lily (*Lilium superbum*), southern rein-orchid (*Platanthera flava*), few-flower tick-trefoil (*Desmodium pauciflorum*), and Walter's greenbrier (*Smilax walteri*). Growing in the floodplains, but on mesic soil (and thus not in a wetland), are the Watch List Lewis's heartleaf (*Hexastylis lewisii*) and the former Watch List nestronia (*Nestronia umbellula*).

Most of the good-quality hardwood forests on slopes are Mesic Mixed Hardwood Forest natural community. Several excellent examples occur in Warren County, along Shocco Creek, as well as in Franklin County. The canopy is dominated by American beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), white oak (*Q. alba*), and tuliptree (*Liriodendron tulipifera*). A scattering of umbrella magnolia (*Magnolia tripetala*) is present in the sparse understory and shrub layers. The herb layer is fairly rich and includes many ferns and spring-blooming wildflowers. A few small areas are embedded with the locally rare Basic Mesic Forest, Intermediate variant community. This community features locally scarce species such as the Watch List glade fern (*Diplazium pycnocarpon*), the Watch List heart-leaved skullcap (*Scutellaria ovata*), maidenhair fern (*Adiantum pedatum*), showy orchis (*Orchis spectabilis*), doll's-eyes (*Actaea pachypoda*), and goat's-beard (*Aruncus dioicus*). A tract along Little Shocco Creek has a notable 15-20' high knoll within the floodplain that contains a Mesic Mixed Hardwood Forest.

A powerline clearing in one of the Franklin County tracts has an exceptionally diverse herb and shrub layer, and several of these species are hostplants for rare butterflies. In fact, three rare species – mottled duskywing (*Erynnis martialis*), frosted elfin (*Callophrys irus*), and reversed roadside-skipper (*Amblyscirtes reversa*) – are present in the clearing, and the latter two are found in the Piedmont only at this site. Several other uncommon butterflies are also found in the clearing and in the adjacent forests.

BOUNDARY JUSTIFICATIONS: The primary area includes high quality natural communities, on both floodplains and slopes, and lower quality floodplain forests which function to preserve water quality for rare mussel populations in Shocco Creek, Little Shocco Creek, Maple Branch, and Fishing Creek. A minimum 300-foot primary area is defined along each side of any riparian areas defined as part of the Significant Aquatic Habitat, supporting the numerous federally listed and rare aquatic species. A minimum 200-foot primary area is defined on each side of any tributaries draining into the Significant Aquatic Habitat. Pine plantations that occur within the floodplains are included in the primary area because their management affects water quality in the adjoining creek. The powerline clearing is included as a special management area because of its importance to rare butterfly populations and other animal species of early-succession habitats. The buffer area consists essentially of pine plantations, thinned pine stands, and recent clearcuts.

MANAGEMENT AND USE: The area is used for public hunting and wildlife management. The portions of the preserve designated as primary area will be left in their natural condition. The pine plantations located within the primary area will be allowed to succeed naturally to hardwood forest. Restoration areas mapped within the primary area will be restored to the natural structure

and composition of floodplain forests. Prescribed burning in the uplands, used for management of pine plantations, will be allowed to run into the wetlands where necessary. The special management area will be managed by the entity holding the right-of-way, currently Progress Energy (CP&L), through off-season mowing which avoids impacts to the soil. Herbiciding of the powerline clearing should be avoided. Right-of-way maintenance which continues to provide rare butterfly habitat, will be encouraged, where possible.

THIS DEDICATION OF THE SHOCCO CREEK GAME LAND NATURE PRESERVE IS MADE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

1. As used in this Letter, the terms "natural area" and "nature preserve" shall have the same meaning as contained in North Carolina General Statutes, section 113A-164.3.

2. Pursuant to North Carolina General Statutes 113-164.8, all State-owned lands lying within the above designated area are hereby dedicated as a nature preserve to be known collectively as the Shocco Creek Game Land Nature Preserve (hereinafter "preserve") for the purposes provided in the North Carolina Nature Preserves Act, as amended, and other applicable law, and said State-owned land, shall be held, maintained, and used exclusively for said purposes.

3. **Primary Custodian**: The primary custodian of the preserve will be the North Carolina Wildlife Resources Commission, which will be responsible for managing the preserve in accordance with State Administrative Code 15 NCAC 12H.300.

4. **Primary Classification**: The primary classifications and purposes of the preserve will be conservation, nature education, wildlife management, hunting, fishing, trapping, and other recreational uses authorized by the Primary Custodian. The ecological significance of the preserve is described in Exhibit A.

5. **Management Areas**: For the purposes of management, the preserve shall be considered to consist of a Primary Area (approximately 2,536 acres) and a Special Management Area (approximately 36 acres), as more particularly described in Exhibit A, attached thereto and by this reference made a part hereof. The Primary Area consists essentially of the significant aquatic habitat supporting numerous rare mussels, amphibians, and crayfish in the vicinity, including the federally listed dwarf wedge mussel (*Alasmidonta* heterodon). It also includes the adjoining high-quality Piedmont/Low Mountain Alluvial Forest and upland Mesic Mixed Hardwood Forest natural community types. The Special Management Area is primarily managed as a powerline right-of-way, but provides early successional habitat for several rare butterfly species as long as it continues to be properly managed.

The Primary Area is deemed by the Secretary of the North Carolina Department of Environment and Natural Resources to qualify as an outstanding natural area under statutory criteria for nature preserve dedication (G.S. 113A-164.6) and further serves all of the public purposes for a dedicated preserve as stated in Administrative Rules 15 NCAC 12H.0301(b).

The Buffer Area, which contributes to the management and protection of the Primary Area, consists of pine plantations, thinned pine forests, and fields.

6. **Rules for Management of the Primary Area(s)**:

A. Character of Visitor Activity: The principal visitor activities in the preserve shall be hunting, fishing, trapping, walking, research, and observation. These activities shall be regulated by the Custodian to prevent significant disturbance of the preserve. These activities may specifically be regulated by the Custodian to protect and conserve the natural values of the preserve.

Activities and uses unrelated to those listed above are prohibited except as otherwise provided in these Articles or unless necessary to carry out the purposes of the preserve. Prohibited activities include, but are not limited to: construction; commercial activities and development; commercial silviculture; agriculture and grazing; gathering of native species of plants or plant products; the removal, disturbance, molestation, or defacement of minerals, archaeological and natural resources, except for research purposes as approved by the Custodian; and those activities specifically restricted in these Articles.

There shall be no fires, except as necessary for ecological management of the preserve or in conjunction with supervised educational activities of the Custodian, or further excepted as herein provided or otherwise expressly permitted.

B. Consumptive Wildlife Uses: Hunting, fishing, and trapping shall be permitted on the preserve subject to regulations and management by the North Carolina Wildlife Resources Commission.

C. Orientation and Guidance of Visitors: The Custodian reserves the right to orient and guide visitors for educational programs, hunting and fishing uses, scientific research, and for preserve management. Exhibits, programs, and printed materials may be provided by the Custodian in service areas. The Custodian may restrict access to visitors in those instances or in such areas that restrictions may be determined necessary to safeguard sensitive environmental resources in the preserve.

D. Disturbance of Natural Resources: The cutting or removal of trees, dead or alive, or the disturbance of other natural resources is prohibited except as necessary for

removal of hazards to visitors, control of disease that would damage or reduce the significance of the preserve, restoration after severe storm damage, trail clearance and maintenance, or for purposes of maintenance or restoration of natural communities or rare species populations as stipulated in the preserve management plan and that which is consistent with the purposes of these Articles. Salvage timber cuts which may be necessary due to natural catastrophe will be allowed in the Primary Area, but in a manner that will contribute to the recovery of the prevailing natural conditions of the forest and in consultation with the North Carolina Natural Heritage Program.

Specifically, a component of the management plan will address the restoration areas located as mapped in Exhibit A within the 100-year floodplain. The goal within these areas will be to restore natural community structure, composition, and function, in consultation with the North Carolina Natural Heritage Program.

A Special Management Area, providing early successional habitat for rare butterflies, is delineated within the powerline right-of-way. The right-of-way will primarily be managed by the entity holding the right-of-way, currrently Progress Energy (CP&L), through off-season mowing which avoids impacts to the soil. The Custodian will encourage right-of-way maintenance which continues to provide rare butterfly habitat, where possible.

E. Wild Fire Control: Wild fires may mimic natural processes historically occurring in an ecosystem on a landscape level. When the extent of a wild fire does not threaten human life or structures, it may be allowed to burn with minimal control. When conducting prescribed burning in the upland plantations adjacent to the preserve, fire may specifically be allowed to burn into riparian areas and particularly across narrow riparian areas bordered by pine plantations on either side. If wild fire control is necessary, firebreaks may need to be established. When possible, existing roads and firebreaks will be utilized for wild fire control. When new firebreaks need to be established, environmentally sensitive areas will be avoided when possible.

Specifically, it may be necessary to construct a fire line to allow burning of mature pine plantation without impacting adjacent younger pine stands, and that fire line is likely to cross a drainage within the Primary Area.. In the event that this occurs, a culvert will be constructed in accordance with the latest version of the Forestry Best Management Practices as produced by the North Carolina Division of Forest Resources of the Department of Environment, Health, and Natural Resources, to minimize impacts to hydrology.

A firebreak of approximately 8 feet in width will specifically be constructed and maintained on the west side of the Special Management Area within the powerline right-of-way, using an existing track of disturbance and avoiding wetland impacts where possible. Old firebreaks which affect the natural hydrology of wetlands will

be filled and allowed to revegetate. Planning of firebreak restoration should occur in consultation with the North Carolina Natural Heritage Program.

F. Water Control: The purpose of water control shall be to maintain the preserve's natural water regime. Water levels that have been altered by man may be changed if necessary to restore the preserve to its natural condition. In a preserve with a long history of managed hydrology, water levels may be managed to perpetuate the ecosystems that have evolved around the hydrology or may be restored to natural condition. This decision should be made in consultation with the Natural Heritage Program. Millponds are an example of situations in which water levels have been historically managed.

G. Pollution and Dumping: There will be no storage or dumping of ashes, trash, garbage, hazardous substances, toxic waste, other unsightly or offensive material, or fill material, including dredge spoil in, on, or under the preserve. No underground storage tanks may be placed within the preserve. No surface or ground waters of the preserve may have pollutants added within the preserve.

H. Control of Vegetational Succession: Control of vegetational succession may be undertaken if necessary to maintain or restore a particular natural ecosystem type or to preserve endangered, threatened, rare, or other unusual species. Controls will be done in the manner that best imitates the natural forces believed responsible for maintaining the natural ecosystem type, or that minimizes unnatural effects on non-target portions of the ecosystem. Prescribed burning is particularly essential to ecosystems where natural wild fire historically suppressed woody vegetation and promoted herbaceous diversity.

I. Control of Populations: Any control of animal or plant populations on the preserve shall be for the purpose of correcting those situations where those populations are significantly affecting natural conditions on the preserve, and in accordance with the Custodian's established regulations for hunting, trapping, or fishing of designated game animals. The Custodian may, in consultation with the North Carolina Natural Heritage Program, apply biological controls, herbicides and pesticides, and other means deemed necessary or appropriate to control or eradicate exotic or native species of plant or animal that are degrading the natural character of the preserve. Because of potential impacts on native species, no exotic flora or fauna shall be introduced into the preserve.

J. Research and Collecting Permits: Any person wishing to engage in scientific research requiring collecting or otherwise affecting anything within the preserve shall first secure written permission from the Custodian.

K. Roads and Trails: Construction and maintenance of roads, trails, and other access structures within Primary and Buffer Areas of the preserve will be limited to the level necessary to appropriately manage the preserve. New roads shall not be

constructed in the Primary Area. When necessary, the Custodian may construct and maintain access limited to staff use for management purposes, such as service paths (single lane vegetated paths) for patrol, right-of-way maintenance, and other management activities, within the Primary Area. Number and width of new paths will be minimized, and sensitive areas avoided when possible. Existing roads that occur within or form a boundary of the Primary Area may be maintained by grading of the roadbed, replacing culverts, or adding stone as needed in order to maintain the integrity of the road for vehicular use. Daylighting of roads within the Primary Area should be minimized, but may be used if necessary to maintain the condition of the road. Access management and construction will be part of the overall management planning process and will include consultation with the North Carolina Natural Heritage Program.

L. Other Structures and Improvements: Structures or facilities shall not be erected by the Custodian within a preserve, except as may be consistent with the purposes of the preserve as stated in this dedication. Site selection shall be consistent with this dedication.

M. Management Plan: The Wildlife Resources Commission, as Primary Custodian of the preserve, shall be required to prepare and submit for approval to the Secretary of the Department of Environment and Natural Resources a management plan for the preserve. The management plan will be part of the larger management plan developed for the gamelands. This plan shall be subject to all the provisions of this dedication and shall additionally be consistent with the management principles set forth in the North Carolina Administrative Code 15 NCAC 12H.0300 and such other regulations as may be established from time to time by the Secretary of the Department of Environment and Natural Resources. In any case where contradictions may arise between this instrument of dedication and other management regulations, the terms of this dedication shall take precedence.

7. **Rules for Management of the Buffer Area(s)**: Primary area rules also apply except that additional forestry and wildlife management activities may be planned and carried out as needed. Construction and maintenance of roads, trails, and other access structures within buffer area(s) of the preserve will be limited to the level necessary to appropriately manage the preserve. These activities will be conducted in accordance with policy of the N.C. Wildlife Resources Commission and general management philosophy as outlined in Commission planning documents, in addition to providing for the buffer functions in relation to the primary area(s). WRC rules and guidelines require the protection and enhancement of wildlife populations and habitat so that hunting, fishing, trapping and other wildlife recreational opportunities are available to citizens of this State. Forest management is primarily conducted to enhance wildlife habitat.

Buffer functions within the dedicated area may include protecting the primary area(s) from indirect detrimental ecological effects, providing additional area for species and ecological processes that require larger areas, and providing important successional stages and

disturbance regimes and other habitat diversity for wildlife. Based on these general objectives, the following buffer functions will be addressed in the management plan.

1) Landscape level function of community type and structure. (Buffer area management may involve timber harvest and other forms of stand manipulation, but will not involve forest canopy type conversion over more than limited areas, other than to restore stands to types suited for the site. Introduction of exotic species known to be invasive in natural communities will be avoided.)
2) Maintenance of habitat connectivity and continuity among primary areas.
3) Providing for habitat diversity.
4) Management needs of rare animal and plant species populations occurring within the buffer area; and
5) Protection of soil and hydrologic resources and processes within the primary area and extending into the buffer. (Buffers will be retained along streams, and watersheds of primary areas will be protected from hydrologic alteration.)

8. **Amendment and Modification**: The terms and conditions of this dedication may be amended or modified upon agreement of the Wildlife Resources Commission and Secretary of the Department of Environment and Natural Resources, and approved by the Council of State. Any portion of the tract dedicated pursuant to this instrument may be removed from dedication in accordance with the provisions of North Carolina General Statutes 113A-164.8.

9. **Permanent Plaque**: The Custodian should erect and maintain a permanent plaque or other appropriate marker at a prominent location within the preserve bearing the following statement: "This Area is Dedicated as a State Nature Preserve."

Restoration of Coastal Plain floodplain forest communities
Mike Schafale
December 2011

Coastal Plain floodplains may contain a number of different natural community types and subtypes, sometimes in large patches, sometimes in fine-scale mosaics. Primary restoration areas are generally dedicated in bottomland hardwoods or levee forest communities. In these communities, the goal of restoration is a reference condition with a multi-layer forest structure, a canopy that is closed except for canopy gaps, a canopy that is maturing toward old-growth, and appropriate species composition for the community type in all strata. Freedom from non-native invasive species is desired, but is almost impossible to achieve in some floodplain community types.

The most common states to restore these communities from are plantations of loblolly pine or soft hardwoods, recent clearcuts, or successional vegetation of weedy native species. Most of the desired species for these communities are common, and none seem to be extremely conservative. Most disperse readily and likely exist nearby, with the possible important exception of the bottomland oaks and hickories that are desired in bottomland hardwoods. Natural succession can be expected to ultimately return these sites to a natural reference state, if invasive plant populations are not too dense and if flooding regimes are not too drastically altered. Even if flooding regimes are altered, the vegetation likely will recover to a similar forest structure and to an acceptable composition that resembles another floodplain community type.

Ideal restoration treatment depends on the current state of the vegetation. Plantation canopies should be removed. If advanced regeneration of desired species is limited but a seed source is present, it may be best to thin the stand first, especially for bottomland hardwoods where oaks are needed. If there is enough advanced regeneration, it may be best to clearcut the planted canopy. If there is no seed source, planting of oaks may be desirable, and it may be better to clearcut the planted canopy. Some kind of site preparation treatment, ideally a specific one such as hand spraying or cutting of targeted plants, may be needed to control vines, brush, and undesired trees. If invasive plants are abundant, they should ideally be treated with some species, targeted method, before harvest. All cutting and site preparation should strive to leave any established desirable trees and desirable herb patches.

For recent clearcuts and successional vegetation, a dense stand of weedy trees and/or brush and vines may have become established. It may be best to let these grow until trees have become big enough to control the vines and the stand is starting to thin itself. Then, some form of selective thinning, removing undesired species and releasing whatever desired individual trees have established, will help speed restoration. If no seed source is nearby and no desired trees are establishing, it may be necessary to create canopy gaps in the young stand and plant them.

Because these communities are expected to recover naturally with time, and because minimizing disturbance in floodplains is a goal in itself for protection of streams, less intensive restoration or passive restoration may be as desirable an option. Plantations may be left to age out and die naturally, with an expectation that desired species will begin to establish in canopy gaps. Similarly, if the site is a weedy successional stand, it can be left for natural succession to passively restore it.

If plantations are harvested, especially by clearcut, successional vegetation of weedy species may replace them. Hopefully at least some resources could later be devoted to releasing desired trees in these stands, and to

planting if no desired trees establish. This could be gradual work at girdling or injecting undesired trees, or waiting until the trees are commercial size and cutting the undesired trees while leaving all desired trees. However, leaving these stands to succeed naturally is OK.

The most important thing to do in low intensity restoration of floodplains, if a planted canopy is going to be cut, is to watch for invasive species. Species that could take over the canopy, such as princess tree or tree of heaven, should be eradicated from the site before any cutting. Species that could take over the shrub layer, such as Chinese privet, should be eliminated or controlled if they are not already dominant. Ideally, herbaceous invasive species such as Microstegium and Asian dayflower, and vines such as Japanese honeysuckle, would be similarly controlled. However, unless they are concentrated in small areas, such control may not be feasible, or may cause unacceptable damage to native plants.

Exhibit 1: Public Input Meeting Notes

Upper Tar Game Land Complex Public Input Meeting

Chief W.R. Richardson Tribal Government Complex, Haliwa-Saponi Indian Tribe
39021 Hwy. 561, Hollister, NC 27844
April 10th, 2014 @ 6:30 PM

Questions and Comments from Public Comment Period:

1. Did IP retain timber rights when the State purchased the Game Land property? Public thinks they did.
2. Why can't WRC clear some openings in the forest areas to create openings? Why not more clearcuts?
3. Gentleman indicated there were out there to help make public water available to potential camp ground sites.
4. Gentleman suggested that there should be areas without dog running to allow still hunters an area to hunt.
5. Why is horse riding not allowed?
6. Is it possible to get a permit to use and ATV or UTV to allow access to disabled sportsmen?
7. Person suggested that disabled access be added to the Game Land.
8. Has there been thought to limiting the type of guns allowed on Game Land? Gentlemen indicated that some hunters were using military style rifles with large capacity magazines.
9. How much tax value was taken out when the land was bought by the State?
10. Does the State pay property tax?
11. Is there thought to putting a shooting range on these Game Lands?
12. Gentleman suggested that dog hunting be allowed on certain days and other days reserved for still hunting.
13. Person stated that it is out of town hunters that shoot towards houses, not local hunters.
14. What is WRC policy on beavers and beaver dams?
15. More gates are open year round now, is that on purpose?
16. What type of vegetation is found on the power line right of way? Is it more like the western part of the state?
17. Has there been consideration to asking local hunting clubs to help with maintenance of the roads?
18. Who should be contacted if a hunting club wants to help mow a road?
19. Gentleman thanked the enforcement officers for the job they do.
20. Suggestion for better access to the creek from 561 or 43 to launch or retrieve a canoe.
21. A question arose about providing public fishing ponds.

Exhibit 2: Game Land Management Plan Comment Questions

Upper Tar Game Land Complex Management Plan

PLEASE WRITE the appropriate Game Land or Group for which you wish to comment for EACH QUESTION.
Upper Tar Game Land Complex: Comment on entire "UTGLC", OR "Brinkleyville", "Embro", "Sandy Creek", or "Shocco Creek"

1- What habitats do you think are most important to protect and/or improve on this game land?

_____
_____
_____
_____

2- Considering those that live on land and in water, what species do you think are most important to protect and/or improve on this game land?

_____
_____
_____
_____

3- How do you use this game land?

_____
_____
_____
_____

4- Please explain why you think the current level of access is, or is not, satisfactory on this game land.

_____
_____
_____
_____

5- What suggestions, if any, do you have for changing how this game land is managed and maintained?

_____
_____
_____
_____

6- What would encourage you to start using this game land, or to continue using it more actively?

_____
_____
_____
_____

7- What additional comments do you have regarding this game land?

_____
_____
_____
_____
_____

Name: _____
Address: _____
Phone: _____
Email: _____ (Continue on back if necessary, **Note Question # and Game Land**)

(Sorted) On-line Public Comments for UTGLC Management Plan

G88 (Q3-Brinkleyville)- Squirrel hunting with Mountain Feist Dogs.

G89 (Q4-Brinkleyville)- Six day use allows for maximum opportunities for all sportsmen.

G95 (Q3-Embro)- Squirrel Hunting with Mountain Feist Dogs.

G96 (Q4-Embro)- Six day use allows for maximum usage for all sportsmen.

G102 (Q3-Sandy Creek)- Squirrel hunt with mountain feist dogs and redbreast fish in creek.

G103 (Q4-Sandy Creek)- Although I would not hunt deer with dogs on this tract, it is obvious that the usage of Sandy Creek Game Land is minimal compared to that of other game lands in the area because of the no deer dog regulation.

G107 (Q1-Shocco Creek)- Bedding areas for deer and rabbit, (small random clear cuts). All mature hardwood stands, (primarily creek buffers).

G109 (Q3-Shocco Creek)- I use the Shocco Creek Game Land primarily for squirrel and deer hunting as well as redbreast fishing in small creeks. I own Mountain Feist Squirrel Dogs and Beagle Deer Hounds. I work in the timber industry in and around these game lands and have a strong connection to the rural community surrounding them. The six day access allows for maximum usage to all sportsmen whatever they prefer to pursue.

G110 (Q4-Shocco Creek)- Six day access with current regional game regulations provides the most opportunities for sportsmen of all types to get the maximum usage from this game land.

G111 (Q5-Shocco Creek)- More small random clear cut areas in pine plantations would be desirable to create better bedding and forage areas.

G112 (Q6-Shocco Creek)- Allow deer either sex season as currently allowed in eastern deer season.

G113 (Q7-Shocco Creek)- As a frequent game land user and also a member of the local timber industry I am upset at the handling of forest sales on this and other game lands in the area. We have frequently heard that sales are so cumbersome to get approved that the managing "foresters" simply renew contracts for old bid sales. In a time when all government resources are stretched, sales should be made to maximize value back to the NCWRC not based on ease of continuing existing contracts.

G88 (Q3-Brinkleyville)- To deer hunt using dogs, and I want to continue to do so.

G93 (Q1-Embro)- The deer habitat needs to be put under control and looked at because the use of dogs on the game lands is hurting the population. All the dog hunters shoot anything that crosses and even though it is buck only except the first week and the last week of the season, when the deer get shot they are not getting recovered in ethical manor. People wound a lot of deer on the Embro-Odell game lands and end up dying later on because they are not shot to be killed and being pushed by the dogs.

G95 (Q3-Embro)- I primarily use the Game Lands to hunt on but it is extremely dangerous right now due to the fact that there are so many dog hunters on the land that shoot in every direction. As I have been hunting on the Game Lands many times and herd bullets wizzing past as a pack of dogs come by. It is a huge safety concern right now to the general public and any other hunter that uses the land from September to January.

G99 (Q7-Embro)- The Embro-Odell Game Lands is a great piece of property for any hunters and anyone that enjoys the outdoors but there is one major problem, the use of dogs on the game lands to hunt deer. There is a list of reasons why this should be outlawed and fair chase to be given. First the people that want to hunt the game lands outside of dog hunting is extremely dangerous and a huge safety concern. Most of the people that I have witnessed dog hunting on the game lands have semi-automatic rifles that they are using instead of shotguns. The semi-auto rifles are far more dangerous at a running deer and can travel 10 times farther than a shotgun will. I am surprised someone has not been shot accidentally on these game lands yet. Secondly, the amount of truck and vehicle traffic on these game lands is outrages with everyone trying to follow the dogs and keep up. This causes harm to the land and cost money for the state to repair everything that is tore up during the hunting season.

G95 (Q3-Embro)- For hunting during both big game and small game seasons. For hiking and bird watching during off season.

G97 (Q5-Embro)- I feel like the game land is being managed totally for the benefit of Deer hunters hunting with dogs. It has become almost suicidal to attempt to still or stand hunt during deer season, due to road hunting deer hunters firing indiscriminately at game animals, without any regard to where their high powered rifle bullets will go. I would suggest that a fair resolution for all concerned would be for the game lands to be restricted to hunting with dogs on three days per week and other types of hunting allowed 3 days per week, with Sundays being reserved for non-hunting of any sort. I would suggest that the 3 days allowed either group be alternated yearly from Mon., Tues, Wed, in even number years and Thur., Fri. and Sat in odd number years. I would also suggest that dog hunters not be allowed to run dogs indiscriminately during closed seasons for dog hunting. Presently they are run in total disregard for seasons or regulations and obtaining a wildlife officer to enforce the laws is a near imp……..

G95 (Q3-Embro)- I was a soil scientist with USDA in Warren County for 15 years. I mapped nearly all the gamelands in the county during that time, and used them several times for turkey hunting. I also observed quail in several of the gamelands. Of course, deer are the main priority at this time.

G97 (Q3-Embro)- The Embro game lands are essentially all old paper company land, and therefore completely loblolly pine plantations. Allow the pines to mature, cut large areas from time to time, and use the monies from the sale of the trees to reinvest in the gamelands for a more diverse plant culture. Food plot fields, hardwoods, and some remaining pines. This will produce a greater variety of "edge effect" that wildlife likes, as well as diversification of wildlife species.

G97 (Q5-Embro)- Limit dog hunter use. Thur.-Sat.? Give deer a chance to settle down.

G104 (Q5-Sandy Creek)- Limit dog hunter use.

G111 (Q5-Shocco Creek)- Limit dog hunter use, still hunters do not have a chance. After 2 weeks solid dog hunting deer movement is nearly all at night.

G107 (Q1-Shocco Creek)- I have hunted Quail on public land around North Carolina for the last 10 years. While there are efforts of improvement evident it is not the right combination of stuff going on. The Federal land is much better as far as number of Quail present. Many times the timber is thinned and burned but no fields present or the fields are way too small and isolated. I could write 50000 words on what needs to be done. 1. Burn and thin the pines as is currently being done. 2. Leave the waterlogged land alone do not waste the time on it. 3. Very important every managed tract should had a 3 to 5 acre field of Bi-color Lespedeza on it. 4. Limit the harvest further by making it 4 birds per day in good areas and enforce it. 5. When you burn areas leave small areas untouched for escape cover. 6. Consider stocking some areas and then draw paid permits for a hunt where revenue is enough to at least cover the cost. Something has to happen or Quail hunting is going to be gone for good. It can be done look at ……..

G109 (Q3-Shocco Creek)- I use the shocco creek game land primarily for deer hunting with dogs. This is a great resource and I enjoy being able to dog hunt this area because it is relatively close to the house and a big enough block of woods to withstand dog hunting. At the moment I am pleased with the management of this game lands.

G110 (Q4-Shocco Creek)- Currently I am very satisfied the level of access to the shocco creek game land. I work with ncdot and I totally understand erosion control and water management, however, the water breaks in the paths seem quit excessive with a few that are obviously never going to work. I drive a two wheel drive truck that cannot make it down the path because the furrows are way too steep.

G111 (Q5-Shocco Creek)- I currently would not change how the game lands are maintained or managed. If it ain't broke don't fix it!!

G109 (Q3-Shocco Creek)- We use the game land to allow our dogs to chase deer. It is very important to me to continue being able to do so.

G109 (Q3-Shocco Creek)- Small game, mainly squirrel hunting.

G110 (Q4-Shocco Creek)- I feel Shocco Crk GL is nice area with a very satisfactory level of access.

Upper Tar Game Land Complex Public Input Comment Cards Transcribed

Embro Game Land

Q1- Food plots for wild animals. Keep roads clear for easy access. Have hardwood areas for food sources for wild animals.

Q2- Deer and turkey, quail.

Q3- Hunting, nature walks, wildlife observing.

Q4- Access is okay but keeping the roads clear is a major factor to getting around the property.

Q5- Limit the amount of dog hunting on public land to three days a week. This would allow still hunters safe days to hunt on public land.

Q6- Limiting the amount of dog hunting. During the general hunting season (rifle season) the deer become nocturnal because they are constantly being chased by dogs.

Q7- Prohibit the use of semi-automatic military style weapons to hunt deer or limit the magazine round capacity of these type weapons. Only allow shotguns, using buckshot, for dog hunting on game lands.

Game Land not specified

Q1- Keep paths pulled up and less big mud holes.

Q2- Deer and turkey.

Q3- Hunting.

Q4- Some paths are rough.

Q5- *BLANK*

Q6- I like it because everyone can't hunt without proper licenses.

Q7- *BLANK*

Embro Game Land

Q1- Improve food plots and habitats for deer and turkey.

Q2- Deer and turkey and songbirds.

Q3- Deer and turkey.

Q4- Trucks on Game Land disturbs hunting for still hunters, and bird watching, and just hiking.

Q5- Have half of the week for still hunting without dog hunting.

Q6- Stop dog hunting and rifles being fired on Game Land.

Q7- Some of the land should be for still hunting only, and no trucks on roads.

Embro Game Land

Q1- Food, cover, shelter, development of hardwood floodplain forest.

Q2- Deer and turkey.

Q3- Recreation (Hunting).

Q4- The access are satisfactory, they just need to be maintain and keep clean.

Q5- Access road maintenance like cutting underbrush and foliage so the road can drain and dry.

Q6- With hunting club land management and lease all around part of the Embro Game Land we actively utilize Game Land.

Q7- The Wildlife Commission has done a great job of providing public lands for hunting access. They are to be commended for looking into long term management.

Embro Game Land

Q1- Woodlands, waterways.

Q2- Bear, deer, bobcats, turkeys, quail, small animals and songbirds.

Q3- Hunting, hiking, fishing.

Q4- Access is okay, but roads become deeply rutted from 4WD trucks.

Q5- Better enforcement of existing regulations and safer environment by limiting high power rifle use from roads and paths.

Q6- Less hunting of big game by use of dogs.

Q7- Coyotes seem to be increasing -- can they be controlled? Need open areas. Little Fishing Creek is mostly totally unusable due to blocking by blowdowns. Consider use of ATV's/UTV's for disabled people.

NCDENR

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

May 21, 2014

Chris Baranski, Management Biologist
NC Wildlife Resources Commission
Butner Depot
Brickhouse Road
Butner, NC 27509

RE: Upper Tar River Game Lands Management Plan

Dear Mr. Baranski:

The North Carolina Natural Heritage Program appreciates the opportunity to provide input as the North Carolina Wildlife Resources Commission (WRC) develops a management plan for the Brinkleyville, Shocco Creek, Embro and Sandy Creek Game Lands, hereafter referred to as the Upper Tar River Game Lands. We also appreciate the ecosystem management approach that the WRC has historically applied to managing the Game Lands, and would encourage WRC to continue with this management philosophy, especially as natural habitats across North Carolina are degraded, and habitat fragmentation increases. Maintaining high-quality examples of North Carolina's natural ecosystems is important for native wildlife - including rare species - and the citizens of our state.

The Natural Heritage Program (NHP) welcomes a continued partnership in conservation, and of course extends an offer to assist in planning, as well as provide the information on natural resources that we have acquired over the years – often with the help of WRC biologists. We propose that WRC incorporate natural heritage data into the management plan, including the element occurrences of rare species, special animal habitats, and exemplary and rare natural communities, and particularly, the Significant Natural Heritage Areas and Dedicated Nature Preserves that have been identified by the NHP as priorities for conservation. Our information is available spatially through GIS data layers, in site reports, and we will make NHP biologists available to provide specific information on the resources as necessary.

The Upper Tar River Game Lands play a particularly important role in protecting the Upper Tar River aquatic ecosystem, a collection of Natural Heritage Areas that host an exceptional assemblage of mussels, fishes, and amphibians, including numerous rare, threatened, and endangered species. We note that most of the Upper Tar River Game Lands are dedicated, and are subject to the articles of dedication for management of primary, primary (restoration), and buffer areas. The primary areas largely protect the floodplain communities and riparian areas; these areas are of particular importance to the aquatic systems, and are often high-quality habitats in their own right.

There are some specific issues we recommend addressing in the Upper Tar River Game Lands management plan. These recommendations would include maintaining the integrity of the watershed, and minimizing fragmentation to the extent possible. Floodplains are fragile ecosystems often subject to disturbance, such as vehicle usage, flooding/scouring, tree harvest, or even natural treefall. Disturbances can open up areas to invasion by exotic plant species, particularly privet and microstegium. Please continue to control or limit access to floodplains to foot traffic, such that logging roads and ATV tracks are gated or blocked before they reach floodplains, and avoid or minimize stream crossings and/or fording of tributaries.

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In the primary areas along the Tar River and tributary creeks, one management concern is the invasive non-native plants. We encourage control or removal of these plants to the extent practicable, with treatment carefully targeted to avoid impact to the native plants. Methods such as mechanical removal, stem or stump treatment with herbicide, and precisely directed herbicide spray are most likely to be successful at the ultimate goal of improving the native natural community.

The Upper Tar River Game Lands management plan intends to help guide management and user activities for the next ten years. During that time, North Carolina will most likely continue to be one of the fastest-growing states in the nation. Maintaining the integrity of natural areas and connectivity for wildlife within the Game Lands will provide a much greater opportunity for North Carolina's native diversity to remain viable. Thank you for your contribution to the conservation of our natural resources in North Carolina. Please contact me or other NHP staff if you have any questions, or would like additional information.

Sincerely,

Scott Pohlman