Bertie County Game Land Management Plan

2016 – 2026

N.C. Wildlife Resources Commission staff has extensively contributed to the development and preparation of this plan through their various fields of professional expertise. All content, management strategies, recommendations, goals, and needs for change were developed using the best available science and professional working knowledge of the Bertie County Game Land, its habitats, and terrestrial and aquatic species. Careful consideration has been given to all input received from the public, external agencies, and organizations that have an interest in or use the game land to ensure a comprehensive management program is administered. The successful implementation of this plan will depend on the continued input and support from all interested parties.

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Executive Summary

The North Carolina Wildlife Resources Commission charged North Carolina Wildlife Resources Commission staff to develop Game Land Management Plans for all NCWRC-owned game lands. The creation of this plan was a joint effort from North Carolina Wildlife Resources Commission biologist and land managers, natural resource conservation groups and agencies, and the public. The primary goal for this plan was to establish a clear path for management activities for the Bertie County Game Land for the next ten years and set a "Desired Future Condition" for habitat types beyond that ten-year horizon.

Balancing increasing outdoor recreation demands with conservation objectives in protected areas presents a difficult challenge for land managers. Access to land has been a restricting factor in recruiting hunters since the 1980's. It is important to the hunting heritage of North Carolina that large areas of land are managed to provide opportunities to hunt. Hunters typically do not ask for much on the game lands. They ultimately just want a quality place to hunt with good access. The Bertie County Game Land, like many other game lands across the state, is being used by many user groups other than the traditional hunters, fishermen, trappers, and wildlife viewers. These non-traditional users put strains on the wildlife, habitats, traditional users, and infrastructure on the game lands. Many of the non-traditional uses are acceptable on game lands at certain levels however; unrestricted and unregulated use by any group can negatively affect the natural resources that draw people to visit the game land. Other than hunting and trapping, all other uses are not regulated on Bertie County Game Land. It is hunter dollars that fund the majority of the land management activities on the game lands.

Bertie County Game Land consists of 3,884 acres located on the Cashie River outside of Windsor, NC in Bertie County. Habitats vary from Tidal Swamp Forest and Wetlands and Floodplain Forest, Dry Coniferous Woodlands, Mesic Forest and Oak Forest, Early-successional Habitat, to Small Wetland Communities. Recent acquisitions to Bertie County Game Land have added an upland component that once supported a natural community dominated by longleaf pine supported by a desired mix of native grasses and forbs. Today, through active forest management, NCWRC land managers are working to restore elements of the longleaf pine community.

Bertie County Game Land helps protect portions of the Cashie River Swamps Significant Natural Heritage Area, small creeks, and floodplain wetlands. These tracts provide important travel corridors for black bears along the Cashie River and is recognized as a Global Important Bird Area.

It is a goal of this document to lay out a path forward that will first conserve the natural resources and recognize the hunters, fishermen, trappers, and wildlife viewers as primary users of the game lands and consider other 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.

Table of Contents

Introduction

North Carolina Wildlife Resources Commission

The North Carolina Wildlife Resources Commission, hereafter known as NCWRC, was established in 1947. Prior to 1947, the tasks of managing state owned Wildlife Management Areas were executed by the Department of Conservation and Development. General dissatisfaction with the program led to the creation of the Wildlife Resources Law in 1947 that established the North Carolina Wildlife Resources Commission.

Since 1947, the NCWRC has been dedicated to the conservation and sustainability of the state's fish and wildlife resources through research, scientific management, wise use, and public input. The NCWRC is the state regulatory agency responsible for the enforcement of fishing, hunting, trapping, and boating laws and provides programs and opportunities for wildlife-related educational, recreational, and sporting activities.

Game Land Program Mission Statement

Consistent with the original establishment legislation for the NCWRC, 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 and as directed by wildlife management objectives

History

Prior to 1971, game lands in North Carolina were limited to designated and tightly controlled Wildlife Management Areas. 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 Wildlife Management Areas were incorporated into the new Game Lands Program and the new program allowed the Commission to lease/incorporate additional lands as game lands to expand

the land base. Beginning in the 1980s, land owners, 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 funds greatly compensated for the loss of game lands leased from the private sector and currently over 2 million acres are enrolled in the Game Lands Program.

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 in the state. All 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, now named Land and Water Access Section. This organizational change was made to deliver a more comprehensive and efficient wildlife and fisheries management program on all public lands and waters in the state. Depots remained at former locations with the establishment of new depots/crews at certain remote locations that were not efficiently served under the former program.

Purpose and Need

The purpose of this Game Land Management Plan is to provide a guide for managers to follow in the creation of wildlife and land management prescriptions. Fish and wildlife habitat needs were given priority; outdoor and wildlife related requests/activities were considered individually depending on compatibility and appropriateness. All aspects of game land management were considered in the development of this plan and include but are not limited to; fish and wildlife communities, forest management, infrastructure development and maintenance, public uses, fish and wildlife information needs, financial assets and future needs, future plans for acquisition, regulations and enforcement, and existing and needed partnerships and collaborations. While this plan was written to a ten-year horizon, it will remain a living document able to adapt to change.

More specifically, this plan will:

- Provide a clear direction for game land management.
- Provide the public, local, state, and federal officials with a better understanding of game land management and objectives.
- Provide clear management objectives to ensure that these actions are consistent with the game lands program goals.
- Provide a basis for future budgetary operational expenses and manpower needs.

Regional Context

Bertie County Game Land (BCGL) is located in the Mid Atlantic Coastal Plain. In North Carolina, a huge diversity of fish and wildlife habitats exist across the three distinctive regions of the state: the Coastal Plain, the Piedmont, and the Mountains. These regions fall within larger ecoregions that span state borders and link North Carolina to neighboring states (Fig. 1). Elevations ranging from sea level to over 6,000 feet provide habitat for over 1,000 species of birds, mammals, fish, reptiles, amphibians, mollusks, and crustaceans, in addition to thousands of other invertebrate species.

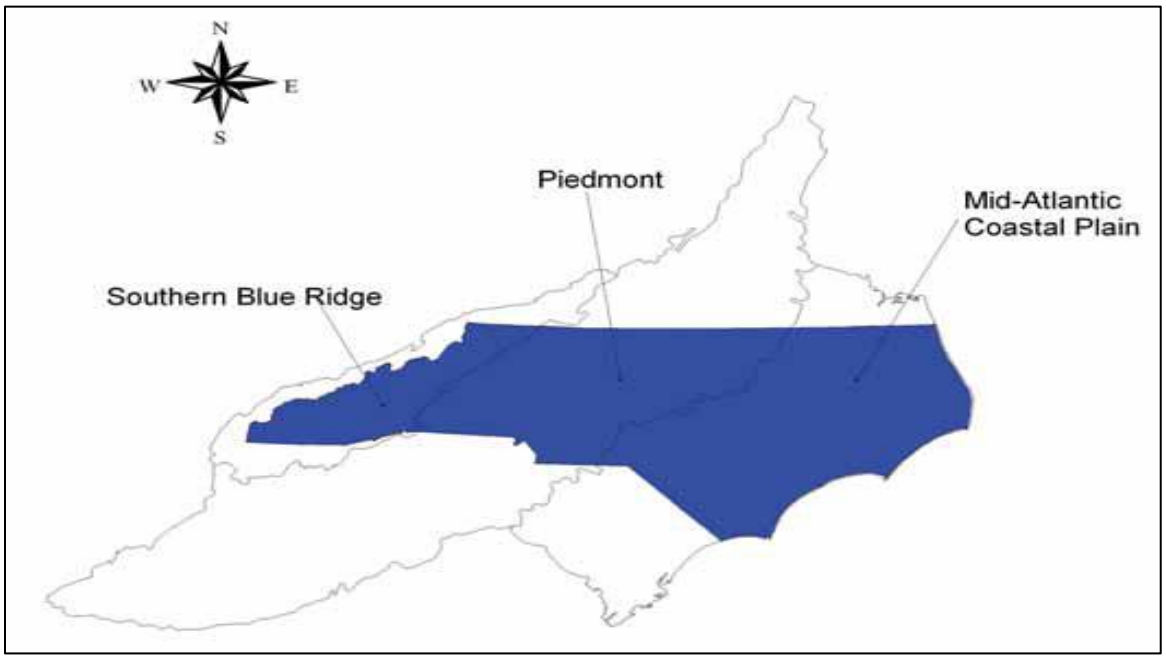

Fig. 1. Ecoregional delineations in North Carolina (Bailey 1995).

The Coastal Plain region is characterized by flat lands extending from the coast inland an average of 125 miles. Elevations in the region increase inland at approximately one foot per mile. The region covers almost two-fifths of the area of the state.

Bertie County Game Land lies on the bank of the nearly 55 mile long Cashie River (Fig. 2). This small river system and its tributaries are a part of the southern reaches of the larger Roanoke River Basin. The Cashie empties into the Albemarle Sound at Bachelor Bay as does the Roanoke. The Cashie River is connected to the Roanoke River by Thoroughfare (The Gut) and by Eastmost River and Middle River near the mouth of the Roanoke River at Bachelor Bay.

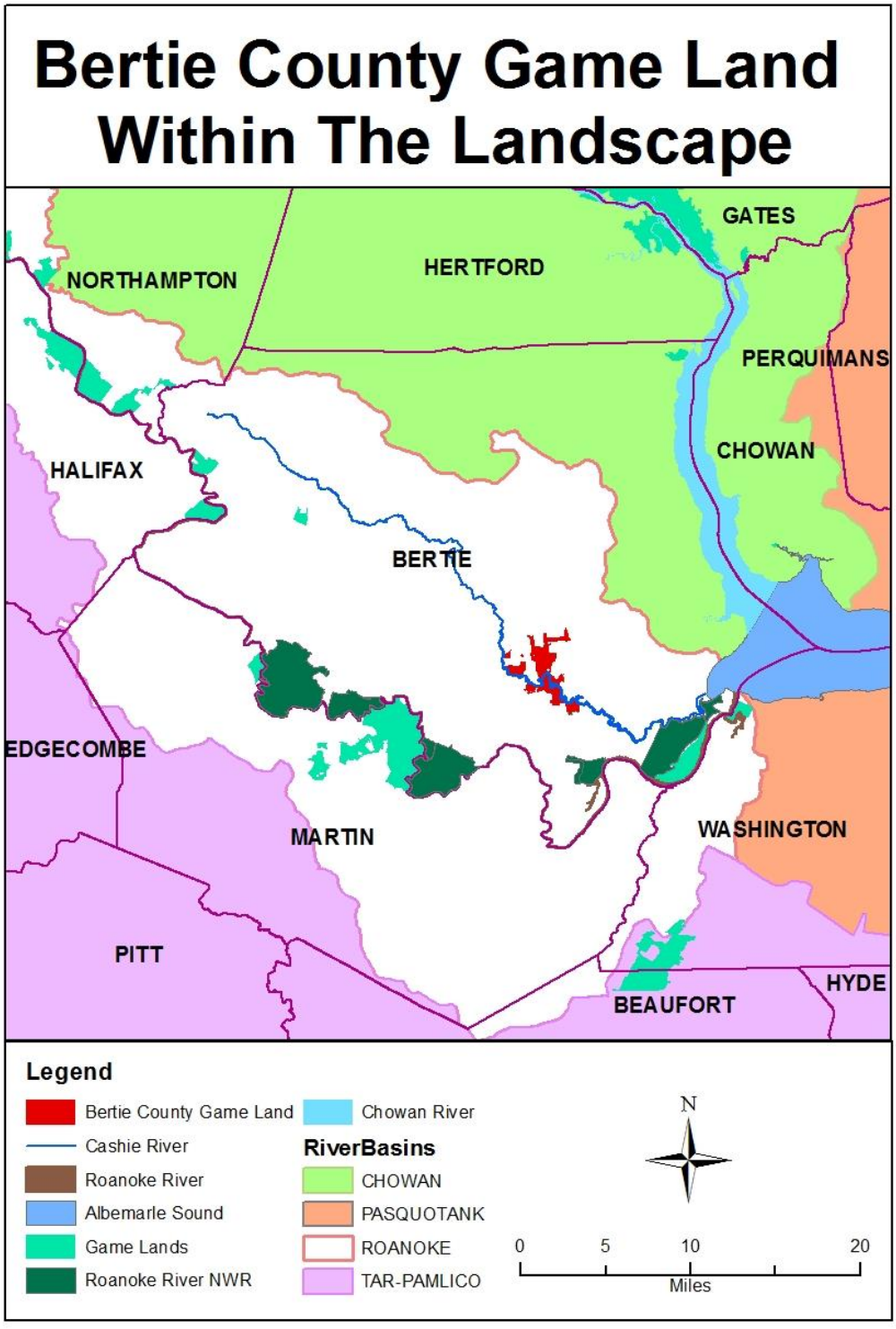

Fig. 2. Bertie County Game Land within the landscape.

Role of Bertie County Game Land in Regional Conservation

The BCGL is only a small game land at 3,884 acres, but the lands possess several important attributes. The Cashie River divides the game land and 1,857 acres of the Tidal Swamps and Floodplain Forests on the game land are designated by the North Carolina Natural Heritage Program (2015) as a portion of the 4,680-acre Cashie River Swamps Significant Natural Heritage Area. Significant natural areas contain examples of natural communities, rare plant or animal populations, or geologic features that are among the highest quality or best of their kind in the state. The National Audubon Society recognizes the Roanoke River Bottomlands, of which the Cashie River bottomlands are a part of, as a Global Important Bird Area (National Audubon Society 2016).

The Cashie River empties into the Albemarle Sound which is part of the Albemarle-Pamlico Estuary, the second largest estuary system on the United States. The North Carolina Division of Marine Fisheries (2009 and 2016) includes the Cashie River as a portion of the Chowan and Roanoke River and western Albemarle Sound Strategic Habitat Area and as an Anadromous Fish Spawning Area. Bertie County Game Land is an important asset in helping to protect aquatic resources. Striped bass, blueback herring, and white perch are important anadromous species that potentially spawn in the Cashie River.

The bottomlands and the adjacent uplands of BCGL offer important black bear habitat that helps meet Objective 4 of the NCWRC Black Bear Management Plan to conserve and manage black bear habitat in accordance with bear population objectives for each bear management unit (North Carolina Wildlife Resources Commission 2012). The strategies outlined in the bear management plan in which BCGL plays an important part include:

- Identify, acquire, and maintain property that would provide habitat for black bears.
- Identify key movement corridors and work, either through acquisition, easements, or agreements, to conserve these areas.
- Identify game lands that can be managed to create or maintain bear habitat and bear travel corridors.
- Support habitat management practices that benefit bear management objectives on both private and public lands.

Spurred by plummeting waterfowl populations, the North American Waterfowl Management Plan (1986) called for the protection, restoration, and enhancement of black duck migrating and wintering habitats on the east coast of the United States. The North American Waterfowl Management Plan (NAWMP) identified regions where partnerships could implement the goals of the NAWMP. The Atlantic Coast Joint Venture (ACJV) was formed in 1988 to offer a stepped down approach to fulfill the goals and objectives of the NAWMP. The South Atlantic Migratory Bird Initiative (SAMBI) is the vision and process in conservation planning and implementation. The acquisition of lands that now make BCGL aid in reaching goals set by the NAWMP and SAMBI to protect habitats for migrating and breeding waterfowl (North American Waterfowl Management Plan 1986 and South Atlantic Migratory Bird Initiative 2006). A 2005 revision to the Atlantic Coast Joint Venture Waterfowl Implementation Plan combined the Roanoke River and Chowan River into one focus area (Atlantic Coast Joint Venture 2005).

Game Land Specific Information

Location and Size

The BCGL lies in Bertie County and encompasses 3,884 acres of northeastern North Carolina along the banks of the Cashie River, just 3 miles southeast from the heart of Windsor. The largest tract is the Johnson's Landing Tract at 1,728 acres. This tract is divided by NC Highway 308 and is bordered on the south by the Cashie River. Three smaller tracts also lie on north banks of the Cashie. The Baltimore Tract, or Barber-Coppersmith Tract, at 114 acres and the Blades-Piland Tract at 457 acres accessible by the river only. The more southerly Thunderbolt Tract is situated between the river and NC 308 and is 247 acres in size. The land-locked Blades-Winston Tract is 20 acres and has no public right-of-way. The final tract, known as the Williams Tract, borders the southern bank of the Cashie River and is primarily 1,316 acres of tidal swamp and floodplain forest. Access to this tract is by the Cashie River or Roquist Creek.

Climate

Bertie County falls into the humid subtropical climate zones as does most of North Carolina. The average annual temperature for years 1981-2010 is 58.2 degrees Fahrenheit. July and August are typically the warmest months with daytime temperatures close to 86 degrees Fahrenheit (National Oceanic and Atmospheric Administration 2015). The average yearly precipitation is 47.9 inches, with June, July, August, and September being the wettest months. November is typically the driest month with just under 3 inches of precipitation a year (National Oceanic and Atmospheric Administration 2015). The first freeze for Williamston averages November 5th and the average last freeze is March 26 (National Weather Service 2015). Winds are typically out of the west and northwest during the fall and winter months and south and south west through the spring and summer (State Climate Office of North Carolina 2015).

Significant rainfall occurs with tropical systems. Hurricanes that have severely impacted the area in recent history were Dennis and Floyd in 1999, Isabel in 2003, and Irene in 2011.

Soils

The Cashie River has had a pronounced impact over much of the soils found on BCGL. Tidal swamps and floodplain forests make up a large portion of the Williams and Baltimore tracts and a good portion of the Blades-Piland Tract. Most of these habitat types are on soils characterized as Dorovan mucky peats, which make up 48% of the soils on the game land. The Johnson's Landing Tract is primarily Leaf and Lenoir loams that are nearly level and are poorly and somewhat poorly drained respectively. Craven fine sandy loams soils with slopes ranging from 1% to 8% are prominent on the Johnson's Landing and Thunderbolt tracts. Most of the pine plantations are found on the Leaf, Lenoir, and Craven soils. The remaining mapped soils constitute only 6% of the game land (Fig. 3)(Table 1)(U.S. Department of Agriculture 1990).

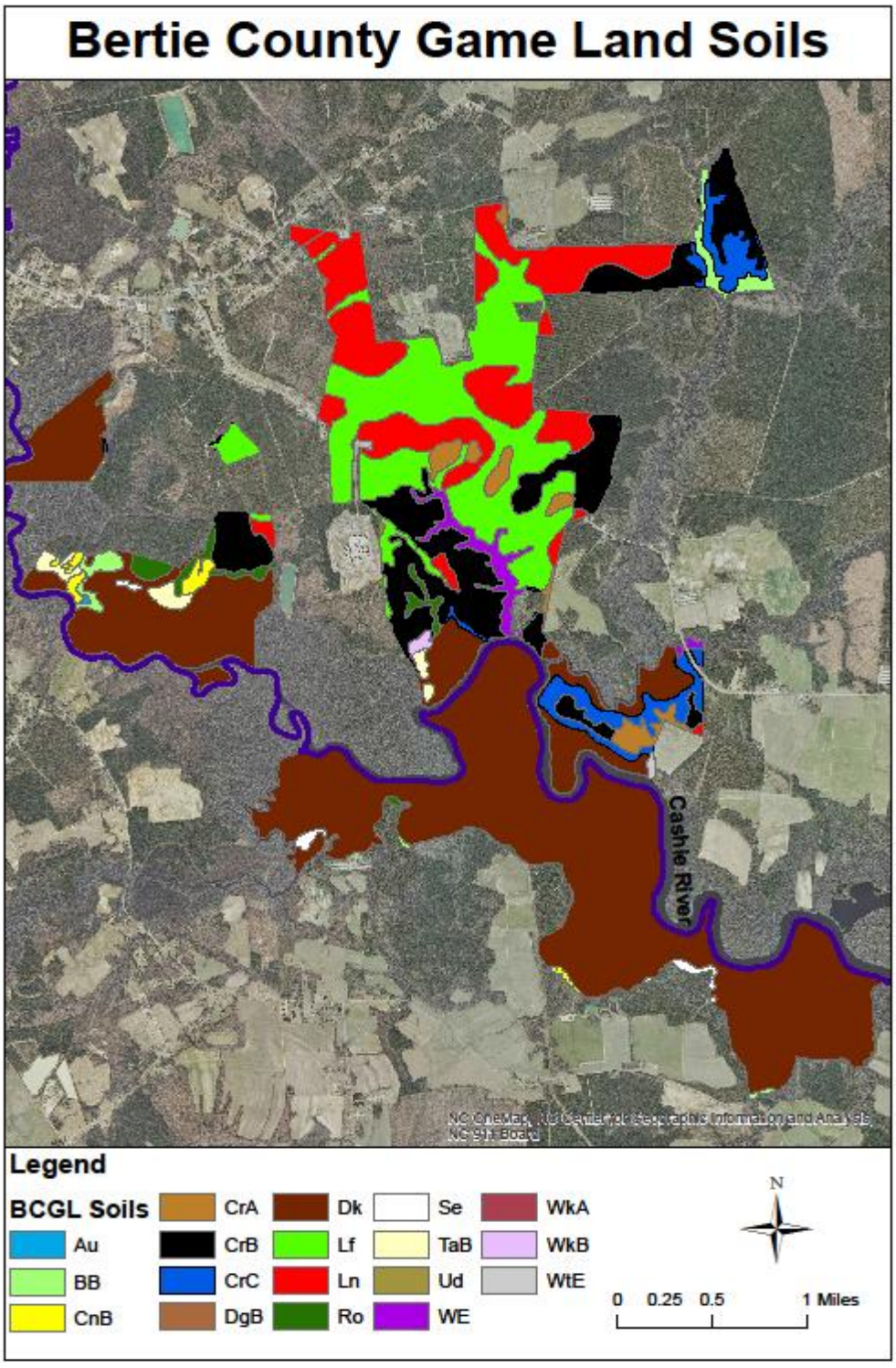

Fig. 3. Soils map for Bertie County Game Lands (U.S. Department of Agriculture 2013).

Table 1. Table of soil series and abbreviations for Bertie County Game Land.

Abbreviation	Soil Type	Acres	Percentage of Game Land
Au	Augusta fine sandy loam	1.34	0.03%
BB	Bibb and Johnston loams, frequently flooded	52.13	1.35%
CnB	Conetoe loamy sand, 0 to 5 percent slopes	25.01	0.65%
CrA	Craven fine sandy loam, 0 to 1 percent slopes	70.11	1.81%
CrB	Craven fine sandy loam, 1 to 4 percent slopes	485.64	12.53%
CrC	Craven fine sandy loam, 4 to 8 percent slopes	141.47	3.65%
DgB	Dogue sandy loam, 0 to 2 percent slopes	1.64	0.04%
Dk	Dorovan mucky peat, frequently flooded	1858.54	47.95%
Lf	Leaf loam	604.06	15.59%
Ln	Lenoir loam	472.78	12.20%
Ro	Roanoke fine sandy loam, frequently flooded	52.33	1.35%
Se	Seabrook loamy sand	15.11	0.39%
TaB	Tarboro loamy sand, 0-5 percent slopes	33.89	0.87%
Ud	Udorthents, loamy	0.31	0.01%
WE	Wehadkee loam, frequently flooded	52.09	1.34%
WkA	Wickham sandy loam, 0 to 2 percent slopes	0.15	0.00%
WkB	Wickham fine sandy loam, 2-6 percent slopes	6.01	0.16%
WtE	Winton fine sandy loam, 15 to 60 percent slopes	3.19	0.08%

Hydrology

Much of the land area of BCGL is directly impacted by the Cashie River comprising of low-lying tidal swamps and floodplain forest adjacent to the river. Heavy rain events can inundate hundreds of acres and wind driven tides can either push water upstream into the swamps or flush water from the system into the Albemarle Sound. Both events are typically short lived and the system returns to its normal waterlogged state.

The Leaf and Lenoir soil classes are nearly level in slope and are poorly drained. Most of the pine plantations, which are on these soils, have ditches that help drain the property. Most of the ditches typically empty into the natural drainages that lead to the creeks and river. Creeks that border the game lands include Roquist, Wading Place, and Sutton Creek.

Natural drain found on Johnson's Landing Tract of Bertie County Game Land. Taken by David Turner.

Habitats

Tidal Swamp Forest and Wetlands and Floodplain Forest will be combined for discussion in this plan as it is difficult to distinguish between the two habitat types through aerial imagery and any proposed management actions will be identical. The Tidal Swamp Forest and Wetlands low-lying habitats are normally saturated and may have surface water present. Floodplain Forests are interspersed throughout the Tidal Swamp Forest. Elevation changes as little as a few inches may determine the difference in habitat types. Both the Tidal Swamp Forest and the Floodplain Forest contain examples of Cypress-Gum Swamps which are similar in appearance with typical canopy tree species of bald cypress, water tupelo, and swamp black gum (Schafale and Weakley 1990). Red maple, water ash, and American hornbeam is a common understory species (Frost et al. 1990). These habitats collectively account for 46.5% of the land area of BCGL or 1,807 acres.

With the addition of the Johnson's Landing, Blades-Piland, Blades-Winston, and Thunderbolt tracts, 1,677 acres of Dry Coniferous Woodlands were added to the game lands program. Dominated by loblolly pine, these habitats offer land managers the greatest flexibility in habitat manipulation of the forest types existing on BCGL. Mechanical harvests and prescribed burns

can reduce basal area to promote a ground vegetative layer that typically does not exist in unmanaged stands. These loblolly pine stands are in varying age classes and are being converted to longleaf pine on appropriate sites.

Mesic Forest and Oak Forest habitats can be found mostly outside the floodplain with the rise in elevation, typically comprising the drains and slopes along pine stands. Mesic forests are characterized by moist uplands that are protected from fire. Typical canopy dominates include white oak, American beech, and yellow popular (Schafale and Weakley 1990). Oak forests on the drier sites include species such as white oak, hickory, loblolly pine, and sweetgum (Schafale and Weakley 1990). Likely due to slope and soil wetness limiting logging equipment access, these stands were never converted to loblolly pine plantations. Together, these habitats occupy 247 acres or 6.3% of BCGL.

The Early-successional Habitats on BCGL are defined as powerline right-of-ways and fields. Dominion North Carolina Power operates a large transfer power line through the Johnson's Landing and Williams tracts accounting for 46 of the 53 acres designated as Early-successional Habitat. Within the powerline right-of-way, NCWRC staff plant 9.3 acres in annual wildlife foods. Two fields are mapped in this habitat type with one being on the Williams Tract with no access. A small 1.25 acre opening surrounded by a loblolly pine stand on the Johnson's Landing Tract is planted annually to offer disabled sportsman an accessible area to utilize a permanent shooting blind. The Dry Coniferous Woodlands also offer Early-successional Habitat qualities as clearcuts are reforested and thinned pine stands are included in the prescribed burn rotation.

Although occupying an extremely small percentage of the land mass of the BCGL at 28.5 acres or 0.7%, Small Wetland Communities are extremely important to wildlife. Two beaver ponds, two barrow pits, and a vernal pool in a loblolly pine plantation constitute the Small Wetland Communities of BCGL. Ephemeral wetland sites, as does the depression in the pine plantation, offer important breeding sites for amphibians due to the lack of predatory fish. Several beaver ponds exist creating early-successional habitat and open water for waterfowl. Each of these habitat types will be discussed in greater detail in subsequent sections.

Surrounding Land Use

Bertie, County is mostly rural with a 2014 estimated population of 20,106 (U.S. Department of Commerce 2016). The largest town in Bertie County is Windsor, the county seat. Agriculture and woodlands are the major land uses in Bertie. According to USDA Farm Service Agency (2015) report for 2014, Bertie harvested 121,565 acres or 27% of the county's land area. Major crops are cotton, soybeans, peanuts, corn, and wheat. Acres planted in sage are beginning to increase in Bertie and have displaced some wheat crops. Bertie County has 304,900 forested acres accounting for 68% of the county's land area (Brown 2004).

More locally surrounding the game land, there are six poultry farms within 3 miles of the game land. The North Carolina Department of Public Safety's Bertie Correctional Institution operates a on the western border of the Johnson's Landing Tract. Several houses are scattered around the perimeter of the game land and the heart of Windsor lies just 2.5 miles to the west. Agricultural land and timberland are the major land uses adjacent to the game land.

Cultural Resources

North Carolina is not only known for its natural history but also its rich historical/cultural resources. The most recent Native Americans to occupy the area were the Tuscaroras. English settlement is thought to begin around 1657 (U.S. Department of Agriculture 1990). Archaeological sites include prehistoric Indian habitation sites. Because the sites can be easily damaged, unauthorized artifact collecting activities on all state owned property, including NCWRC owned lands, are prohibited by the Archaeological Resources Protection Act (G.S 70 Article 2)(Appendix I). One cemetery is known to exist on the Blades-Piland Tract.

Acquisition History

The NCWRC first leased the Williams Tract and the Barber-Coppersmith Tract from Georgia-Pacific in 1993. These tracts had limited access for the general public as there were no roads to the property and most users needed a boat to hunt the tracts. The Thunderbolt, Blades-Piland, and the Blades-Winton tracts were acquired in August 2005 using Ecosystem Enhancement Program funds. Using Clean Water Management Trust Fund monies, the NCWRC acquired the former Georgia-Pacific Williams and Baltimore (Barber-Coppersmith) tracts from the Nature Conservancy in April of 2007. To this point, there were no driving access onto any of the tracts. Users could park along side of NC 308 and walk onto the Thunderbolt Tract. In June of 2007, the NCWRC, working with The Nature Conservancy, acquired the Johnson's Landing Tract from International Paper. This tract had good vehicular access which opened this game land to users that did not have a boat.

Purpose of the Bertie County Game Land

Beginning in 1993, the lease of the Williams Tract and the Barber-Coppersmith Tract allowed for public hunting and trapping opportunities in an area that was noticing general use of private land being restricted to hunt clubs renting the private land. The Ecosystem Enhancement Program (EEP) was developed in 2003 between the NC Department of Transportation, NC Department of Environment and Natural Resources, and the US Corps of Engineers to proactively offset future functional losses to wetlands and riparian buffers for transportation projects. The Thunderbolt, Blades-Piland, and the Blades-Winton tracts were purchased with EEP funds and added to the game lands program with conservation easements protecting the land from certain actions. The Williams Tract and the Barber-Coppersmith Tract with its Tidal Swamp and Floodplain Forests were purchased with funding through CWMTF to help protect the water resources of the Cashie River and Roquist Creek that provide spawning habitat for anadromous fishes.

The Johnson's Landing Tract was acquired as part of the International Paper land liquidation effort in the mid-2000's. The Johnson's Landing Tract was a part of a larger acquisition that added nearly 64,000 acres to the game lands program in eastern North Carolina. The primary purpose of BCGL is to provide hunting, fishing, trapping, and wildlife viewing opportunities. Other than recreational opportunities, BCGL provides essential breeding and nesting habitats for wood ducks, migrating corridors for wintering waterfowl, breeding and migrating habitat for neo-tropical songbirds, and serves as an important travel corridor for black bears. The benefits of the protection of water resources through EEP and CWMTF aided acquisitions and the

opportunity to restore lands to habitats considered to exist prior to European settlement should not be overlooked.

The North Carolina Department of Natural Resources has designated BCGL as a Dedicated Nature Preserve. The Articles of Dedication designations recognize the natural importance, and many times, the sensitive nature that the habitats have to human interference (Fig. 4). The Articles of Dedication terms and conditions guide land managers on appropriate uses of the land (Appendix II).

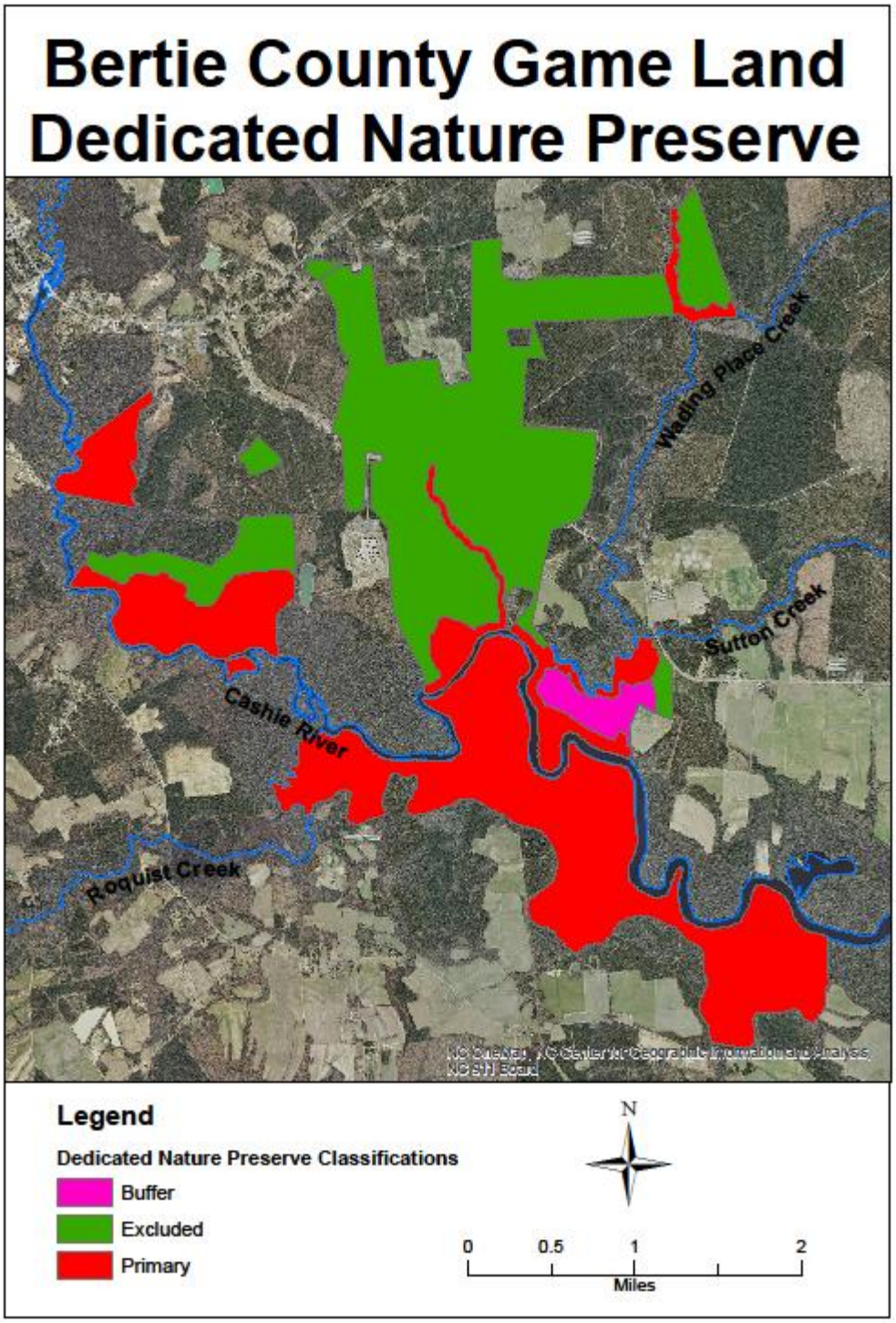

Fig. 4. Articles of Dedication designations on Bertie County Game Land.

Game Land Goals and Measures of Success

Goals

- Provide for a diversity of habitat types through science based land management practices to ensure that a wide variety of terrestrial and aquatic wildlife species are conserved on the game land.
- Conserve popular game species at huntable levels through science based land management and sound regulations.
- Provide quality habitat across the game land for endangered, threatened, and rare species to promote sustainable and perpetual populations.
- Provide sufficient infrastructure and opportunity to allow game lands users a quality experience while on the game land with minimal habitat degradation and minimal conflict among user groups.

Measures of Success

- Monitor invasive species in Tidal Swamp and Floodplain Forests.
- As Dry Coniferous Woodland habitats progress with age and stand treatment, develop burn compartments to meet annual prescribed burning goals.
- Meet annual prescribed burn acreage targets and habitat goals through expanding burning window by conducting more growing season burns.
- Expand the ecotone transition between Oak Forest and Mesic Forest habitats and Dry Coniferous Woodlands habitats.
- Improve drainage to facilitate annual plantings in wildlife openings.
- Allow Beaver Ponds to follow natural succession.
- Introduce prescribed fine into Small Wetland Communities Vernal Pool to reduce shrub layer and leaf litter buildup to promote use by reptiles and amphibians.
- Address priority roads and projects outlined in the *Infrastructure Development and Maintenance* section of this plan.
- Develop management strategies to minimize conflicts between user groups.
- Efforts are 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 the game land.

Habitat Communities

Tidal Swamp Forest and Wetlands and Floodplain Forest

There are 1,807 acres on BCGL classified as Tidal Swamp Forests or Floodplain Forest. For the purpose of this plan, these two habitat types will be discussed together as both habitats can be difficult to distinguish apart by aerial photography as small changes in elevations can dictate which class the habitat would be designated. Also, the majority of both habitats are protected as Primary Areas through the Articles of Dedication resulting in similar management strategies.

The Tidal Swamp Forest on BCGL are described as habitats occurring along rivers and creeks where flooding is influenced by wind tides (Schafale and Weakley 1990). Typical canopy dominates along the river and creek shores include swamp black gum, water tupelo, and a spattering of bald cypress throughout. Large diameter bald cypresses can be found along the waterways. Water ash, red maple, and American hornbeam dominate the sub-canopy (Frost et al. 1990).

The Floodplain Forest component in the combined habitat type discussion exists on slightly higher elevations than the Tidal Swamp Forest. Swamp black gum, water tolerant oaks, loblolly pine, and Atlantic white cedar are common canopy dominates with a more developed shrub and herb layer compared to the Tidal Swamp Forest (North Carolina Natural Heritage Program 2016).

Due to environmental conditions requiring unconventional logging techniques, historical timber harvesting targeted large, high value trees. Rotation ages are longer than on adjacent uplands. Consequently, large diameter trees that develop hollows important for cavity-dwelling species are more abundant in these habitats.

Black bear sitting in a large bald cypress. Taken by David Turner.

A. Location and Condition of Habitat (Fig. 5)

Nearly all of the Williams Tract and the Baltimore Tract habitats and 65% of the Blades-Piland Tract are considered to be Tidal Swamp Forest and Wetlands or Floodplain Forest habitats.

These habitats radiate north from the Cashie River into the Johnson's Landing and Thunderbolt tracts.

Timber stands in these habitats are mostly uniform with few canopy gaps. Most of the canopy gaps are created during storm events. These gaps create diversity in the forest vegetative structure and may be attractive to some neo-tropical migrant songbirds. Historically, there have been past logging practices which removed only the highest value trees in some of the timber stands. This practice of "high-grading" has reduced the timber value and tree species diversity of the stands but has increased the age distribution as natural regeneration has filled the canopy gaps. Habitat quality for cavity-oriented species continues to improve as timber stands age. The Tidal Swamp Forests and the Floodplain Forests have not been under a harvest regime for some time; therefore, most are mature stands with high wildlife habitat value. None of this stand type has been logged since acquisition by the State.

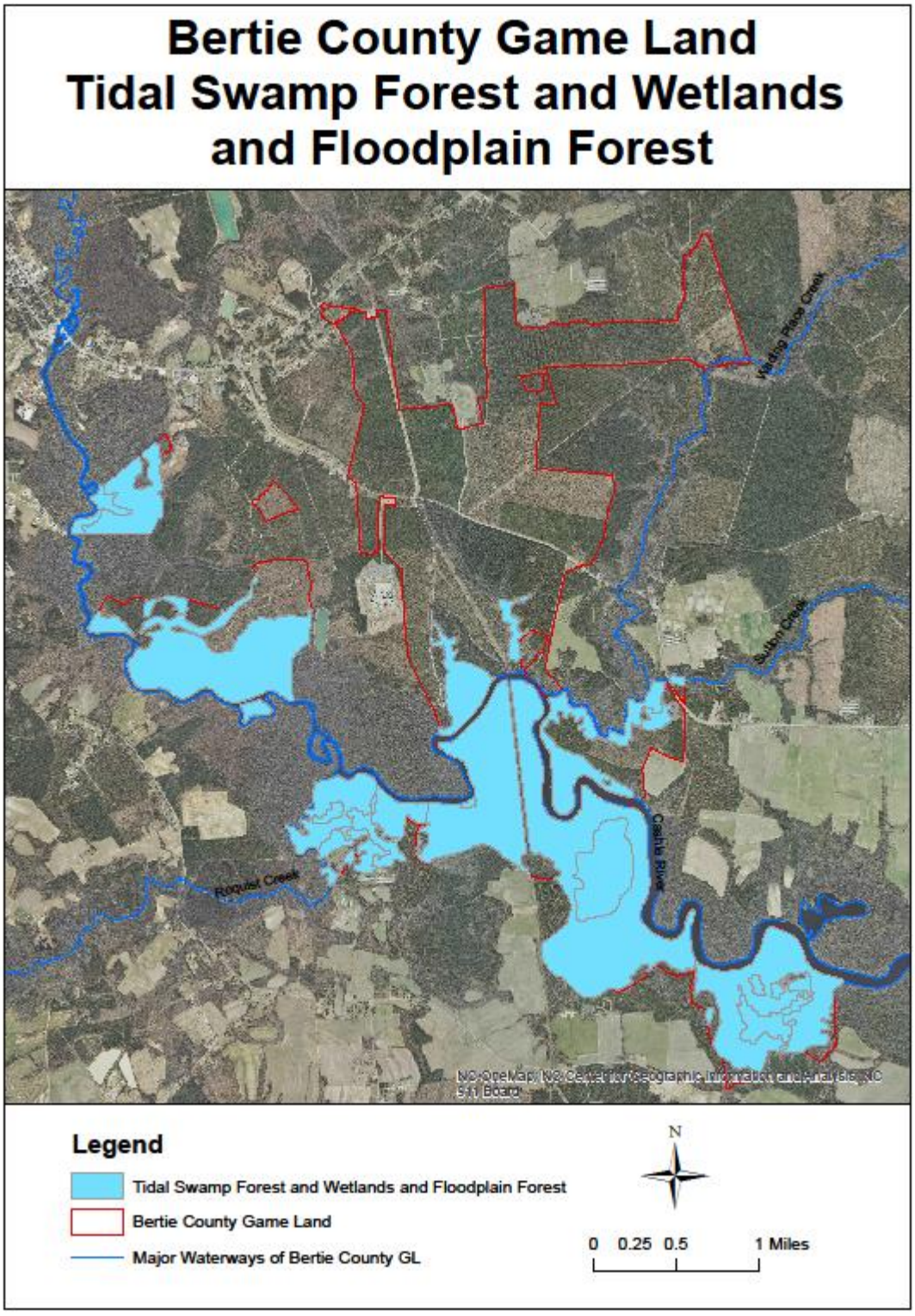

Fig. 5. Tidal Swamp Forests and Floodplain Forest habitats on BCGL.

B. Priority Species

The priority game and furbearer species identified for the Tidal Swamp Forest and Wetlands and Floodplain Forest type include: river otter, beaver, white-tailed deer, black bear, raccoon, gray squirrel, wood duck, woodcock, and wild turkey. Table 2 lists nongame species potentially found in this habitat type on BCGL and their conservation status.

Table 2. Listed non-game species associated with Tidal Swamp Forests and Floodplain Forest habitats. See Appendix III for Status and Ranking descriptions.

Common Name	Scientific Name	State Status (Federal Status)	Natural Heritage State and Global Rank
Bald Eagle	*Haliaeetus leucocephalus*	T	S_3B, S_3N, G_5
Cerulean Warbler	*Dendroica cerulea*	SC(FSC)	S_2B, G_4
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	SC(FSC)	S_3, $G_3G_4T_3$
Southeastern Bat	*Myotis austroriparius*	SC(FSC)	S_2, G_3G_4
Timber (Canebrake) Rattlesnake	*Crotalus horridus*	SC	S_3, G_4

C. Management Challenges

The Articles of Dedication that apply to these tracts are designed to specifically address Tidal Swamp Forest and Floodplain Forest types for plant community restoration or water quality preservation purposes. The provisions that protect these areas from degradation also restrict potentially beneficial active management practices. In addition to the Dedication restrictions, most of these areas are not conducive to logging.

Rising water levels may change the composition of the Tidal Swamp Forest along the Cashie River and Roquist Creek. *Phragmites sp.* should be monitored in these sites and if it presents management concerns, the NCWRC should consult the North Carolina Department of Environmental Quality for recommendations to address *Phargmites sp.* spread. Currently, alligatorweed is prevalent in mats along the shoreline of the game land and chokes both Roquist Creek and Wading Place Creek; however, vegetation control within public waterways are outside of the scope of this plan.

D. Management Strategies & Needs

The Articles of Dedication would limit timber management activities to a salvage operation of damaged trees following a catastrophic event, such as a hurricane. Since large rain events typically accompany a hurricane, timber salvage operations in these flood-prone sites are an

unlikely scenario. Therefore, passive management retaining mature trees for their mast production and cavity potential with minimal site disturbance is the intended strategy.

Suppression of exotic plant species would be a desirable and a conservation easement permissible activity within these habitat types. Initially, monitoring to identify affected areas, species identification, and determining if control is feasible is the current priority. Development and implementation of a control plan before an infestation is too widespread with specific treatment measures can be formulated in annual planning documents.

E. Desired Future Conditions

In most cases the desired future conditions in the Tidal Swamp Forests and Wetlands and Floodplain Forests of ample mast production, adequate numbers and size of tree cavities, an abundance of coarse woody debris, and conditions for habitat specialists have been met or are proceeding in that direction without additional active management activities.

Dry Coniferous Woodlands (Loblolly/Longleaf Pine Forests)

Dry Coniferous Woodlands comprise nearly one-half (1,678 acres) of the BCGL. The Dry Coniferous Woodland type primarily consists of planted loblolly pine stands with a single stand planted in longleaf pine. The understory plant component is composed of hardwood tree species and vines, most commonly sweetgum and red maple. In open canopy stands treated with fire, grasses such as bluestem and *Panicum sp*. have become established along with a flush of volunteer loblolly pine regeneration.

A. Location and Condition of Habitat (Fig. 6)

The Dry Coniferous Woodland forest type is represented on all but the Baltimore and Williams tracts. Almost all of this type has been established by artificial regeneration involving heavy mechanical site preparation and herbicides. Much of the acreage currently in pine would naturally have mixed pine-hardwood stands rather than the monotypic species stands presently in place. Approximately 83% of this forest type on BCGL is found on the Johnson's Landing Tract, where stands are situated on flats or gradual slopes to hardwood drains. The Johnson's Landing Tract is a fairly contiguous pine forest type, becoming less so as it approaches the Cashie River to the south. Due to BCGL's proximity to the Cashie River and its tributaries, virtually all of the pine stands are located on inter-stream terraces or other upland topography adjacent to river floodplain. With sometimes only subtle site differences in soil and topography between adjacent stand-level management units, tree age and application of first thinning treatment are the factors that demarcate timber stands.

While much of the natural plant understory character has been disrupted by substantial site preparation efforts over several timber rotations, occasionally less common native plant species have managed to perpetuate themselves on microsites within the plantations. Two notable examples are a small population of southern twayblade identified on a mesic site on the Johnson's Landing Tract and silky camellia from a well-drained knoll on the Thunderbolt Tract. A significant understory plant component is lacking due to canopy closure in pre-merchantable stands, while hardwood saplings and pine regeneration dominate the understory of thinned stands, due partly to the inconsistently applied prescribed fire. The lack of a seed source for

grasses and herbs to infiltrate timber stands contributes to unimpeded tree seedling establishment.

Sites with the Dry Coniferous Woodland type on BCGL range from 10'- 32' above sea level. Most of the soils have a sandy loam texture with hydrology dependent upon elevation and slope. Lenoir and Leaf soils predominate on the flat somewhat poorly-drained sites, while moderately well-drained Craven soils and associated inclusions are mapped on slopes and upland crests (U.S. Department of Agriculture 2013).

Although tracts were acquired in stages, the NCWRC began active management of BCGL following acquisition of the Johnson's Landing Tract, starting with timber thinning in 2007 and prescribed burning initiated in 2009. At the time of acquisition, all of the stands currently in loblolly pine were in place. Only one stand that had been recently harvested and not reforested was subsequently established in longleaf pine by the NCWRC. Pine timber on BCGL is relatively young. Including the longleaf stand, timber age ranges from 7 – 35 years. Most sites are fairly productive for loblolly pine growth with average 50-year site indices of 85 or greater. Over the last nine years as timber has reached merchantable size or met basal area thresholds for second thinning, treatments have been applied at a rate equating to a 10-year reentry interval for the available acreage base. All but 315 of the 1,678 pine acres has received a mechanical timber treatment since tract acquisition by the State.

Loblolly stand on BCGL. Taken by David Turner.

B. Priority Species

The primary game species frequenting the Dry Coniferous Woodland type on BCGL are white-tailed deer and wild turkey. There is significant interest in hunting opportunities for both of

these species on the game land. The management regime working toward open timber stands opportunistically retaining mast-producing hardwoods within pine stands has improved overall turkey habitat. Browse resources for deer has been improved as well through reduction of tree canopy closure. Gray squirrel provide the best small game species hunting opportunities. Although more associated with adjacent hardwood stands, squirrels make forays into the pine stands for seed in the fall and winter months. While more widely dispersed to localized sites across the game land, American woodcock are another regularly occurring small game species.

Ovenbird is a songbird species characteristically found within the pre-thinning plantations during the breeding season. Post-thin stands have a different suite of species including northern cardinal and eastern towhee. With management treatments, habitat is trending toward favoring early successional species. Table 3 lists nongame species potentially found in this habitat type and their conservation status. The timber rattlesnake is the only species documented by staff to occur in this habitat type on BCGL. Eastern fox squirrels are not known to occur on the game land but have been documented in Bertie County. As timber stands age, fox squirrel habitat will continue to improve. Red-cockaded woodpeckers do not occur on BCGL. A historical record of the birds just off the property is documented from the 1980's. That timber stand no longer exists. There are no pine stands on BCGL that are old enough or tree diameters large enough to support a red-cockaded woodpecker cluster.

Table 3. Listed non-game species associated with Dry Coniferous Woodlands. See Appendix III for Status and Ranking descriptions.

Common Name	Scientific Name	State Status (Federal Status)	Natural Heritage State and Global Rank
Timber (Canebrake) Rattlesnake	*Crotalus horridus*	SC	S_3, G_4

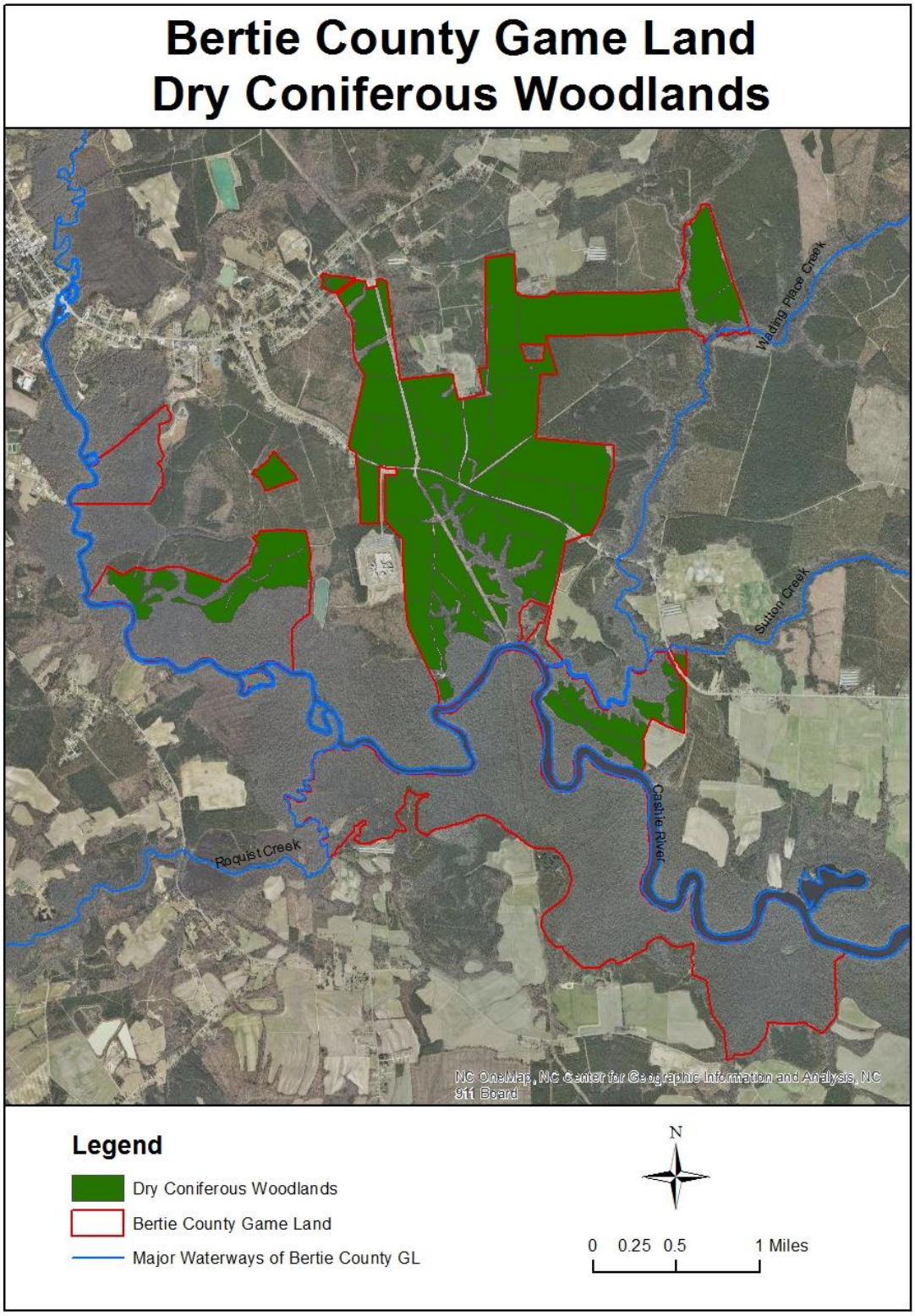

Fig. 6. Dry Coniferous Woodlands on BCGL.

C. Management Challenges

Ecosystem Enhancement Program (EEP) acquired mitigation lands with conservation easement restrictions apply to the Blades-Winston, Blades –Piland, and Thunderbolt tracts impacting timber harvesting abilities. Included within these tracts are 276 acres of the Dry Coniferous Woodland type. The NCWRC requested and was granted the ability to do limited tree cutting for the purposes of wildlife habitat management. The conditional approval maintained a 300' stream buffer requirement and limited work to artificially regenerated stands with the end objective of restoration of native plant communities.

Application of prescribed burning prescriptions have been hampered by a number of issues. Young pre-thinning age loblolly pine stands, within a larger burn compartment, that can be damaged by a burn application has limited prescribed burn unit size. Several of the burn units, where firebreak construction within the swamp forest is not an option, require connecting a containment line into flooded swamp limiting the burning window to the winter months. Site preparation techniques by the previous landowner for pine establishment on portions of the tracts included bedding. Ponding of water between beds during wet periods has limited the ability to burn these sites. Tract size is a major limitation requiring installation of firebreaks along property lines in most burn compartments. With the exception of timber stands maturing to better withstand burning treatments, the remaining issues will be reoccurring challenges throughout the management regime.

Establishment of a native grass-forb understory in the face of an aggressive seeding of loblolly pine and hardwood stump sprouts, coupled with the absence of a grass and herb seed source is also a major challenges to meet habitat goals.

Another anticipated challenge is application of longleaf pine restoration initiatives on more productive soils on BCGL than where it is traditionally implemented on more sterile sites and where competing vegetation may be less of an inhibitor to establishment.

D. Management Strategies & Needs

To meet the prescribed burning target of treating the available pine acreage an average of every three years, the current burn acreage would need to be increased fourfold. In order to achieve the increased burn acreage target, development of larger burn units is needed. The timber management program is progressing toward that end of thinning every timber stand as it becomes merchantable and cutting firebreak corridors down property boundaries where constructed breaks are needed.

Under the current management scenario, assuming they are healthy, loblolly pine stands on BCGL will be carried through a saw timber rotation. As loblolly pine stands mature and final harvests become a consideration, the specific timing and tree species for reforestation will be defined in the annual forest management plan generated by field staff. Reforestation considerations will take into account tract habitat conservation efforts, site appropriate species for reforestation and longleaf pine restoration initiatives.

In order to ensure success in addressing longleaf pine restoration potential on BCGL, there needs to be concerted evaluation effort to identify suitable sites based upon soil type, hydrology, and the ability to maintain in a prescribed burning rotation. Approximately 40 percent of BCGL has

soils mapped as moderately well-drained sandy loams suitable for longleaf pine with additional acreage in more marginal soils in locations able to be incorporated in a burning regime. Due to site productivity, adaptation of methods for longleaf pine establishment may require more than the standard of chemical site preparation followed by a prescribed burn interval. Additionally, the intensity of treatments will vary according to site productivity and proximity of competing vegetation seed sources. On selected sites, when balancing effort and unit cost of complete competition control, determination that a mixed species stand of which longleaf pine is a component, may be an acceptable compromise.

E. Desired Future Conditions

A Desired Future Condition of Dry Coniferous Woodlands would include the development of open canopy timber stands working toward a grass-forb dominated understory with prescribed fire as the primary understory management tool. Longleaf pine reforestation, where appropriate, will aid in the maintenance of a prescribed burning rotation throughout its life cycle without the fire exclusion period early in a loblolly pine rotation. It is likely that no additional stands on BCGL will be converted to longleaf pine within the 10-year scope of this plan because of young stand age.

Loblolly pine stands not slated for conversion will have the flexibility to be managed on biologically mature rotations to provide timber age class diversity and an extended period for application of prescribed fire.

Managers will continue to expand vegetative transition zones from abrupt to a more natural graduation between pine and hardwood forest types for improved wildlife habitat value.

Longleaf pine stand on BCGL. Taken By David Turner.

Mesic Forest and Oak Forests

Timber stands classified as Oak Forest and Mesic Forest types on BCGL comprise approximately 6% (248 acres) of the property. The Oak Forest and Mesic Forest type occurs primarily on slopes existing in the transition between the pine-dominated uplands and swamp forest types. Occasionally, the type occurs embedded within the Cashie River Tidal Swamp-Floodplain Forest types perched slightly above frequently flooded elevations. Though mapped as a single type for the purposes of this planning document, the oak-dominated versus more mesic species are stratified by elevation. On BCGL, American beech and upland oaks extend upland beyond the 25 feet above sea level contour, while more mesic forest species are prevalent at the foot of slopes on somewhat poorly drained sites. Slopes range from nearly level to fairly steep, sometimes exceeding 20% on the last high terrace before the river floodplain. Some of the mesic sites are infrequently flooded for short durations, usually associated with severe storm events. Due to slope and elevation, the more upland variants are almost never inundated and rarely experience water ponding. Most of these types experience some fire-sheltering, due to proximity to a watercourse, surrounding swamp, or low-volatility fuels. With a few exceptions, most Oak Forest and Mesic Forest types on BCGL average less than 10 acres in size. Due to inaccessibility or location within a stream water quality buffer most stands in this habitat type

have not been subject to a recent timber harvest. As a result of their timber harvest history the stands are fairly mature and relatively even-aged.

Dominant tree species of the BCGL Oak Forest and Mesic Forest type include: American Beech, sweetgum, red maple, tulip poplar, black gum and a variety of oaks with species positioned according to elevation. Common mid-story species are flowering dogwood and crabapple on upland sites with sourwood and ironwood dominating more mesic areas. Most of this type on BCGL is in a closed canopy stage and relatively open beneath. Occasionally, microsites at BCGL, usually associated with a high water table and soil organic component, have a well-developed shrub layer dominated by gallberry and bay species, sometimes infused with switchcane. Privet has become part of the shrub component in canopy caps and where timber stand edges meet openings, such as roads or utility right-of-ways. As a result of tree canopy shading the understory tends to be poorly developed with a sparse herbaceous coverage of heart-leaved ginger, ferns, and sedges. As sites tend toward a more mesic condition, vines become more prevalent represented by yellow jessamine, trumpet creeper, poison ivy, and greenbrier.

A. Location and Condition of Habitat (Fig. 7)

On BCGL, the Oak Forest and Mesic Forest stand types are narrow fringes on stream bluffs or slight topographical rises in broad swamp bottoms. The upland sites are very linear in nature set along contours, while the lowland sites are water-deposited soil domes. The Johnson's Landing Tract south of NC 308 has a well dissected and fairly extensive series of ravines draining to the Cashie River, which are indicative of the upland version of this type. Also the north side of the Thunderbolt Tract, draining to Wading Place Creek, has ravines exhibiting those features. Sites on the Williams and Baltimore tracts typify the lowland variant of this type on BCGL.

Their somewhat inaccessible nature for logging and function as stream water quality buffer has yielded fairly mature stands with habitat value for mast production, tree cavities, snags, as well as dead and down woody material. While old enough to provide these numerous habitat features, the stands are not so old to have begun to decline. As a climax successional type, the stands will trend toward an uneven-aged distribution with a gradual shift in species composition. On upland sites, tree replacement in single stem canopy gaps will favor the most shade tolerant species with American beech becoming more prevalent over time.

From a wildlife habitat standpoint, Oak Forest and Mesic Forest habitat types represent a small percentage of the ownership acreage, but has a disproportionally high value as a habitat type linking other forest types along a contiguous river corridor.

B. Priority Species

Priority game species for management in this forest type are wild turkey, white-tailed deer, and gray squirrel. Seasonal opportunistic use of this forest type by black bear for mast-producing resources no doubt occurs, although bear occurrence across the upland portions of BCGL is infrequent. Summer tanager and wood thrush are summer residents in the Oak Forest and Mesic Forest habitat type.

Table 4 lists selected nongame species potentially found in this habitat type and their conservation status. Of the species included, timber rattlesnake has been documented as occurring on the game land.

Table 4. Listed non-game species associated with Oak Forest and Mesic Forest. See Appendix III for Status and Ranking descriptions.

Common Name	Scientific Name	State Status (Federal Status)	Natural Heritage State and Global Rank
Southeastern Bat	*Myotis austroriparius*	SC(FSC)	S_2, G_3G_4
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	SC(FSC)	S_3, $G_3G_4T_3$
Timber (Canebrake) Rattlesnake	*Crotalus horridus*	SC	S_3, G_4

C. Management Challenges

Site inaccessibility for equipment is a major challenge for work in this community type. The other major limitation on BCGL is that this type is found within Clean Water Program buffers, Ecosystem Enhancement Program acquired mitigation lands, or other areas protected by NC Natural Heritage Program Articles of Dedication and are protected from tree removals and equipment disturbance.

D. Management Strategies & Needs

Due to the restrictions listed above, alterations as a result of mechanical treatments are not likely to occur. Since most of these stands are presently in a desired condition in terms of species composition and age, any short term management strategy would be for maintenance rather than improvement or conversion to another type.

While not intentionally targeted for prescribe burning, stands adjacent to the Dry Coniferous Forest type may be included in prescribed burning compartments where it reduces burn complexity and firebreak construction requirements. Due to site sensitivity from slope or proximity to a watercourse, firebreaks in this forest type will consist of wet, raked, or other low impact lines. Fires here are expected to be low intensity due to the fuel type, therefore are not expected to harm the large diameter hardwood stems and may promote oak regeneration over more fire susceptible tree species. In many cases, the past landowner's pine timber production goals has reduced the width of and eliminated the coniferous to hardwood natural transitions. Where appropriate this type may be expanded into the Dry Coniferous Forest type and more gradual vegetative transitions promoted.

E. Desired Future Conditions

The target condition for this forest type is mature uneven-aged trees, populated by predominately mast-producing species providing a sustained yield of snags, cavities, and downed woody material for wildlife habitat. This community type is expected to continue to provide a forested buffer to preserve water quality and acreage may gradually be increased where site appropriate.

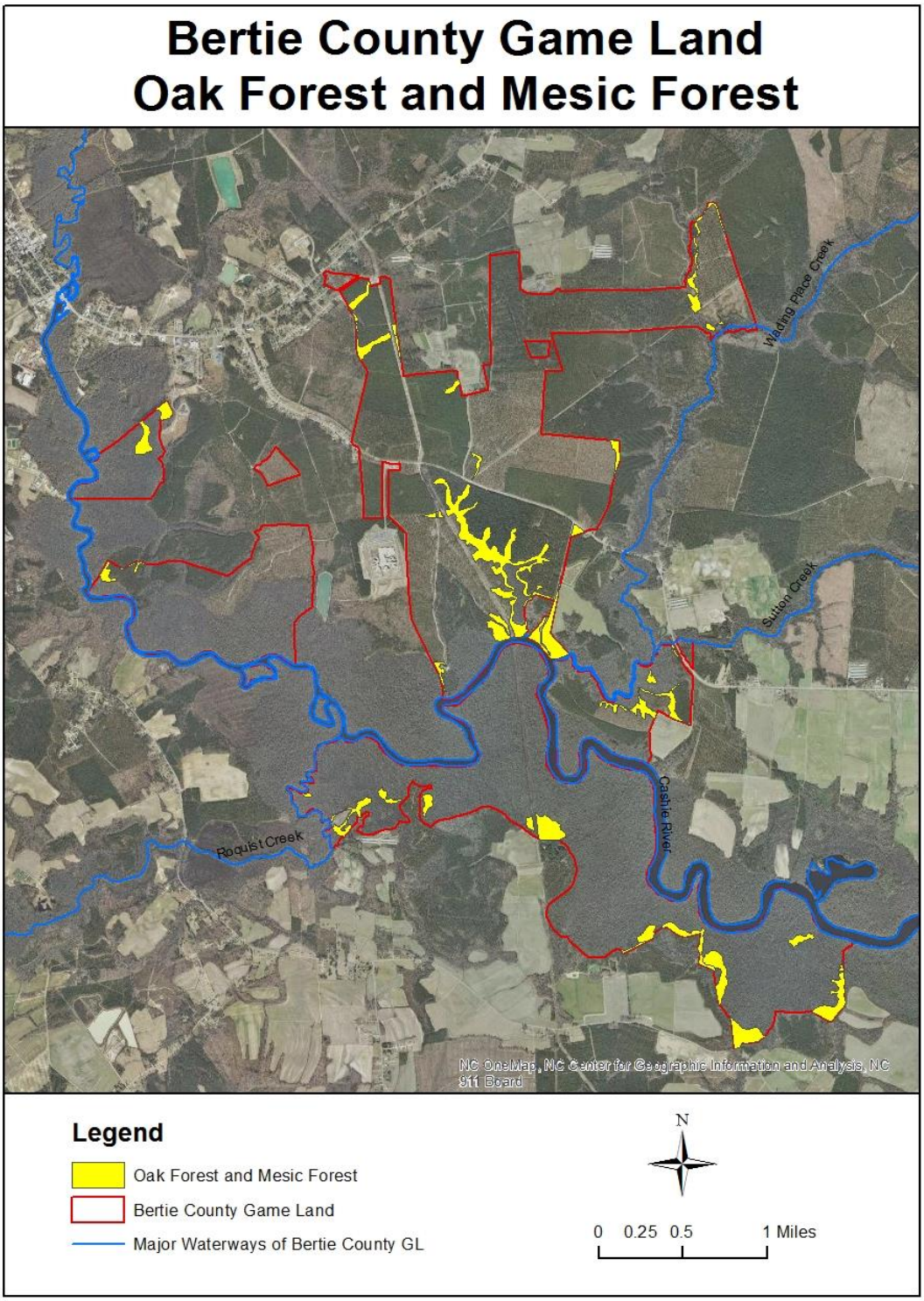

Fig. 7. Oak Forest and Mesic Forest on BCGL.

Early Successional Habitat

Approximately 53 acres (1.3%) of habitat on BCGL is classified as Early Successional Habitat. These communities form soon after a disturbance and generally consist of herbaceous annuals and perennials that quickly occupy disturbed sites. They reproduce seeds that are disturbance-adapted or can be widely dispersed by wind, water, or animals. Early successional habitat can be a mix of grasses, legumes, wildflowers, vines, shrubs, saplings, and agricultural plantings. In general, sod-forming grasses such as fescue and bermudagrass provide minimal wildlife value; while grasses that grow in individual clumps, such as switch grass and broom sedge, provide greater value for wildlife. Small patches of vines or shrubs contribute to habitat value, but woody vegetation should not shade out the grasses and forbs.

These communities are characterized by high productivity and provide habitat for many disturbance-adapted wildlife species. Early successional habitats are highly ephemeral and in the absence of further disturbance, the attractiveness and productivity of these habitats declines.

Wildlife opening at the disabled sportsman blind. Taken by David Turner.

This habitat type requires frequent disturbances that suppress or reset ecological succession. These disturbances include activities such as timber harvests, disking, mowing, burning, and/or herbicide treatments to maintain this condition. However, environmental factors such as weather events, climate, and natural fires still play a role in creation and maintenance of these habitats. Without these disturbances or active management, natural plant succession will inhibit the quality and limit the longevity of many of these habitats.

It must be noted that early successional wildlife habitat differs from other open lands by the vegetative component represented. Although pastures, hayland, agriculture crops, lawns, and golf courses may be considered early successional *lands*, they should only be considered early successional *habitat* if they are composed of vegetation that is beneficial to wildlife. There are 9.3 acres of managed wildlife openings on the game land. These openings have elements that are similar to other, more natural, early successional habitats during portions of the year and will discussed in this portion of the plan.

Historically, both large and small areas of these habitats were created by catastrophic natural fires, anthropogenic fires, large-scale wind events, insect pests, or pathogens such as fungal diseases that all cause significant canopy loss. Timber harvest also creates early successional habitats for several years following the harvest and this character can be maintained through understory treatments. Early successional habitats resulting for timber management and prescribed burning is covered in the *Dry Coniferous Woodland* section.

A. Location and Condition of Habitat (Fig. 8)

BCGL has 47 acres of the 53 acres of Early Successional Habitat in powerline right-of-ways. A Dominion North Carolina Power transfer line bisects the Johnson's Landing and the Williams Tract. The Williams Tract portion of the powerline splits the Tidal Swamp and Floodplain Forest. Although these acres are converted from the Tidal Swamp and Floodplain Forest habitat types, the existing early successional habitat is thought be good. Under the powerline, the ground is completely vegetated with grasses, sedges, red maple saplings and other moist soil adapted flora. The Johnson's Landing Tract portion of the powerline is more representative of upland early successional habitats that could support northern bobwhite quail and cottontail rabbits. Vegetation includes warm season and cool season grasses, hardwood and pine saplings, and shrubs.

NCWRC staff annually plant 10.6 acres of wildlife openings on BCGL. Most of these openings occur under Dominion's powerline on the Johnson's Landing Tract. Two smaller openings, 0.9 acres and 0.4 acres, are set in loblolly pine stands and planted annually. Typical crops include: browntop millet, sunflowers, iron-clay cowpeas, oats, and clover. NCWRC staff have taken advantage of these opportunities to provide a forage crop for wildlife. Most of these wildlife openings are wet natured and, at times, can be difficult to work.

Powerline ROW on the Williams Tract showing Early Successional Habitat through the Tidal Swamp and Floodplain Forest. Taken by David Turner

B. Priority Species

Game species that are targeted for management in these habitats include Northern bobwhite, mourning dove, wild turkey, white-tailed deer, cottontail rabbit, and marsh rabbit. Table 5 lists the listed nongame species potentially found in this habitat type and its conservation status. Priority non-game species that may use these habitats include American kestrel, prairie warbler, and orchard oriole.

Table 5. Listed non-game species associated with Early Successional Habitats. See Appendix III for Status and Ranking descriptions.

Common Name	Scientific Name	State Status (Federal Status)	Natural Heritage State and Global Rank
Timber (Canebrake) Rattlesnake	*Crotalus horridus*	SC	S_3, G_4

C. Management Challenges

A primary management challenge is providing this habitat in a forested landscape which requires intensive and constant management practices such as prescribed burning, mechanical, and/or herbicide treatments. These activities aid in resetting succession.

Invasive species can cause problems in early successional habitats. Fire ants kill newly hatched ground nesting birds, reptiles, and new born mammals. Brown-headed cowbirds parasitize bird nests and many exotic plant species take advantage of the light conditions in early successional habitats. Plant species such as tall fescue, bermudagrass, and other sod-forming grasses form a dense structure at ground level. This makes it difficult for young wildlife to travel through these areas, limits seed and invertebrate availability, and limits the native seedbank from germinating.

Poorly timed management actions can have a negative impact on early successional habitats and the wildlife species that rely on those habitats. Mowing or disking during certain times can destroy bird nest, eliminate the following year's seed source of desirable species, and promote invasive or other undesirable vegetation.

Wet soil conditions can make planting the annual forage crops difficult. Most of the openings are on Leaf, Lenoir, and Craven soils. Wetness is the main limiting factor describing these soils for cropland (United States Department of Agriculture 1990).

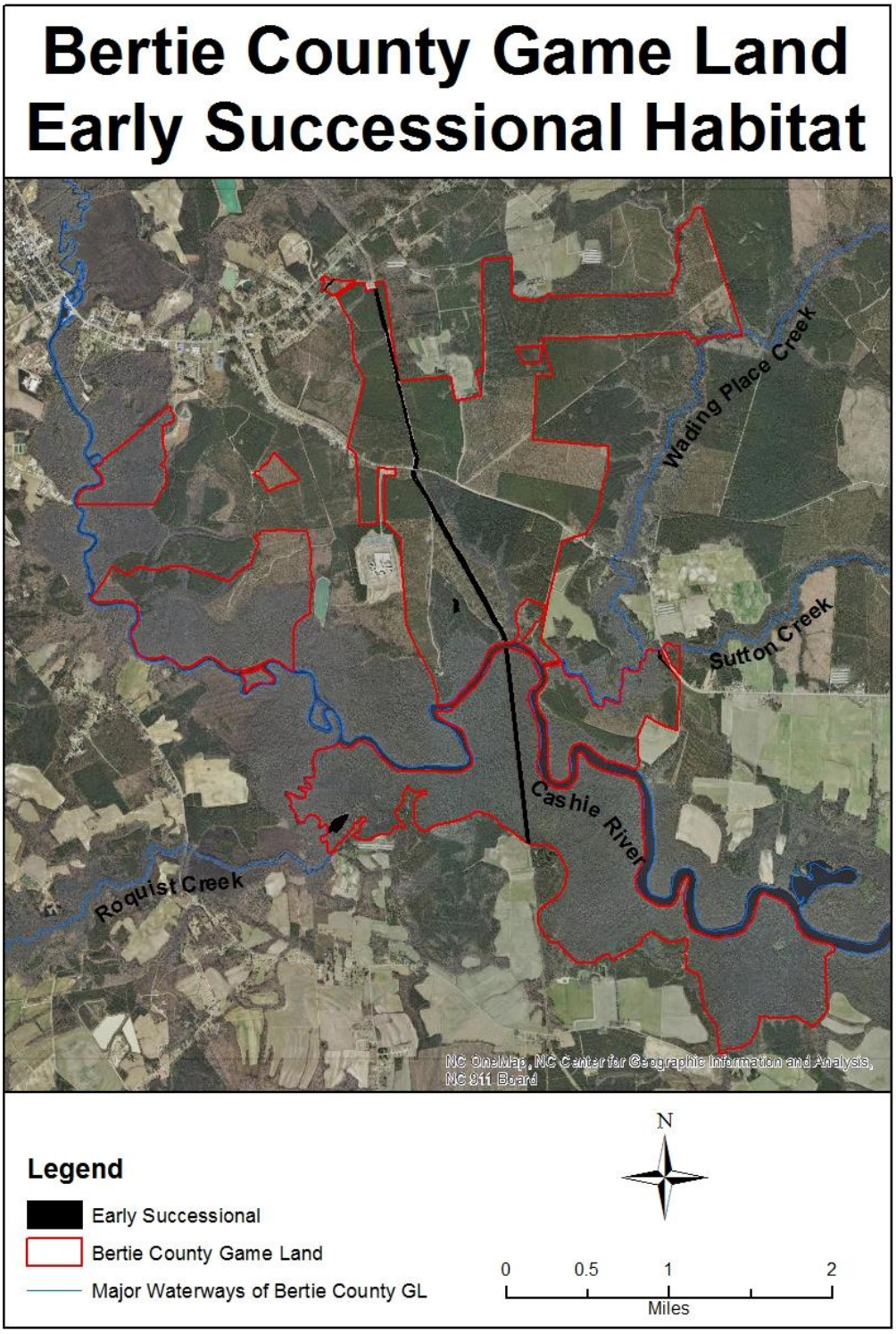

Fig. 8. Early Successional Habitats on BCGL.

D. Management Strategies and Needs

By default, the primary maintenance of the early successional habitats under the power lines will fall to Dominion North Carolina Power. Typically, vegetation control in the power line easement consists of mowing or the use of herbicides. The NCWRC does not actively manage the early successional habitats on the Williams Tract due to having no access. On the Johnson's Landing Tract, NCWRC staff will maintain the areas designated as wildlife openings.

Management of the wildlife openings will fall into 2 categories; dove fields and other wildlife openings. The dove fields are more labor intensive than most of the other openings and therefore are covered separately.

Dove fields by definition are managed primarily for dove hunting. Other wildlife including early successional songbirds, quail, rabbits, and white-tailed deer routinely take advantage of the food and cover offered in the fields. Below are management recommendations for the dove fields.

- Use a burndown herbicide in early spring to limit plant growth. If heavy vegetation is not controlled early and allowed to grow, extensive tillage may be required to permit adequate seed/soil contact to allow germination.
- Apply fertilizer by soil sample recommendations.
- Plant millets around the last week in May at a rate of 18-20 pounds per acre.
- Use a pre or post-plant application of a glyphosate herbicide to kill any new weeds prior to millet germination.
- Monitor weeds in millet. A post-emergent herbicide application may be required to control broadleaves.
- Apply a pre-emergence herbicide to control broadleaf weeds and grasses in sunflower fields. This can be a pre-plant incorporated, pre-plant, or a pre-emergence application. Follow herbicide label directions.
- Plant sunflowers the second week in May. Plant no later than May 15.
- Monitor weeds and apply a post-emergent herbicide per label.
- Prior to dove season, begin mowing areas in millet and sunflowers fields.
- Rotate crops of millet and sunflowers crops where applicable.
- Consider minimum plant back intervals of herbicides used.

Most of the wildlife openings will be planted in clover, cowpea mix, or oats. Typical clover establishment will consist of a pre-plant or pre-emergence herbicide treatment followed by planting a mix of either clovers and oats or clovers and wheat. Seeding rates vary based on the mixes used. Weeds should be monitored and may require mowing during the spring and summer. A post-emergent herbicide may be required to control weeds. When considering to plant clover, avoid areas that are extremely sandy or stay wet in the winter. Clover cannot tolerate long periods of hot, dry weather nor can it survive in long-term saturated soils. Partially shaded areas and areas that can hold some moisture in the summer are preferred.

Warm-season crops can be planted alone or in mixes. Iron-clay cowpeas are normally planted as a mix containing sunflowers and milo. The stalky sunflowers and milo give the cowpeas structure to climb on. Mixing broadleaf and grass crops can complicate weed control if weeds become a problem. Staff should consider the expected weeds and plan to use a pre-emergence

herbicide to establish the crop. Till the fields to achieve good soil-seed contact and plant in May. Seeding rates vary based on the mixes used.

The warm-season wildlife openings should not need further management. It is recommended that a browse exclosure be installed. The exclosure is a small pen (pictured right) to keep wildlife, mainly deer, from feeding in an area. This will help to determine if the plot is large enough to support the browsing pressure or if the crop fails. By using the exclosure, managers can eliminate if browsing pressure was the cause of crop failure.

Browse exclosure in cowpea food plot. Taken by David Turner

Oats should be planted in September. Plant oats in a prepared seed bed at a rate of 60-80 pounds per acre. Drilling oats is recommended, although broadcasting oats into a tilled field and then lightly tilling or lightly disking the seed is acceptable. Using a seed drill ensures a proper seeding depth and seed distribution. No herbicides are usually required to meet the goals of an oat food plot. Oats will grow through the fall and mature in the summer.

Tilling should be conducted when soils are not too wet. The soils tend to clod when disking when wet preventing good seed-soil contact. Several of the fields have poor drainage. These areas may need shaping to allow for draining or use agricultural drain plows after planting to facilitate drainage.

E. Desired Future Condition

Desired Future Condition may never be achieved in these habitats. Ideally, DFC would be an open land landscape that did not produce undesirable/noxious vegetation in wildlife openings. Undesirable/noxious weeds will continue to pose a management problem on the game land. Many crops like chufa are not found on many herbicide labels and therefore finding a suitable herbicide labeled for a crop planted in the wildlife opening can be difficult.

Dove field under powerline ROW. Taken By David Turner

Over the next ten years, NCWRC staff should develop drainage strategies for the openings to facilitate working the fields and maintaining the plantings. Currently there are no infrastructure needs required for providing current and predicted early successional habitats.

Small Wetland Communities

Small Wetland Communities on BCGL are described as beaver ponds, barrow pits, and vernal pools that are ephemeral in nature. Beavers Ponds can be either active beaver ponds with dams maintained by beavers or road culverts blocked by debris or plugged by beavers. Vernal Pools are small sites that flood seasonally and dominated by a dense to sparse herb layer (Schafale and Weakley 1990). Most of the known sites are Dedicated Primary Areas and management will follow guidelines set forth in the Articles of Dedication agreement.

Vernal Pools are important for reptiles and breeding amphibians (North Carolina Wildlife Resources Commission 2005). Due to the ephemeral nature of these wetland types, fish are usually absent, making these essential reproductive habitats for many amphibian species that are vulnerable to fish predation (Bailey et al. 2006).

Old barrow pit on South Road of BCGL. Taken by David Turner.

A. Location and Condition of Habitat (Fig. 9)

Occupying only 28.5 acres, or 0.7% of the landscape, Small Wetland Communities are extremely important to wildlife. Two beaver ponds, two barrow pits, and a small vernal pool in a

depression in a loblolly pine plantation constitute the Small Wetland Communities of BCGL. Ephemeral wetland sites, as does the 0.34-acre depression in the pine plantation, offer important breeding sites for amphibians due to the lack of predatory fish. The vernal pool is located in a loblolly pine stand with a grassy ground cover. Water is normally present only in the winter and spring.

The two beaver ponds are on the northern reaches of the Johnson's Landing Tract. The condition of beaver pond habitats is constantly changing. The eastern most pond is in good condition with the dam holding. The pond's dam on the western side of the CC Road was washed over during a heavy rain event and has not been rebuilt by beavers. As a result, the pond is reduced to a narrow ribbon of water. Natural beaver ponds are dynamic. Over time as food resources diminish, beavers will leave the area to find a more suitable site. Once the beavers are gone and the dam deteriorates, natural succession brings in woody stems and, through time, the site will be attractive to dispersing beavers.

The beaver population seems to be robust and dispersing beavers will repopulate good locations. Beaver ponds create early-successional habitat and open water for waterfowl.

The barrow pits on the Johnson's Landing Tract hold water year-round. Small sunfish are present, as well as the more common basking turtles. The pond-like barrow pit at the southern end of the South Road contains good submerged and emergent aquatic vegetation. Three sides of this pond is sheltered with trees, helping to cool the pond. These pits offer limited benefit to amphibians because of the fish presence.

B. Priority Species

The priority game and furbearer species identified for the Small Wetland Communities habitat type include: river otter, beaver, wood duck, mallard, American black duck, hooded merganser, and woodcock. There are no known priority nongame species that utilize Small Wetland Communities on BCGL.

C. Management Challenges

Vernal Pool management challenges are dependent on the management of the adjacent uplands in which the small wetland exists. In the short-term, the pool and the surrounding plantations will be burned on a prescribed fire rotation. When the stand is burned in the dormant season, fuel moistures in the wetlands will dampen the intensity of the fire or may prevent a fire burning across the wetland resulting in hardwood tree establishment.

Beaver dams that impact infrastructure, including roads and culverts, will have to be addressed. In these cases, beavers may have to be removed and the dam destroyed. Land managers will have to work with NCWRC engineers to try to find a solution that maintains the important beaver pond habitats and protects infrastructure were appropriate. The ponds that are present are well established. Dispersing beavers may not reoccupy these sites and without the beavers, the dams may fail causing the wetlands behind them to dry.

D. Management Strategies & Needs

The management of the Vernal Pool will be subject to the management of the uplands surrounding it. Prescribed fires in the pine stand will be allowed to burn through the small wetland habitats. Dormant season fires may not burn through the wetlands with enough intensity to control shrub growth or leaf litter buildup. Bailey et al. (2006) recommends burning these seasonally isolated wetlands during periods when water levels are the lowest. As desired habitats on upland sites develop, many upland sites will be burned during the growing season. Growing season fires will allow land managers a greater window to conduct prescribed burns, increasing the acres that can be burned in a year. Growing season burns will allow for better woody stem control as fire intensity is greater and hardwood stems are more susceptible to mortality compared to cooler dormant season burns. During the growing season, the Vernal Pools will be the driest, allowing prescribed fires to reduce leaf litter buildup and shrub density around the wetlands.

Beaver Ponds will be passively managed unless there is a substantial threat to infrastructure or timber production on either state-owned land or private property. Trapping is allowed on the game land and easily accessible areas are likely to be trapped.

The barrow pits require no intervention. Land managers should not drain these sites or ditch to them. Vegetation around the barrow pit under the power line is under the control and responsibility of Dominion North Carolina Power.

E. Desired Future Conditions

In the case of the Vernal Pool, the desired future condition will be a habitat that offers valuable breeding and nesting habitat for reptiles and amphibians. The site should be ephemeral in nature as not to support predatory fish. Ideally, as upland habitats develop, prescribed fires can be used to maintain the wetland and the ecotone that surrounds it.

Beaver Ponds will continue to go through a series of succession. Most of the sites where Beaver Ponds are or will be constructed are protected from active management by the Articles of Dedication. Other than maintaining current, well-established beaver ponds along the roads, it is desired that natural succession take its course on the landscape where threats to property are minimal.

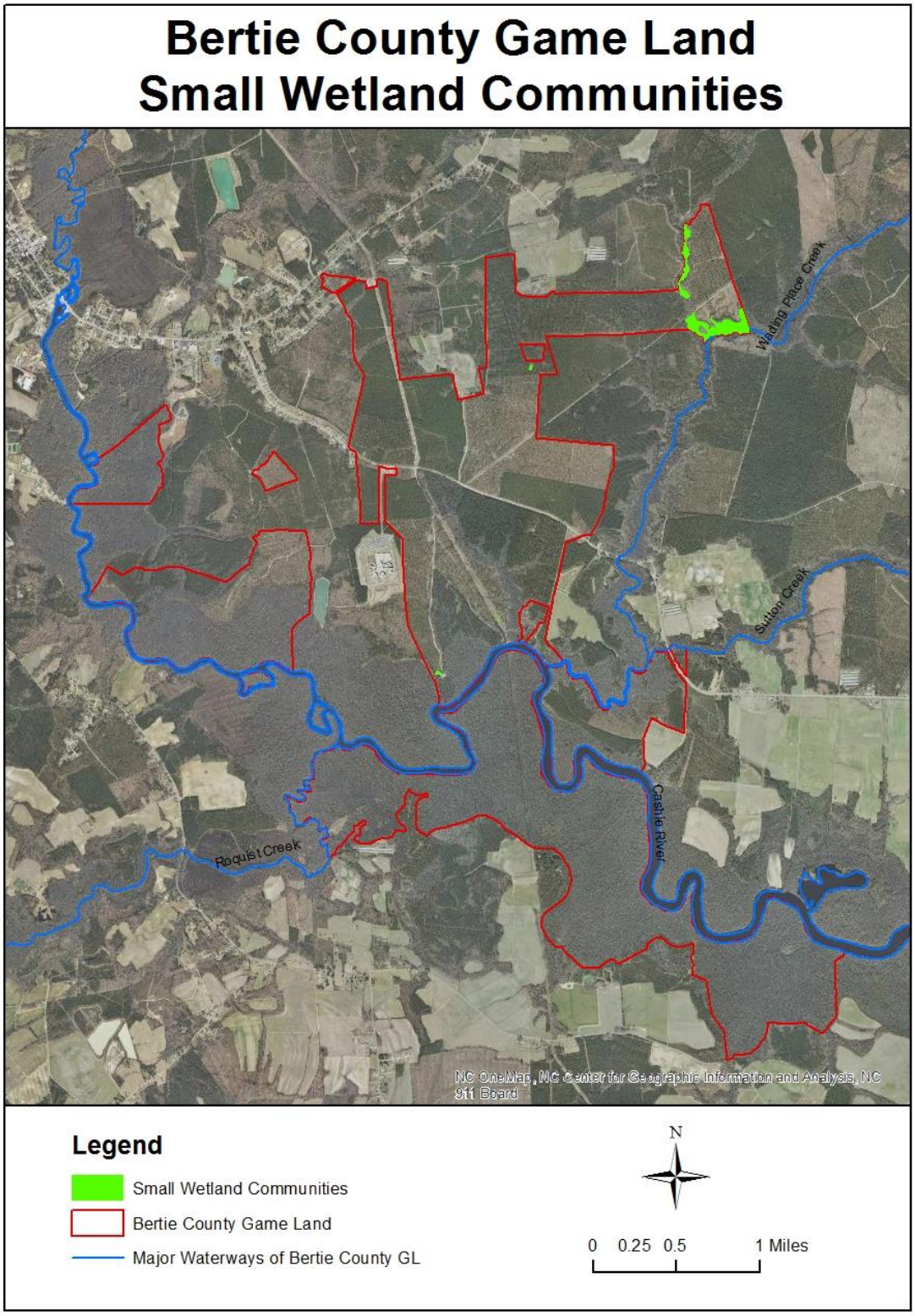

Fig. 9. Small Wetland Communities on BCGL.

Infrastructure Development and Maintenance

Bertie County Game Lands consist of areas where little or no access is provided due to wetlands or because access is required through private land while other areas have unimproved roads allowing access to the majority of certain tracts. There is significant need for improvements to roads used for entry into most game land areas. Several of the established main roads should be improved to all-weather surfaces to facilitate access and for timber and habitat management. Opportunities also exist to develop public fishing areas and provide additional parking facilities as demand increases.

Engineering and Lands Management staff evaluated the condition of the existing infrastructure in December of 2015 to determine the current needs and future development potential. The following sections provide a summary of findings and provide specific recommendations for improvements based on current priorities and future goals.

Road Assessment

There are 7.2 miles of roads and 4.5 miles of trails located on BCGL (Fig. 10). None of the roads can be classified as all-weather roads. This issue is not only burdensome to maintenance staff, but it is a limiting factor for users trying to access certain areas and necessary for future development plans. Road accessibility will also be critical for emergency personnel should the need arise, especially in times of inclement weather or longer duration rain events.

Existing Road Conditions

A majority of the roads in use have some gravel surface while others are nothing more than dirt paths. Some roads have isolated areas where the roads have been covered with large aggregate to provide short term stability for timber cutting or spot repairs. Some roads lack adequate crown to keep the subsurface soils from becoming saturated. The absence of a crowned road surface combined with inadequate drainage features such as longitudinal ditches and cross pipes limit the ability for traveled roads to remain stable. Areas where roads pass through depressions with no drainage outlet should be filled and adequate drainage measures installed.

Maintenance staff has done well to keep vegetation cut back providing adequate cleared width to install roadside ditches through most areas without requiring additional clearing. There is an absence of vegetation along the edge of some roads (shoulders) that causes soil instability and contributes to erosion and rutting in the traveled path. Soil conditions throughout the game lands vary slightly. Most of the road surface soils are clay based soils.

Future Road Improvements

Creating all-weather accessibility through the main roads should be the highest priority in the immediate future. Providing stable road surfaces and drainage systems are necessary to accomplish this goal. Identifying areas where cross pipes are required and installing them prior to filling low areas, constructing stable fills, grading of longitudinal ditches, and providing a crowned road surface should be accomplished prior to installing gravel surfacing and vegetation on shoulders and ditches.

The following list of improvement projects are prioritized based on current need and future development potential. All estimates are based on providing an 8 foot wide gravel road surface with a 4 foot grass shoulders on each side. Further engineering evaluation and design will be required to determine specific needs for a given project area.

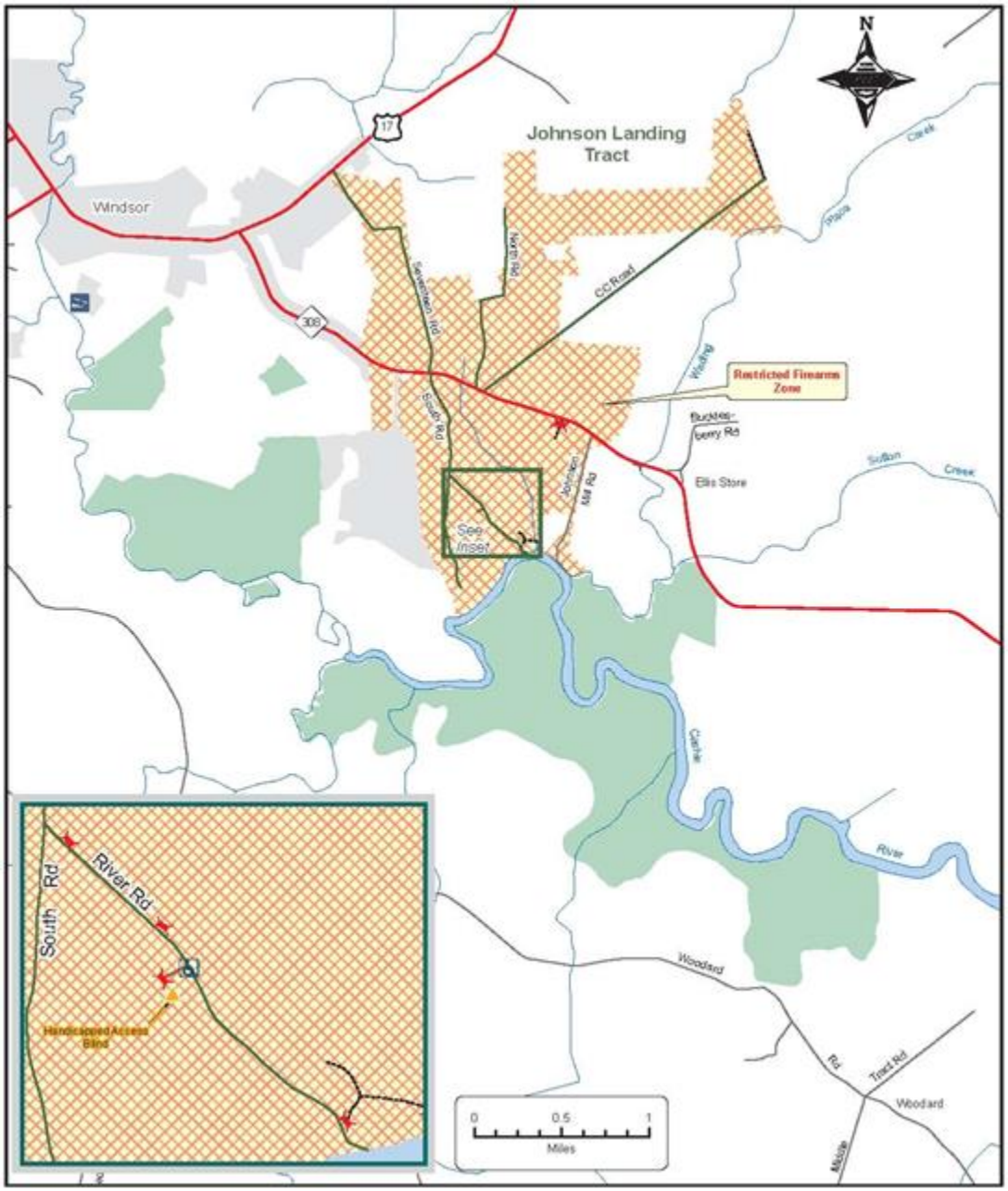

Fig. 10. Road, trail, and gate map for Bertie County Game Land.

In Order of Priority

South Road

This is the main access road into the Johnson's Landing Tract. This is a wide and well-worn road that encounters two-way traffic. Grading a crowned road bed and providing a gravel surface is needed to ensure maintaining all-weather access. Improvement costs for this 1.28 mile section are estimated at $128,000.

River Road

This is a spur road off of South Road that gives access to the disabled hunting blind. The road bears to the east approximately .67 miles after entering from South Road and ends on the bank of the Cashie River. Grading a crowned road bed and providing a gravel surface is needed to ensure maintaining all-weather access. Estimated improvement costs for this road is $67,000.

Seventeen Road

The Seventeen Road has two access points, one off of NC 17 on the north end and the other on NC 308 to the south. It serves as a main travel route of the Johnson's Landing Tract. Needed improvements include grading a crowned road bed and providing a gravel surface to ensure maintaining all-weather access. Also, some ditch grading and road elevating in lower areas is needed. Estimated cost for improvements to this 1.44 mile segment is approximately $143,000.

CC Road

The CC Road has a shared ownership and access with adjacent land owners. Some ditch grading and road elevation in lower areas will be needed. Grading and gravel surfacing are needed to create an all-weather main road system through this tract. Estimated costs for improvements for this 2.32 mile segment are $232,000.

North Road

A large section of this road has been well crowned and graveled, which is the section that leads to an adjacent land owner's property. The rest of the roads needed improvements include grading a crowned road bed and providing a gravel surface to ensure maintaining all-weather access. Estimated cost for improvements to this 0.71 mile segment is approximately $71,000.

Other Roads

There are a few roads in which the NCWRC does share administrative access only, that are worth mentioning and do require some maintenance and costs. Maintenance requirements include annual flat mowing and side mowing or herbicide application as needed.

Road Maintenance

Maintenance of all road facilities is necessary. The maintenance needs in the BCGL are extensive due to the unimproved condition of most of the existing roads. Improving the main roads will free up maintenance staff to extend their effectiveness and promote improvements to other facilities. There are other less travelled roads not mentioned in this report that require

continual maintenance. It is recommended that $15,000 be included into annual appropriations to provide for spot repairs and improvements.

Maintenance supervisors and staff should set a routine schedule to inspect facility conditions and identify needed repairs and improvements. Correcting deficiencies quickly will often eliminate the need for more expensive repairs at a later time. The following list of items outlines suggested routine maintenance practices that should be accomplished regularly.

Typical Road Maintenance Practices

- Inspect roads regularly, especially before the winter season and following heavy rains.
- Keep ditches and culverts free from debris (see Culvert Maintenance Section of this Management Plan).
- Remove sediment from the road or ditches where it blocks normal drainage.
- Grade and shape the road surface periodically to maintain proper surface drainage.
    - Typical road should be crowned at approximately 4%, or ½" per foot.
    - 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 motor grader 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, with a mowed grass surface.
- 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.

Road Safety Features

- 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 as necessary at every 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 road intersection on a game land.
    - Information kiosks with game land road map – Entry signs should be installed at every entrance to a game land off of a DOT road. Information kiosks should be located near the entrances and in parking areas.
    - Signs should be initially installed at areas with higher traffic volumes. Additional signs should be installed as deemed necessary.

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 addition 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 them back to flatten the slope.
- Side slopes need to be stabilized with additional vegetation, erosion control mat, or rip rap.

Parking Areas

There are no designated parking areas located on BCGL as parking on existing road shoulders have been sufficient to most users. 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.

Gates

Gates are an important tool in managing the game land. Some roads cannot handle significant traffic. Gates also aid in habitat and wildlife conservation by reducing disturbance. There are many gates located throughout the game land, which limit access to certain roads and portions of the game land. Game land gates are closed outside of the hunting seasons.

There are approximately 10 swing gates, in good condition, on the game land. All gates require annual inspection and maintenance. All gates that are replaced on game lands should be with the standard swing gate and painted orange for maximum visibility. No cable gates should be installed and any existing cables should be replaced. The cost replacement for a standard swing gate is approximately $1,000.

Kiosks

One large kiosk is located at the entrance of South Road, which provides a large map of the area and several information signs. Other kiosks will be installed as needed at major access roads.

Boundary

There are 41.8 miles of boundary on BCGL. Boundary typically is refreshed on a 3 year rotation. Boundary is marked with two stripes of orange paint and orange paint and signs are place approximately 200 feet apart. Water boundary is posted with signs only.

Disabled Sportsman Shooting Blind

There is a disabled sportsman shooting house located off of River Road (Fig.10), that has been provided and maintained by NCWRC. This is a first come-first serve opportunity for disabled sportsman. The annual maintenance cost for the blind is $225. The blind is in good condition and not expected to need replacement at this time.

Drainage Structure Assessment

Culverts

Any culvert upgrade consisting of a single pipe 36" and greater or a crossing utilizing multiple lines of pipe should include design considerations for fish passage. Specific considerations can be obtained by contacting the Division of Inland Fisheries, Habitat Conservation Program - Technical Guidance Section.

Several culverts on the game lands have been replaced in the past, due to age and high water events. There are no culverts identified that need repair or replacement at this time, but replacement and maintenance of culverts is expected in the future.

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 or 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 or 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 begin.

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.

Recreational Facilities Assessment

Boating Access

There are no designated Boating Access Areas (BAA's) on the game land; however, NCWRC operated Boating Access Areas are critical launching sites to provide public access to remote portions of the game land not serviced by roads. Two BAA's that are close to BCGL include Windsor BAA in the town of Windsor and the San's Souci Ferry BAA off of Woodard Road. The Blades-Piland Tract is just 1.5 miles downstream from the Windsor ramp. The Windsor BAA is the closest improved ramp to most of the water access only tracts. The San's Souci Ferry BAA is 8.3 miles downstream of Johnson Mill Road. There is an unimproved primitive launch site with no ramp or dock at the end of Johnson Mill Road where small motor boats can be launched. There is no standard parking at Johnson Mill. Overall, boating access is adequate to meet the needs of the few game land users hunting or trapping the remote portions of the game land and the eco-tourism paddle trail users.

Public Fishing Access

There are currently no public fishing areas (PFA) on the game land; however, limited bank fishing does occur on the Johnson's Landing Tract. Most of the tracts acreage that is adjacent to the Cashie River has limited high ground that would support a PFA with parking. PFA's exist along the Roanoke River in Williamston 13 miles to the southwest. A 600-foot fishing pier is located at the Edenhouse Bridge BAA and PFA outside of Edenton NC, which is 19 miles from Windsor. The public can fish behind the Roanoke River National Wildlife Refuge office in Windsor.

Shooting Ranges

There is not a shooting range on the game land at this time. Potential shooting range locations will be evaluated. Once developed, all target and recreational shooting on game lands within a 30-mile radius of the range will be directed to that range.

Campgrounds

There are no designated camping areas on the game land. Future sites will be considered if there is a need for this activity. Roanoke River Partners operate the "Lost Boat" camping platform on the eastern end of the Williams Tract. This platform is accessible by boat only. More information about using the platform can be found at the Roanoke River Partners website.

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. There are no major infrastructure elements required for this non-traditional use. There are no known geocache sites on BCGL. The NCWRC Geocaching Policy can be found on the NCWRC website at www.ncwildlife.org.

Hiking

The game land contains several miles of roads and trails which have typically been used for hunter access. Hiking is becoming a more popular activity and will continue to be a demand on game lands. Hiking trails should be on existing roads and trails which will allow NCWRC staff to maintain the trails.

Horseback Riding

Horseback riding is not thought to occur on BCGL, likely because the roads are one-way roads and most horseback riders prefer to ride loop trails. Horse traffic can cause significant damage to the non-graveled roads that exists over much of the game land. Damage to the roads from horses causes excessive wear on vehicles. Roads require more frequent grading prior to gate openings as a result of horse impacts. Given the increased public demand for this use, potential trails will have to be investigated and infrastructure may need to be constructed. No new trails are recommended to be constructed. Dedication requirements and some acquisition funding sources prohibit the creation of new trails in sensitive areas.

Currently, maintenance of the game land is funded in large part by Pittman-Roberson Federal Aid in Wildlife Restoration Act dollars through an excise tax on firearms, archery equipment, and ammunition and based on the number of licensed hunters in the state. Infrastructure improvements for horseback riders should be investigated and is recommended to be self-funded through a game land use fee. Infrastructure needs could include road maintenance and parking for vehicles towing trailers. It is estimated that a minimal cost to provide road maintenance at $2,500 per mile and $70,000 per parking area.

Public Uses

As stated previously in the Game Lands Program Mission Statement, primary public uses of North Carolina game lands are hunting, fishing, trapping, and wildlife viewing. However, the Commission recognizes 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.

As the human population of North Carolina has rapidly grown, state-owned game lands have received increasing pressures to provide public outdoor recreation opportunities. These uses include traditional activities such as hunting, fishing, trapping, and wildlife viewing, as well as other outdoor recreational pursuits. While hunting, fishing, trapping, and wildlife viewing are the primary public uses of state-owned game lands, the NCWRC has always allowed other

dispersed and non-developed recreational activities. Management work conducted on game lands are cost-shared with federal Pittman-Robertson Act funds derived from an excise tax on guns and ammunition and the states receive a portion of those funds based on the number of license hunters there are in the state. Because of this, the NCWRC must exercise care in providing for recreational activities that may not be compatible with the natural resources for which the lands are valued and the primary management objectives of these lands and the primary users.

As a response to these increasing pressures, the NCWRC developed a Game Lands Use Evaluation Procedure to provide a statewide framework for determining appropriate uses for Commission-owned or controlled game land properties.

Different User Groups of Bertie County Game Land

Based off of anecdotal information and input received from the public input processes that occurred from 15 November 2015 to 15 January 2016, we have made our best determination of different user groups that occur on BCGL. A public input meeting was held in Windsor, NC on 1 December 2015. Attendance was low with 10 people attending. The NCWRC received comments from 9 individuals utilizing the online comment application. The discussion of the different user groups below primarily uses responses to question number 3 from the public input meeting and the online comment website: **How do you use this game land?** The user groups are listed below and discussed in greater detail. Please note that the percentages when added together for any question may exceed 100% since many respondents included multipart answers. Appendix IV lists the Public Input Questions as well as all input received with NCWRC response to many comments to questions 4, 5, 6, and 7.

Sixty-nine percent of respondents indicated that they use the game land for hunting, with deer hunting as being the most common response. Small game hunting, waterfowl, and turkey hunting were also cited.

As with many game lands, conflicts between user groups exist. Whether it is still hunters or hunters using dogs, hunters and hikers, or even hunters using different weapons, regulating uses to certain times may be the best way to eliminate some of the conflicts.

Traditional Game Land Users

- Hunters
- Fishermen
- Trappers
- Wildlife Viewers

Discussion of Traditional Game Land Users

According to public input comments, hunters make up largest number of traditional users. Wildlife viewing was reported at 15% of activities that game land users participated in. Overall, we believe that traditional users are generally satisfied with the game land. As with most game lands, users would like more roads open to vehicular access (46%) while others are satisfied with

access or preferred to limit access further (54%). Before roads are gated restricting vehicular access, an assessment was conducted to consider; road condition, the threat of damage during wet periods, disturbance potential to other users, traditional hunting methods used by lessees prior to State ownership, and sensitive habitats.

Deer Hunters

Sportsmen and women take advantage of hunting opportunities offered by the no special hunt permit required game land. Hunters are generally satisfied with the ability to harvest any deer they choose. Of the responses received for question 3 (How do you use this game land?), 69% of the respondents indicated that they used the game land for hunting.

Deer hunters on BCGL fall into two camps: still hunters and hunters using dogs. When asked what suggestions they have for changing how this game land is managed and maintained, 44% of the respondents indicated that they would like to see deer hunting with dogs prohibited or restricted. Although BCGL is 3,884 acres is size, some tracts are isolated with no vehicular access and the Johnson's Landing Tract is segmented with many boundaries adjacent to private land. Game land hunters that have permission to hunt the private property can effectively hunt the game lands with dogs. Game land hunters who can only hunt the game lands are more likely to cause conflicts with the adjoining landowners and clubs. Conflict also arise between any group using dogs for deer hunting on the game land and still hunters. Deer hunting with dogs may not be conducive to some users on BCGL due to its small size, proximity to private land, and limited road infrastructure to catch dogs. Gates restricting vehicular access to certain areas aid in still hunters being able to hunt with limited disturbance. Still hunters looking to get away from hunters using dogs should consider hunting the Lower Roanoke River Game Lands in Bertie and Martin counties. The Roanoke River National Wildlife Refuge does not allow deer hunting with dogs.

The NCWRC recognizes the conflicts that still hunters have with some dog hunting groups. The NCWRC will consider suggestions on how to resolve these issues while respecting the wants of still hunters, outside dog hunting groups, and the neighboring hunting club that use dogs for hunting.

Turkey Hunters

In general, BCGL's has a significant holding of Tidal Swamp and Floodplain Forest habitats that are not attractive to most turkey hunters. Most hunters prefer to hunt the fringes of those habitats and the uplands. The remaining desirable area can offer a good opportunity to turkey hunt. The acquisition of the Johnson's Landing Tract provided good access for turkey hunters with a good mix of uplands and drain/bottomland habitats that support fair numbers of turkeys. Recent pine plantation thinning's and a prescribed burn program have created good habitat to support turkey broods.

We currently believe that turkey hunting opportunities on the BCGL are sufficient. We believe that accessibility to property, habitat management, and the numbers of turkeys available for harvest are at levels to satisfy this user group. This belief in the turkey hunting opportunity is with the public understanding that this is a small, open game land with unlimited hunter access.

Turkey hunting opportunities can be increased with significant upland acquisitions that currently border the game land.

Bear Hunters

The BCGL does have some bear using it. The more accessible tracts like Johnson's Landing, can offer a chance to harvest a bear. Bear hunting is thought to occur at low levels and likely is conducted with groups striking a bear from a bait pile off of the game land. The vehicular accessible portions of the game land is not thought to hold many bear. The remote Williams Tract may hold bear and hunters may find them foraging in the tidal swamps and floodplain forests.

Hunters can harvest bear on BCGL anytime during the Bertie County bear season. The NCWRC knows that this is a small game land that bears use and therefore allows this activity.

Waterfowl Hunters

There are a few beaver ponds and openings within the game lands that provide waterfowl hunting opportunities. Due to the Articles of Dedication Agreement, habitat management within the wetlands is restricted. Within the existing BCGL boundary, there are no plans to construct waterfowl impoundments or create openings in the swamps. The NCWRC is interested in nearby tracts that could be developed into waterfowl impoundments. Public waterfowl hunting opportunities are in high demand.

Small Game Hunters

Small game hunting opportunities are thought to be good on this property. This determination is based on anecdotal information alone because hunters are not required to report small game harvests. Currently, small game hunters have the opportunity to harvest quail, dove, rabbit, gray squirrel, opossum, bobcat, raccoon, fox, woodcock, and beaver.

Most of respondents indicated that small game species were important to manage for. An extensive effort has been underway to increase the early-successional habitats on the game land through timber management and prescribed burning. These habitats offer excellent cover, brooding, and nesting areas for quail and rabbits. Continued effort should increase the amount and quality of early-successional habitats on BCGL. With the amount of early-successional habitat and the forested bottomlands for squirrel and raccoons, we believe that access for small game hunting is adequate. No additional infrastructure is needed to serve this group.

Fishermen

Bank fishing the Cashie River is limited on BCGL. There are currently no public fishing areas (PFA) on the game land; however, limited bank fishing does occur on the Johnson's Landing Tract. PFA's exist along the Roanoke River in Williamston 13 miles to the southwest. A 600 foot fishing pier is located at the Edenhouse Bridge BAA and PFA outside of Edenton NC, which is 19 miles from Windsor. The public can fish behind the Roanoke River National Wildlife Refuge office in Windsor.

Trappers

Trapping of furbearers is currently thought to occur at low levels. No public comments were received that indicated satisfaction, or the lack of, with trapping opportunities on BCGL.

We are currently unaware of any specific infrastructure needs that would provide better opportunities for trappers. Additionally, we believed that ample opportunity is provided to trappers and there are no additional strategies we could implement to increase the use of the game land by trappers.

Wildlife Viewers

Wildlife viewing does take place on the game land but in low numbers. Fifteen percent of respondents indicated that they use the game land for wildlife viewing. Most of the public input respondents' likely listed wildlife viewing as an activity conducted on the game land while pursuing other activities such as hiking. Most of this activity is likely taking place as people are out riding.

Non-traditional Game Land Users

- Bicyclist
- Campers
- Geocachers
- Eco-tourism
- Hikers and runners
- Horseback/trail riders
- Military/Law Enforcement/Emergency Services
- Paddlers
- Researchers, universities, and museums
- Target shooters
- Joy riders and sightseers
- ATV riders and other off-road vehicles
- Other illegal activities

Discussion of Non-traditional Game Land Users

We have attempted to determine all game land users of the BCGL and have made determinations of appropriateness and compatibility for each use based on the fact that hunting, fishing, trapping, and wildlife viewing are the primary uses. As long as non-traditional uses do not negatively influence the wildlife resources or negatively impact traditional users, they may be determined appropriate and compatible. Some non-traditional uses require special consideration and are only considered to be appropriate and compatible under certain circumstances.

Non-traditional users are strongly encouraged to refer to the *North Carolina Inland Fishing, Hunting, and Trapping Regulations Digest* to identify hunting and trapping seasons, as well as, specific days and times that hunting and trapping occurs on the game land. Out of safety concerns, game land users are also strongly encouraged to wear blaze orange while using game lands. In reference to the previous statement about designated hunting days, hunting occurs on

nearly every day starting the first week in September until the end of February and from early April until mid-May for turkey season. No hunting is allowed on Sundays on game lands. Fishing can occur at any time on the game land.

Bicyclist

Bicycling on BCGL is considered compatible as long as bicyclists stay on roads and trails. Impacts to natural resources can be minimized by regulating use through numbers, timing, and conditions of trails. The use of BCGL by bicyclists is currently very low.

Campers

There are no designated camping areas on the game land. Allowing limited camping on BCGL is being considered. Roanoke River Partners operate the "Lost Boat" camping platform on the eastern end of the Williams Tract. This platform is accessible by boat only. More information about using the platform can be found at the Roanoke River Partners website.

Geocachers

Geocaching is considered a compatible activity as long as the NCWRC's geocaching policy is adhered to and can be found at www.ncwildlife.org. There no known geocaches located on BCGL. Geocaches placed in sensitive habitats will be removed. Current infrastructure is adequate to meet the needs of these users. Geocachers are encouraged to respect the hunting seasons and conduct activities on Sundays when hunting on game lands is prohibited.

Eco-tourism

Eco-tourism on some game lands is experiencing a surge in interest from local governments, groups, and entrepreneurs. These people see the game land as a resource to draw in tourism to boost the local economy. Currently, it is not thought that BCGL is a major attraction for ecotourism activities. Paddlers along the rivers and creeks and hikers are likely activities engaged in on BCGL. It is important for land managers to monitor the above activities and document any issues that may arise. Overuse by these activities can negatively impact the resource and traditional users.

Hikers and Runners

The use of BCGL by hikers and runners is considered compatible because it creates minimal disturbance to the natural resources and is consistent with NCWRC policies and objectives. Hikers and runners traditionally stick to established roads and trails and their impact to the road systems is essentially non-existent.

The existing miles of roads and trails provide adequate areas for hikers and runners, though many roads are dead end roads. These areas are not currently designated specifically for pedestrians but can be used by both traditional and non-traditional game land users.

Out of safety concerns and respect for traditional game land users, hikers and runners should realize and be considerate of all hunting and trapping activities on the game land and the times that they are likely to occur. Hikers should consider wearing blaze orange during the hunting season or limit hiking to Sundays when hunting on game lands is prohibited.

Horseback/Trail Riders

Horseback riding is thought to occur only in small amounts on BCGL. The game land is likely not a desirable location due to short dead end roads. Riding through the woods is strongly discouraged since horses can cause habitat destruction. Horseback riding on BCGL can be compatible as long as certain restrictions are in place. Horseback riding, above all other non-traditional uses, has the ability to cause more harm to the habitats, wildlife, and infrastructure. Currently, there are no regulations restricting where riders can go. Although regulations do not exist on BCGL, riding in certain areas may violate terms of the Articles of Dedication with the NC Department of Environment and Natural Resources.

Potential threats to the game land include the introduction of invasive plants and the disturbance to wildlife. Nesting birds in the spring and summer may abandon a nest if disturbed. Newsome *et. al* (2002) conducted a study on the effects of horse riding on national parks and other natural ecosystems in Australia and determined that environmental impacts include, but are not limited to, soil degradation and compaction, erosion, loss of vegetation height and cover, change in plant species composition, degradation of existing roads and trails, the introduction of invasive grass and weed species, accidental transport of fungal pathogens, and the loss of vegetation, which are all common problems associated with horse use.

Out of safety concerns and respect for traditional game land users, horseback riders should realize and be considerate of all hunting and trapping activities on the game land and the times that they are likely to occur. Horseback riders should limit activities during the hunting season and to Sundays when hunting on game lands is prohibited.

Military/Law Enforcement/Emergency Services

Law enforcement and emergency services may conduct training exercises on the game land. Trainers are encouraged to contact the NCWRC to schedule training as not to conflict with hunters.

Paddlers

Public waterways do not fall under the jurisdiction of the BCGL. Potential camping platforms will be considered when approached by paddle trail organizations or other agencies that will partner in the management and upkeep of the platforms.

Researchers, Universities, and Museums

The use of the BCGL by researchers, universities, and museums is considered compatible and does not impact management objectives of the Game Lands Program. These entities use the game land for the collection of data for research and educational purposes. It poses very minimal threats to traditional game land users and does not interfere with, or disturb, the natural resources of this property. These activities are usually handled through NCWRC's permitting process. At times, research activities provide information that may be beneficial to managing the property.

Target Shooters

There are currently no restrictions to target shooting on BCGL. Unregulated target shooting can displace wildlife, pose a safety concern to other users, and cause destruction to property. The NCWRC is currently involved in the design and development of shooting ranges across the state. Once a shooting range is developed within 30 miles of a game land, all target and recreational shooting activities will be limited to that area.

Joy Riders and Sightseers

Joy riding and sightseeing via vehicle on BCGL is allowed. This group should be considerate of other users and be aware of hunting seasons to reduce conflicts between user groups.

ATV Riders and other Off-road Vehicles

The use ATV's and other off-road vehicles on BCGL is considered an inappropriate use. BCGL is part of the Disable Access Program which, through permit, will allow disabled hunters the use of an ATV. When using this permit, disabled sportsmen can ride only on roads that are open to vehicular traffic and on trails designated for disabled access only. Riding in wildlife openings and through the woods is prohibited. More times than not, these vehicles create disturbance and cause destruction to valuable resources on game lands. They greatly degrade roads and trails and create erosion and water quality concerns when driven in and around streams. Because these vehicles are very agile and maneuverable, riders tend to stray away from developed roads and trails and into areas that land managers desire to be undisturbed. These actions can be detrimental to various plant and animal communities and offset previous efforts made to conserve and manage these areas.

Because ATV's and other off-road vehicles have such a great potential to cause harm and create disturbance to natural resources and other game land users, their use on BCGL is prohibited.

Other Illegal Activities

Illegal activities include wildlife/plant/artifact/mineral theft, vandalism, drug use, sexual rendezvous, and trash dumping. These activities are monitored by the Enforcement Division of the NCWRC.

Information Needs

Our current state of knowledge about wildlife occurrences on BCGL is somewhat limited. Our best knowledge is of big game species. Successful big game hunters are required to identify the game land from which they harvest big game during the registration process. The distribution and occurrence of many cryptic taxa such as reptiles, amphibians, and small mammals (including bats) are under-surveyed and their relative distribution and abundance are unknown and misunderstood. It would be appropriate to work closely with the Natural Heritage Program or other entities to develop a biological inventory.

Our current knowledge of game animals is limited, even though we know the number of registered harvested big game species on the game lands. Currently, there are no surveys in place to track changes in population trends of even the most sought after big game animals (deer

and turkey). The game land is small and segmented, making management of big game species populations impossible. Management activities for small game and certain non-game species can have a larger impact due to smaller acreage requirements to sustain populations.

The following is our current knowledge of our priority species. These priority species were identified because they are game animals that are hunted or trapped on BCGL or they have a state or federal status. They are either known or thought to occur on this game land. Included in this information are inventory and management needs and research recommendations for the future. The appropriateness of tracking population trends for some wildlife species will be evaluated and appropriate techniques will be identified when it is determined such actions are warranted and only when appropriate levels of staff and finances are available.

The identification of game land hunters (or other users) would allow the NCWRC to generate a general observation survey in which data on the observations of multiple species could be collected by hunters or any game land user interested in recording the requested information. This cooperation of game land users would supplement our survey efforts and potentially reduce workloads required by NCWRC staff to collect this information. Information derived from these surveys coupled with other information collected by field staff will give NCWRC biologists the ability to better estimate and track population trends. This valuable information will help staff determine the best management techniques to implement in order to achieve management goals.

Reports of diseased animals should be investigated and, when possible, attempts will be made to diagnose the cause of infection or cause of death. Also, as specific disease surveillances are conducted (Chronic Wasting Disease, Lymphoproliferative Disease Virus, etc.), game lands will be incorporated into the effort when appropriate.

Non-game Wildlife Species

- ***Birds***

Neotropical Migratory Songbirds

Current Knowledge

The National Audubon Society recognizes the Roanoke River Bottomlands, of which the Cashie River bottomlands are a part of, as a Global Important Bird Area (National Audubon Society 2015). The varying habitats from Tidal Swamp Forest and Floodplain Forest to Oak-Mesic drains to thinned pine plantations offer a good opportunities to see a diverse suite of songbirds.

Management Strategy

Articles of Dedication designations restrict active management in some areas. No habitat management is directly targeted toward songbirds; however, habitat management directed toward open canopy stands or longleaf pine community restoration will benefit early-successional species.

Inventory and Monitoring Needs

No surveys are being conducted at this time on BCGL.

Research Needs

No research needs are currently warranted within the BCGL. However, monitoring efforts may present opportunities to assist with answering specific questions and conducting hypothesis-driven research in the future.

Red-cockaded Woodpecker (RCW)

Current Knowledge

There are no known red-cockaded woodpeckers using BCGL. In the early 1980's, several cavity trees were noted on property just off of the current game land boundary. The timber on the stand with the cavities was harvested. RCW's excavate cavities in large, living pine trees. On BCGL, it is thought that there is no single pine stand that could meet the qualifications to support a RCW cluster.

Management Strategy

There are no known RCW's using BCGL at this time and no management recommendations for RCW required during the horizon of this plan.

Inventory and Monitoring Needs

NCWRC staff will exercise due diligence when working on the game land. Staff should notify the Wildlife Forester if a suspected cavity tree is discovered.

Research Needs

No research needs on BCGL for RCW's at this time.

Bald Eagle

Current Knowledge

Bald eagles likely use the game land and the Cashie River. Statewide, eagle populations have been recovering since a ban on the agricultural insecticide DDT was instituted in 1972. In 1982, the NCWRC started the North Carolina Bald Eagle Project and released 29 juvenile eagles between 1983 and 1988 from artificial nests near Lake Mattamuskeet. In 1984, the first North Carolina post-DDT ban eagle nest was documented near the lake.

Management Strategy

Management practices that would benefit bald eagles include the protection of forested swamplands.

Inventory and Monitoring Needs

Observations of nests or suspected nesting activity should be reported to the Wildlife Diversity Section. When aerial surveys are conducted for wading birds, eagles should also be documented.

Research Needs

There are currently no known research needs.

- ***Mammals***

Rafinesque's Big-eared Bat

Current Knowledge

Rafinesque's big-eared bat is a non-migratory bat that uses the floodplain forest on the game lands as roost sites and foraging areas. Hollow trees are probably the most preferred roosting and hibernating sites. Unlike many other bat species that are crepuscular, this bat species is nocturnal. They are insectivores and are moth-specialists. They are considered "Special Concern" in North Carolina.

Management Strategy

Protection of the tidal and floodplain forests should continue.

Inventory and Monitoring Needs

Although no positive case of White Nose Syndrome (WNS) has been reported in Rafinesque's big-eared bats in North Carolina, NCWRC staff and game land users should report any cases of a white fungus on the nose of bats to the NCWRC.

Research Needs

Research should be focused to determine seasonal roost site selection and specific maternity sites.

Southeastern Bat

Current Knowledge

Southeastern bats use the floodplain forest and mesic sites near water on the game lands. Roost sites include tree crevices and at times buildings. They can be found hibernating in small colonies in the winter. The Southeastern bat is listed as a species of "Special Concern" in North Carolina.

Management Strategy

Protection of the floodplain and mesic forests should continue especially in areas near swamps and open water as these bats prefer to forage over water.

Inventory and Monitoring Needs

Although no positive case of White Nose Syndrome (WNS) has been reported in Southeastern bats in North Carolina, NCWRC staff and game land users should report any cases of a white fungus on the nose of bats to the NCWRC.

Research Needs

There are currently no known research needs.

- ***Amphibians and Reptiles***

The distribution of herps in northeastern North Carolina is less studied than in other parts of the state. The only state listed species of herp known to occur on the game land is the timber rattlesnake. The distribution and abundance of Wildlife Action Plan Priority turtles, such as the spotted and redbelly, more cryptic species of amphibians, such as the greater and lesser siren, and snakes is unknown through the game land. The newly described Atlantic Coast leopard frog, *Rana kauffeldi*, has been discovered in states to the north with a possible range from Connecticut to North Carolina. Call surveys would be helpful to determine if this species occurs on the game land.

Management Strategy

No specific management activity is being prescribed strictly for the conservation of amphibians and reptiles, mainly due to the lack of understanding of the species occurrence on the game lands. As upland loblolly pine plantations are converted to open pine canopy habitat communities and fire is reintroduced into the ecosystem, conditions should improve to benefit many in this suite of species. Introducing fire back into the vernal pools and into the drains should improve breeding habitat.

Wildlife Enforcement should monitor suspicious activities on the game lands as some species of herps are targeted by collectors for the illegal pet trade.

Inventory and Monitoring Needs

Any inventory of herps on the game land should be coordinated through the Wildlife Diversity Program of the NCWRC pending available staffing and funding. Observations of Wildlife Action Plan priority species should be reported to staff or recorded on the NCWRC's online Wildlife Observation Application to document occurrences and/or range expansion. Surveys targeted at Wildlife Action Plan priority amphibian and reptile species could help determine distribution on these species on game lands.

Research Needs

There are currently no known research needs.

Timber (Canebrake) Rattlesnake

Current Knowledge

Timber rattlesnakes are known to occur on BCGL. In the Coastal Plain, their use of habitat varies from pocosins to pine woodlands. They primarily feed on small rodents and adult snakes are capable of consuming small rabbits and squirrels. They are a long-lived species with recorded lifespans of up to 28 years in captivity. Declining trends in populations can be

attributed to loss of habitat, wanton killing, road kills, and poaching. Timber rattlesnakes are listed as a species of "Special Concern" in North Carolina.

Management Strategy

Protection and management of upland forest communities will benefit timber rattlesnakes. Techniques include maintaining open canopies of forested areas and the use of prescribed fire. Management of early-successional habitat for small game will also prove beneficial for this species.

Inventory and Monitoring Needs

Observations should be reported to staff or recorded on the NCWRC's online Wildlife Observation Application to document occurrences and/or range expansion for this species.

Research Needs

There are currently no known research needs.

- ***Fish***

Anadromous Fish

Current Knowledge

The BCGL is located in one of the most important river basins for anadromous fishes in North Carolina. Each spring, blueback herring, alewife, American shad, hickory shad, and white perch migrate up the Cashie River to spawn. Striped bass also use the Cashie to feed on their way to the Roanoke River. Both Roquist Creek and Wading Place Creeks are designated as Anadromous Fish Spawning Areas (North Carolina Division of Marine Fisheries 2016).

River herring have experienced coast wide declines in abundance over the last two decades and are now at all-time low population levels. A combination of many factors, including recreational and commercial fishing as well as habitat loss and degradation, has led to the river herring decline on the Atlantic coast (Atlantic States Marine Fisheries Commission 2009). Current harvest moratoria are designed to protect river herring stocks and may result in increases in abundance.

Management Strategy

Habitat improvements in tributary streams may also facilitate local increases in spawning populations. Impediments to fish migration within streams on BCGL should be identified and removed to facilitate access to spawning habitat. These impediments may include beaver dams, severe log jams or culverts that restrict fish access. Culvert replacement projects should consider improvements to fish passage. Timber harvests on the game land also consider water quality and siltation of waterways. Clean Water buffers, Ecosystem Enhancement Program restrictions, and North Carolina Forest Practices Guidelines and Forestry Best Management Practices will be followed.

Inventory and Monitoring Needs

No monitoring needs on the game land at this time.

Research Needs

No research needs on the game land at this time.

Catadromous Fish

Current Knowledge

American eel is the lone catadromous fish found in North Carolina. Catadromous fishes spawn in marine environments but migrate as juveniles to freshwater habitats where they grow and mature. It is likely that American eel are also utilizing stream habitats bordering BCGL, but sampling data are not available.

Management Strategy

Habitat improvements in tributary streams may benefit eel populations. Impediments to fish migration within streams on the game land should be identified and removed. These impediments may include beaver dams, severe log jams or culverts that restrict fish access. Culvert replacement projects should consider improvements to fish passage.

Inventory and Monitoring Needs

There are currently no known monitoring needs on the game land.

Research Needs

There are currently no known research needs for the game land.

Game Species

White-tailed Deer

Current Knowledge

White-tailed deer is the most abundant big game species on the game land with Bertie County deer densities averaging 30-44 deer/mi^2 (North Carolina Wildlife Resources Commission 2016). Deer hunting on BCGL follows the eastern deer season and hunting is allowed 6 days per week. Deer hunting with the use of dogs is very popular as most of the tracts were in hunting leases with a long history of hunting with hounds prior to state acquisition.

Based on 2012-2014 averages, the total reported deer harvest per square mile on BCGL was markedly higher than the overall Bertie County harvest (all lands includes both private and public lands; i.e., all huntable lands) (Fig. 11). Several factors can influence these numbers. A large number of the acres on the game lands are not easily accessible to hunters and many of the Tidal Swamp Forest habitats do not support the estimated deer densities for the county. As a

result, most of the deer hunting occurs on the more accessible tracts that contain more upland habitats and the harvest is skewed to those portions of the game land. Hunter effort is thought to be much higher on the game land than Bertie County in general and hunters are likely to harvest any deer. Antlered buck harvest per square mile was also much higher on the game land compared to county averages and is well above statewide management goals of harvesting at least 1 buck/mi^2 (Fig. 11 and Fig. 12).

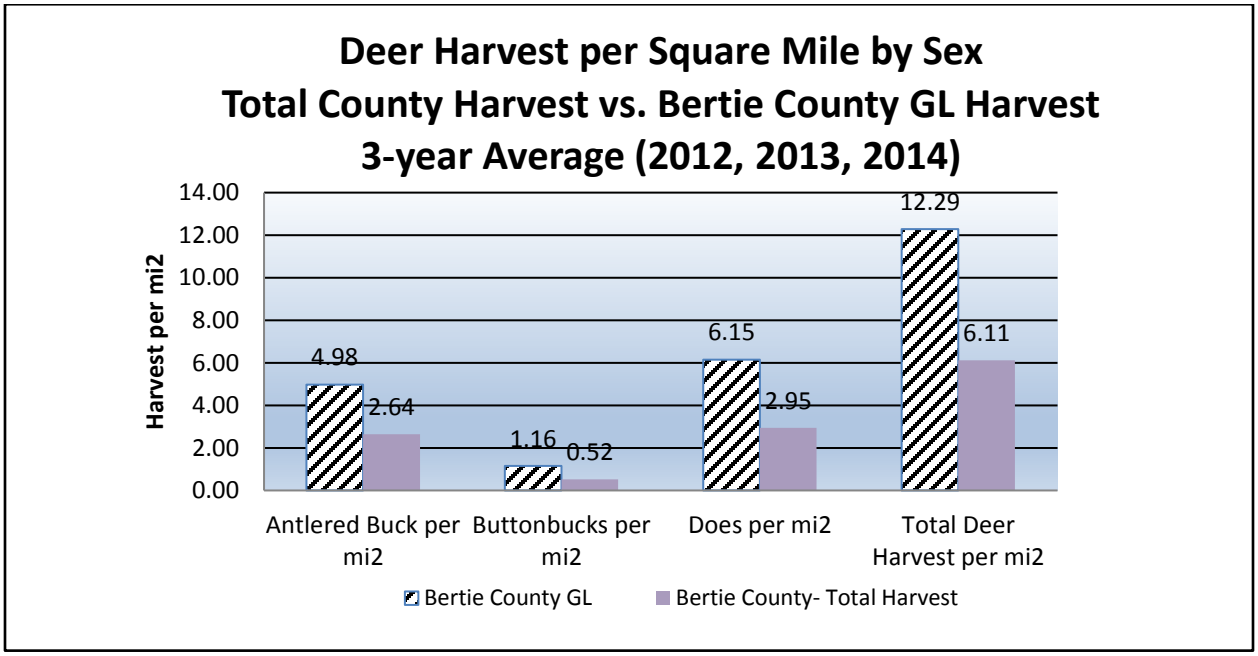

Fig. 11. Game land and county deer harvest per square mile.

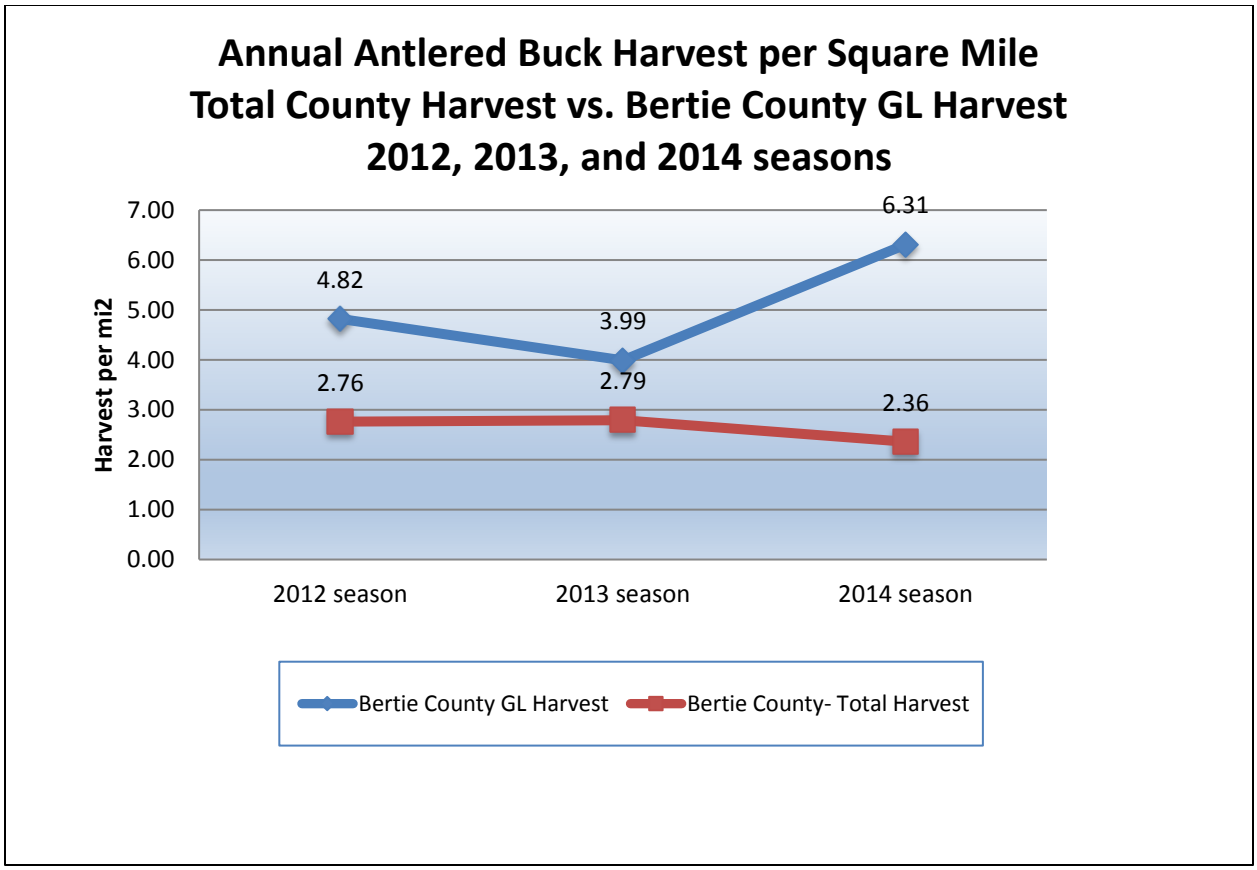

Fig. 12. Game land and county antlered buck harvest per square mile.

The deer harvest reported on the game land is composed of equal percentages of male deer (includes button bucks) and does (Fig. 13). These numbers are in line with overall Bertie County registered harvest (Fig. 13). This data is gathered from the big game harvest reporting system which can provide for a consistent index of harvest over time. The reasons for the slight difference in hunter selection between private lands and game lands may vary. Yearling buck movement may increase the buck's chances of being seen and therefore harvested, game land users may be content harvesting any antlered deer and not pass up the smaller bucks, or private land hunters/clubs may have adopted antler restrictions therefore reducing harvest mortality on the younger bucks. NCWRC deer management goals include having a total harvest comprised of at least 50% does. Doe harvest on BCGL average 50% (Fig. 13). Based on an evaluation of registered harvest and limited biological data, deer harvest levels and harvest composition on BCGL likely represent a low selectivity by hunters to harvest any deer.

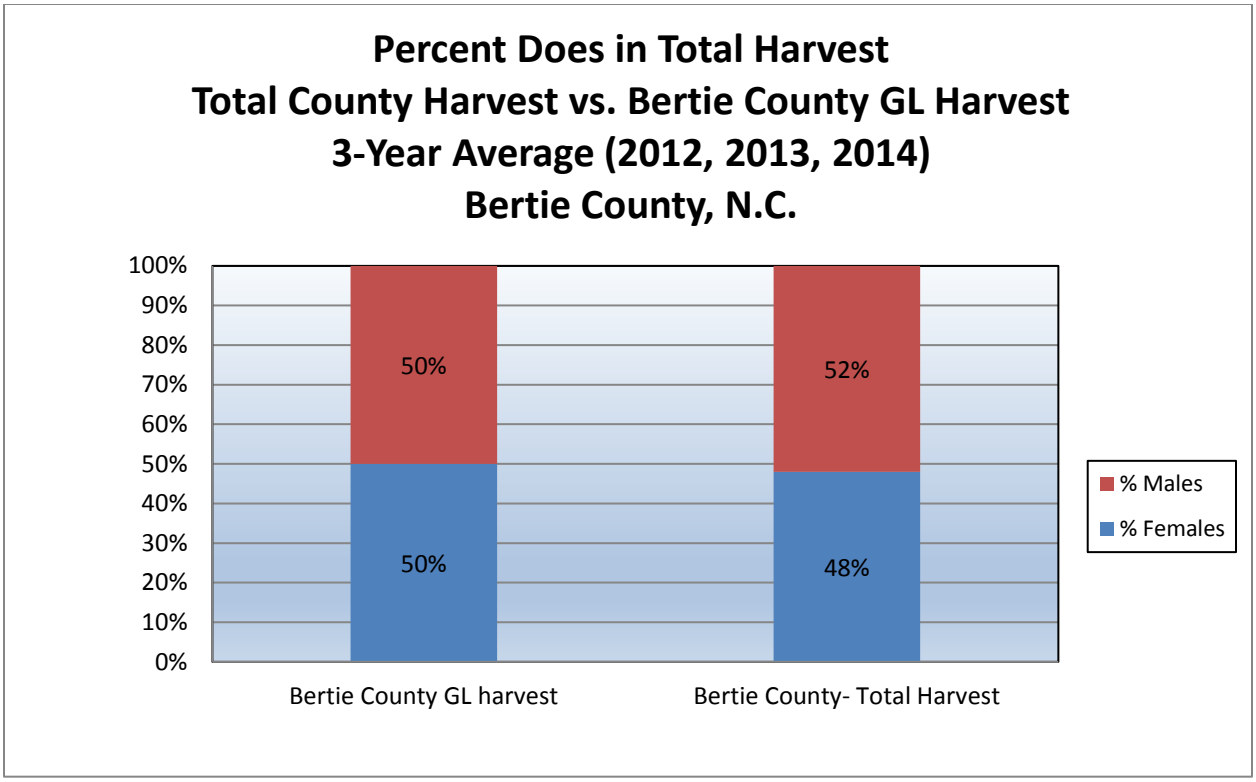

Fig 13. Percent deer harvest by sex.

Management Strategies

BCGL is a small, segmented game land with significant hunting pressure on adjacent private lands. Any long-term monitoring of the BCGL deer herd and harvest recommendations will have to have support from adjacent landowners. Adjacent landowner hunters and game land hunters would have to adopt similar goals for there to be a desired effect.

As a habitat generalist, white-tailed deer will benefit from the continuation of current land management practices. NCWRC will continue to manage the game lands in a manner that supports a wide array of wildlife species. Timber management with a prescribed burning program to develop the forest understory should increase habitat quality for deer. Oaks and other mast producing hardwoods will be retained in appropriate sites and replanted in areas that are not conducive to burning. The annual maintenance of managed openings/food plots should continue to increase forest habitat quality for deer.

Deer management recommendations for the game land to meet the parameters for a well-managed deer herd set by the deer evaluation tool are only possible if collection of biological data is increased. Management parameters addressed in the deer evaluation tool include:

- "Harvest of at least 1.0 antlered buck/mi2…."
- "Total harvest comprised of at least 50% does".
- "Total adult doe harvest (excluding fawns) is comprised of 30-35% yearling does (1.5 years old)".

- "Total antlered buck harvest (excluding button bucks) is comprised of no more than 30% yearling bucks (1.5 years old)".

BCGL deer harvest may not meet all the goals set for statewide deer herd goals. Hunters are harvesting at least 1.0 antlered buck/mi^2 (4.98 bucks/mi^2) and are meeting the percentage of does in the harvest (Fig. 11, Fig. 12, and Fig. 13). NCWRC staff continuously receive comments that there are not the deer on the game land as there were historically. Harvest per square mile are much higher than Bertie County overall and is likely a direct result from hunting effort and low selectivity. Figure 14 reports registered deer harvest on BCGL from 2010-2014.

Due to low sample size of harvested deer from the game land, biologists cannot determine if deer management goals requiring ages are being met. Reported harvest numbers can only be used as an index through time as they do not consider deer densities, hunter effort, hunter selectivity, habitat changes, or hunting methods.

At this time, management recommendations are to maintain the current hunting structure until better data is gathered. A change in the methods hunters use to hunt the game land may have a profound influence on the number and age of deer taken on the game land. BCGL is not large enough to effectively manage a deer herd.

Inventory and Monitoring Needs

Staff should continue to develop ways of annually collecting biological data from deer taken from the game land that will allow monitoring of the deer harvest over time while at the same time contributing to NCWRC statewide and local biological data collection goals. Biological data collection should also be collected from private land harvest to compare to game land harvest. Collection of biological data from hunter harvested deer on and off the game land is extremely labor intensive and should occur opportunistically and as funding and staffing allows. More biological data must be collected on both the game land and private land in order to use age and sex data to guide deer management actions.

Staff should continue to investigate reports of diseased animals. When a diseased animal is reported on the game land, attempts will be made to diagnose what disease process is occurring. Also, as disease surveillance is conducted, the game land will be incorporated into the surveillance effort when appropriate.

Research Needs

No known research needs at this time.

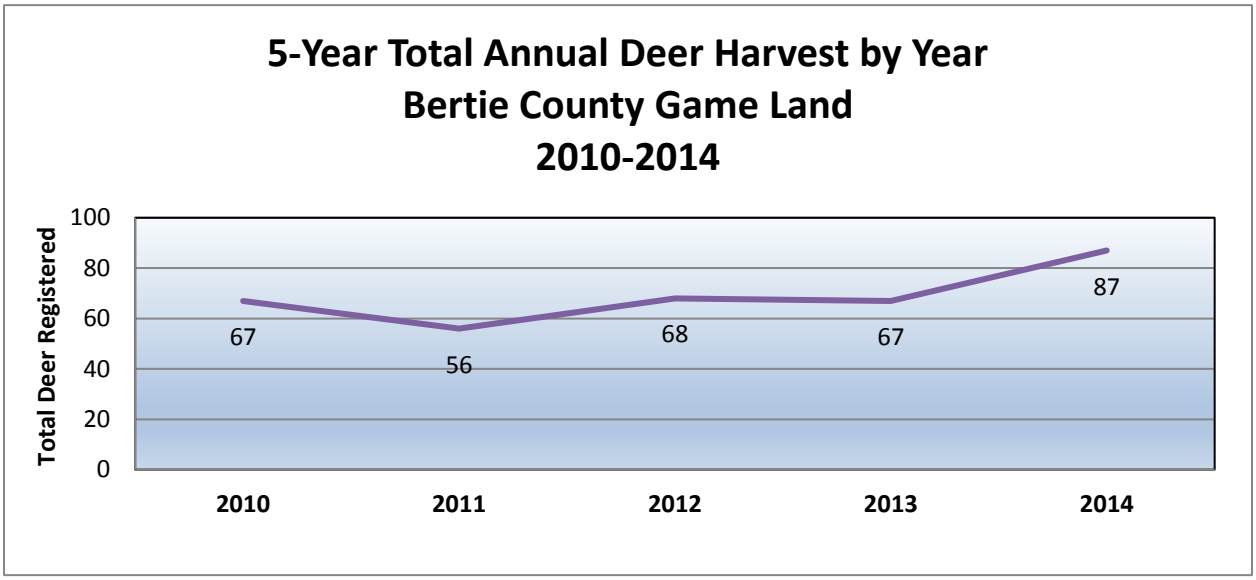

Fig. 14. 5 year total reported deer harvest for Bertie County Game Land.

Eastern Wild Turkey

Current Knowledge

The BCGL consist of a mix of bottomland hardwoods, managed upland forest stands, hardwood drains, and roads and trails used as brood habitat. These areas can provide good numbers of turkeys for public hunting, as well as contributing locally to turkey flocks using surrounding private lands.

The game land harvest per square mile is much higher (Fig. 15) relative to the harvest on private lands in Bertie County. Most of the game land turkey hunting probably occurs on the upland portions of the game land. The high turkey harvest on the game land compared to Bertie County is likely due to the availability of public hunting land to sportsmen.

Management Strategy

A turkey goal for BCGL is to maintain spring gobbler hunting opportunities on the game land. Timber thinning, restoration of groundcover with native warm season grasses and forbs, and prescribed burning should increase nesting and brooding habitat quality. Growing season burning will be employed where possible to help control hardwood saplings. Smaller established oak patches in stands will be retained and mast producing hardwoods will be planted in areas not conducive to prescribed fire. Most roads and trails will not be mowed until the fall providing excellent bugging areas for growing poults. Continued habitat management on the game land, particularly for quality brood habitat and nesting habitat, will play a key role in maintaining annual turkey numbers on the game land.

Establishing baseline data and detecting population trends will assist in management decisions on whether to continue with the hunting structure or explore options to reduce hunting pressure on turkeys to maintain a quality hunting experience.

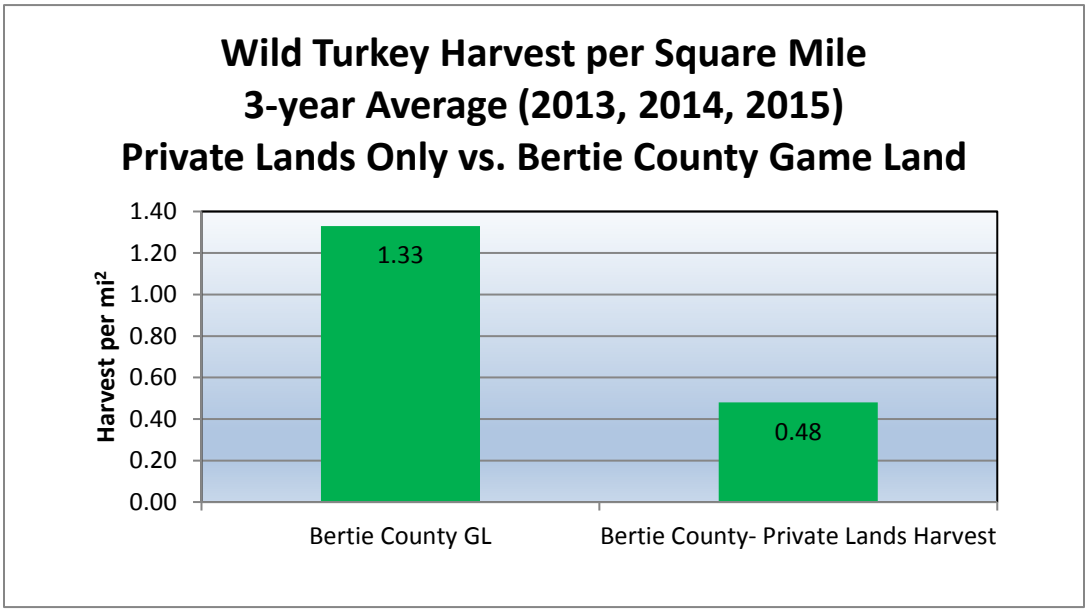

Fig. 15. Wild turkey harvest per square mile.

Inventory and Monitoring Needs

Currently, there are no baseline data for turkey abundance on the game land. Several options are available to gather these data. One that could be utilized could be the direct observation by chance encounters similar to the Wild Turkey Summer Observation Survey, a turkey hunter observation survey, and/or a deer hunter survey. Another could be gobbling bird point counts.

Staff should continue to investigate reports of diseased animals. When a diseased turkey is reported on the game land, attempts will be made to diagnose what disease process is occurring. Also, as disease surveillance is conducted, the game land will be incorporated into the surveillance effort when appropriate.

Research Needs

No known research needs at present.

American Black Bear

Current Knowledge

The tidal swamps and floodplain forest on BCGL has supported bears since the 1970's (North Carolina Wildlife Resources Commission 2012). Large diameter hollow bald cypress scattered throughout the swamps and along the creeks and rivers offer important denning sites. BCGL, with its dense, road less bottomland areas along the Cashie River, provides both travel corridors and a "source" of bears for surrounding areas. The reported annual harvest is low which may

suggest low hunting pressure, bears being chased off of the game land with dogs and harvested on private land, or harvested bears not being reported as harvested on the game land (Fig. 16).

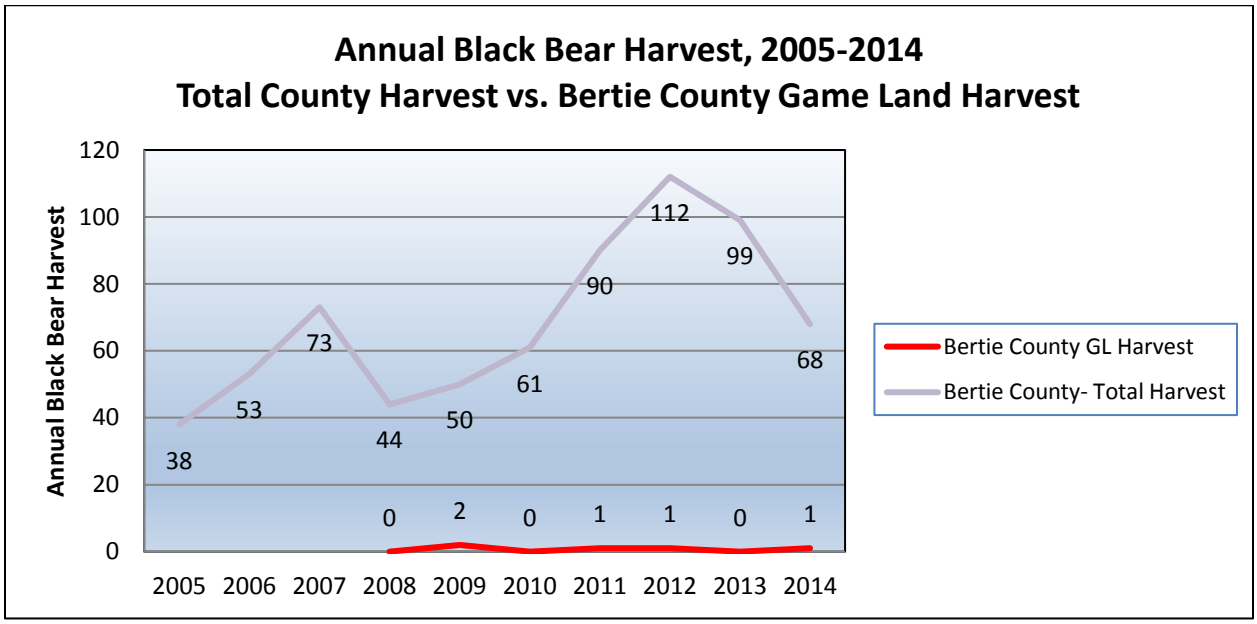

Fig. 16. Bear harvests in Bertie County and BCGL.

Management Strategy

Bears on the game land should be managed following the guidelines outlined in the NC Black Bear Management Plan (NCBBMP) available to the public on the NCWRC website. The NCWRC's management of BCGL using varied hunting regimes allows ample opportunity to hunt bears. BCGL is a small game land and habitat work will help meet the needs of bears. The BCGL by itself will not support a population of bears.

Many studies have concluded that black bear habitat preferences are simply a function of food. Therefore, any land management practices to improve/sustain food availability (soft and hard mast) will benefit black bears. Maintaining travel corridors, timber management, and introducing prescribed fire to upland sites will enhance/maintain habitat for black bear. Black bears move extensive distances during certain times of the year. It is important for movement to occur between the various subpopulations of bears across the state to help maintain bear numbers and genetic diversity. Corridors can also assist in reducing human-bear interactions by decreasing the proximity of traveling bears to human development. Large hollow trees, such as cypress and tupelo, should not be removed, as they serve as potential bear den sites.

Continued acquisition of adjacent lands would support efforts to meet the NCBBMP objective 4, strategies 3, 4, 5, and 6 listed below (North Carolina Wildlife Resources Commission 2012).

- 3. Identify, acquire, and maintain property that would provide habitat for black bears.
- 4. Identify key movement corridors and work, either through acquisition, easements, or agreements, to conserve these areas.

- 5. Identify game lands that can be managed to create or maintain bear habitat and bear travel corridors.
- 6. Support habitat management practices that benefit bear management objectives on both private and public lands.

Inventory and Monitoring Needs

Inventory and monitoring should be considered on an as needed basis. Registered harvest data will allow NCWRC to tract trends over time. Harvest data collection should continue as NCWRC uses age, location of harvest, and sex of the bear in bear unit management decisions.

Research Needs

No known research needs at present.

Furbearers

Current Knowledge

Overall, furbearers are thought to be "common" on BCGL. Hunting opportunities exist for bobcat, fox, coyote, opossum, and raccoon. Trapping opportunities exist for beaver, bobcat, coyote, opossum, raccoon, river otter, mink, muskrat, nutria, and long-tailed weasel. Fox trapping is not allowed by local law in Bertie County.

Management Strategy

Maintain current trapping season to allow for trapping opportunities and the harvest of surplus furbearers. Continue current land management techniques to benefit furbearers in each habitat type. Encourage trappers to utilize the game lands.

United States Department of Agriculture-Wildlife Services, NCWRC staff, and Animal Damage Control Agents may be required to remove beaver from sites impacting infrastructure or significant timber resources.

Inventory and Monitoring Needs

Inventory and monitoring should be considered on an as needed basis. Scent stations and track counts could be used for some species.

Research Needs

No known research needs at present.

Gray Squirrel

Current Knowledge

Gray squirrels are a common small game species on the game land. Gray squirrels inhabit numerous forest types, although they are most abundant in hardwood forests containing a variety of mast-producing trees.

Management Strategy

Current hunting opportunities should be maintained. Maintaining mature forest types on the game land will provide for the habitat needs of squirrels.

Inventory and Monitoring Needs

There are currently no inventory and monitoring needs but they should be considered on an as-needed basis.

Research Needs

There are currently no known research needs.

Eastern Cottontail Rabbit and Marsh Rabbit

Current Knowledge

Eastern cottontail rabbits and marsh rabbits occur on the BCGL in thinned stands, regenerated clear-cuts, and in transition zones between uplands and wetter drains where shrubs, grasses, and forbs dominate. Briar patches, brush piles, and other dense vegetation are needed for escape cover. Interspersion of different cover types is ideal for rabbits.

Management Strategy

Current hunting opportunities should be maintained. Land management techniques that provide brushy cover will be beneficial for rabbits. These include thinning and burning of pine communities, early-successional habitat management, and the creation and/or protection of brush piles and briar thickets.

Inventory and Monitoring Needs

There are currently no inventory and monitoring needs but they should be considered on an as-needed basis.

Research Needs

There are currently no known research needs.

Northern Bobwhite Quail

Current Knowledge

Northern bobwhite quail inhabit early-successional habitat found in forest communities with open canopies and an herbaceous understory. Transitional areas found between community types are critical for quail, especially areas between upland sites and linear openings such as roads, trails, powerlines, and logging skid trails. The amount of area considered suitable quail habitat continues to increase through timber stand improvements. Quail numbers on the game land are extremely low.

Management Strategy

Current hunting opportunities should be maintained. Existing land management practices should continue to provide suitable habitat with an emphasis on improving the quality and acreage of early-successional habitats.

Inventory and Monitoring Needs

The upland portion of the game land that potentially could support quail is small. Although habitat for quail continues to improve, population monitoring is not required due to the game land size being a limiting factor to support large quail numbers.

Research Needs

There are currently no known research needs.

Webless Migratory Birds

Current Knowledge

Woodcock may be found in the hardwood drains. Fields under the large transfer powerline are being planted and managed as dove fields. Hunters have responded favorably to the creation of this hunting opportunity.

Management Strategy

No management will specifically target woodcock. Woodcock habitat will be managed opportunistically through prescribed fire and timber harvests in appropriate sites. NCWRC will continue to manage some of the openings under the powerline for dove hunting opportunities.

Inventory and Monitoring Needs

There are no inventory or monitoring needs known.

Research Needs

There are currently no known research needs.

Waterfowl

Current Knowledge

Waterfowl use on the BCGL is primarily dependent on beaver ponds, creeks, river, and open swamp pockets. Common species observed include wood duck, mallard, black duck, and hooded merganser.

Management Strategy

Beaver ponds should be maintained where appropriate. Most of the swamp habitats are protected by Articles of Dedication agreements and active management in these sites is limited.

Inventory and Monitoring Needs

There are no inventory or monitoring needs known.

Research Needs

There are currently no known research needs.

Financial Assets and Future Needs

The financial assets of the BCGL include a variety of assets in the form of infrastructure, personnel, vehicles, and heavy equipment. It should be noted that the large majority of these assets are also used to manage other game lands in the Northern Coastal Ecoregion and some assets, including personnel, are periodically used in other areas of North Carolina where they may be needed by the NCWRC to achieve management objectives in those areas.

Equipment and other asset needs are evaluated annually and operating budgets are allocated annually based on these equipment needs, upcoming projects, the costs of normal operations, and the availability of funds. The financial report below is an estimate based on existent infrastructure and habitat maintenance and future infrastructure development (Table 6). The figures use the 2006-2015 10-year average Consumer Price Index annual inflation rate of 1.95%.

Table 6. Financial Summary of Activities for BCGL.

Bertie County Game Land																
Financial Summary of Activities																
Habitat Activities																
Project	Description	Activity	Quantity	Unit	Unit Cost	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	Total
H	Vegetation Control	Prescribe burning	500	ac	$ 30	15000	15293	15591	15946	16310	16682	17062	17451	17849	18256	$ 165,438
H	Herbaceous Seeding	Seed or maintain	10.6	ac	$ 175	1855	1891	1928	1966	2004	2043	2083	2124	2165	2207	$ 20,265
H	Firebreaks	Maintain firebreaks	5	mile	$ 525	2625	2676	2728	2782	2836	2891	2947	3005	3064	3123	$ 28,677
															Subtotal	**$ 214,381**
Operation and Maintenance Activities																
Project	Description	Activity	Quantity	Unit	Unit Cost	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	Total
O & M	Road and Trails	Maintain gates	11	gate	$ 100	1100	1121	1143	1166	1188	1212	1235	1259	1284	1309	$ 12,017
O & M	Road and Trails	Maintain road	7.2	mi	$ 2,500	18000	18351	18709	19074	19446	19825	20211	20605	21007	21417	$ 196,645
O & M	Road and Trails	Maintain trail	4.5	mi	$ 2,500	11250	11469	11693	11921	12154	12390	12632	12878	13130	13386	$ 122,903
O & M	Signs and Boundaries	Maintain boundary	41.8	mi	$ 135	5643	5753	5865	5980	6096	6215	6336	6460	6586	6714	$ 61,648
O & M	Bridge Maintenance	Replace culverts	2	culvert	$ 2,500	5000	5098	5197	5298	5402	5507	5614	5724	5835	5949	$ 54,624
O & M	Public Use Facilities	Maintain disabled shooting blind	1	ea	$ 250	250	255	260	265	270	275	281	286	292	297	$ 2,731
O & M	Road Upgrade	Annual gravel allocation	1	ea	$ 15,000	15,000	15293	15591	15895	16205	16521	16843	17171	17506	17847	$ 163,871
O & M	Public Use Facilities	Maintain campground 2017	1	ea	$ 225		229	233	238	243	247	252	257	262	267	$ 2,229
															Subtotal	**$ 614,439**
Development Activities																
Project	Description	Activity	Quantity	Unit	Unit Cost	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	Total
D	Road Upgrade	South Road	1.28	mi	$ 100,000	128,000										$ 128,000
D	Road Upgrade	River Road	0.67	mi	$ 100,000		68307									$ 68,307
D	Road Upgrade	Seventeen Road	1.43	mi	$ 100,000			148,631								$ 148,631
D	Road Upgrade	CC Road	2.32	mi	$ 100,000				245838							$ 245,838
D	Road Upgrade	North Road	0.71	mi	$ 100,000						78198					$ 78,198
D	Public Use Facilities	Develop campground	1	ea	$ 225	225										$ 225
															Subtotal	**$ 668,974**
Inflation rate is calculated from the Consumer Price Index (CPI-U) which is compiled by the U.S. Bureau of Labor Statistics																
2006(3.2%), 2007(2.8%), 2008(3.8%),2009(-0.4%),2010(1.6%), 2011(3.2%), 2012(2.1%), 2013(1.5%), 2014(1.6%), 2015(0.1)=10 Year AVG(1.95%)														Grand Total		**$1,497,794**

Staffing

The current game land management staff for the BCGL is located in Edenton, NC and includes 2 permanent, full-time technicians. Additional staff that assist with management of the game lands includes the Northern Coastal EcoRegion Management Biologist, Northern Coastal EcoRegion Wildlife Forester, and Northern Coastal EcoRegion Technician Supervisor. Technician staff from other depots located throughout the Northern Coastal EcoRegion also provide assistance with larger projects such as prescribed burning, boat ramp renovations, and large road improvements. Overseeing all previously mentioned staff is the Coastal EcoRegion Supervisor that supervises personnel throughout the entire coastal region. The Northern Coastal EcoRegion work area consists of 22 game lands totaling 215,188 acres, 51 boating access areas, and 13 public fishing areas (Fig. 17).

There are currently no need for additional personnel at the Edenton Depot. However, because the previously mentioned staff also conducts management activities on other game lands and boating access areas within the work area, additional staffing needs will be evaluated if demands for more intensive management increases or additional lands are acquired.

Infrastructure

Infrastructure throughout the game land includes miles of roads and trails, numerous culverts for drainage, gates that are used to control access, and a disabled sportsman shooting blind. Major infrastructure upgrades planned over the ten year planning horizon are covered in the Infrastructure Development and Maintenance section.

Heavy Equipment and Vehicles

There is currently an adequate supply of heavy equipment and vehicles to conduct management activities on the game lands. Heavy equipment includes farm tractors with various implements, an excavator, motor grader, and 2 bulldozers. Tractor implements include, but are not limited to, disk harrows, rotary mowers, a no-till grain drill, and box blade. Other equipment includes ATV's and boats.

Personnel at the Edenton Depot are currently outfitted with an adequate supply of vehicles. These include pickup trucks including one that is used for prescribed burning operations and the application of herbicide on roadsides. Additional vehicles and equipment often shared with other depots include a hauling unit, dump truck, and a belly-mounted side mower unit.

As previously stated, the replacement or addition of these assets is evaluated annually based on existing and predicted needs and are acquired if funding is available.

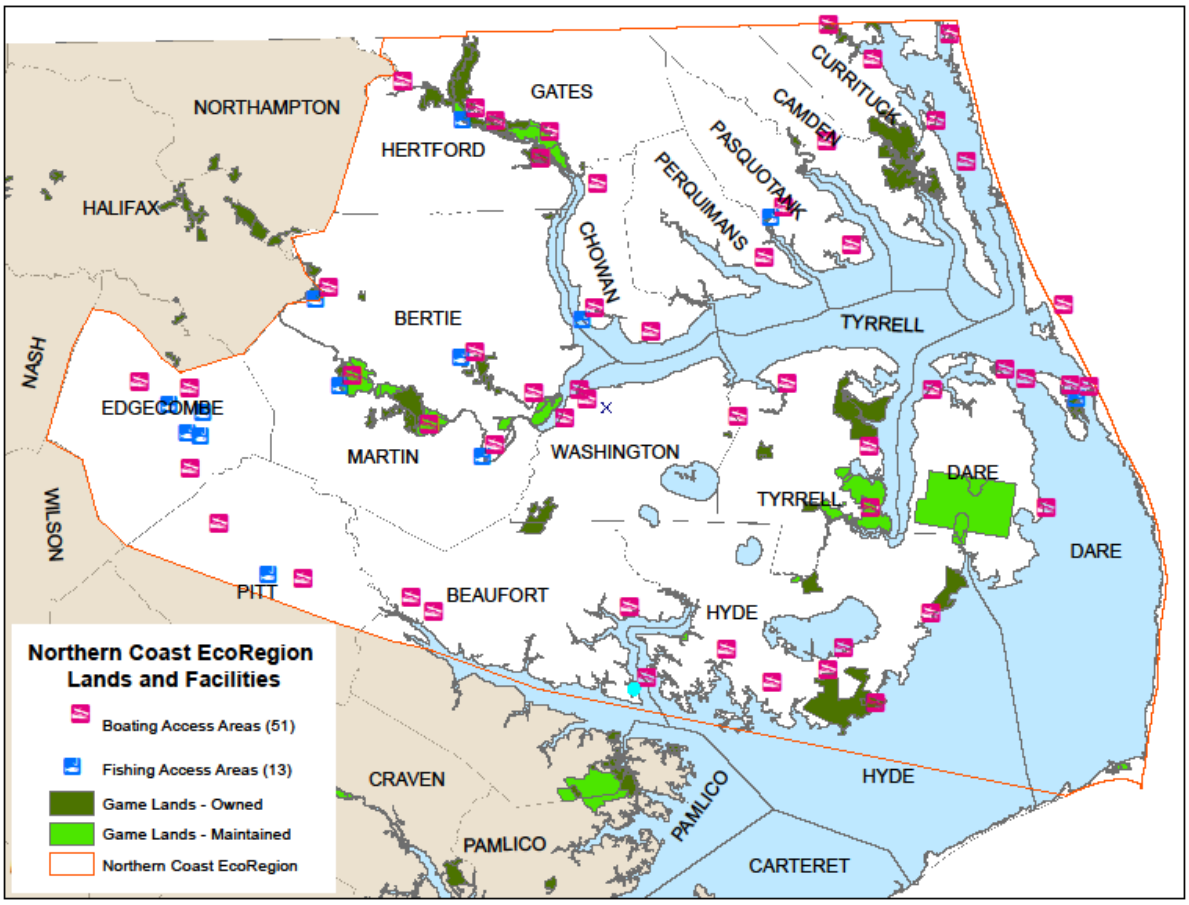

Fig. 17. Northern Coastal EcoRegion Lands and Facilities.

Acquisition Plan

The NCWRC's plans for future acquisition will include inholdings, adjacent lands, and critical habitats. Critical habitats that have rare and/or endangered species, provide outstanding ecological benefits, or provide outstanding opportunities for game land users will be a high priority. Special considerations will be given to; lands that provide corridors for the connectivity of key parcels or are critical to enhance the NCWRC's ability to protect rare habitats, the land management needs of a property, inholdings and key adjacent properties, and the public access and public uses that a property provides. With habitat restoration goals set for some tracts, land managers should evaluate large parcels that will complement habitat community restoration efforts.

Prior to any acquisition, initial land investigations will be conducted by NCWRC staff and evaluations will be submitted to the NCWRC Lands Use Committee. Land will only be acquired from willing sellers and/or through donations and all acquisitions will be based on available funding.

Regulations and Enforcement

Enforcement of all rules and regulations falls to the Wildlife Enforcement Division of the NCWRC. Primary enforcement activities on the game land include: aircraft patrols, check points for license and game compliance, foot and boat patrols, remote camera setups on bait and littering sites, nighttime poaching setups and surveillance, and routine road patrols. These activities occur throughout the year across the game land, with the highest frequency of enforcement activities occurring during the hunting seasons. Critical times for the Enforcement Division on the game land occur during the bear, deer, and turkey seasons.

As with most game lands, the major enforcement problems on the BCGL pertain to littering, regulation violations, license/permit issues, ATV riding, drug use, baiting, and adjoining landowner issues and conflicts. Land and Water Access Section staff and the Enforcement Division have an excellent working relationship and communication on game land issues.

Refer to the current *North Carolina Inland Fishing, Hunting, and Trapping Regulations Digest* for regulations specifically for BCGL.

Partnerships and Collaborations

Partnerships and collaborations among various conservation groups, state agencies, non-governmental agencies, non-profit groups, national organizations, clubs, and private citizens have been pivotal to the successful management of game lands. Newly created and continued partnerships between the NCWRC and these groups will be essential for meeting the goals and needs outlined in this plan. Below is a list of partners that have assisted with conservation efforts on BCGL.

Atlantic Coast Joint Venture

Mission Statement: *"To provide a forum for federal, state, regional and local partners to coordinate and improve the effectiveness of bird conservation planning and implementation in the Atlantic Flyway region of the United States."*

North American Wetland Conservation Act

Purpose: *"The North American Wetlands Conservation Act of 1989 provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico for the benefit of wetlands-associated migratory birds and other wildlife."*

North Carolina Clean Water Management Trust Fund

Mission Statement*: "to clean up pollution in the State's surface waters and to protect, preserve and conserve those waters that are not yet polluted."*

North Carolina Department of Environment and Natural Resources

Mission Statement: "*To protect North Carolina's environment and natural resources."*

North Carolina Ecosystem Enhancement Program

Mission and Purpose: *"To provide a comprehensive, natural resource enhancement program that identifies ecosystem needs at the local watershed level and preserves, enhances, and restores ecological functions within target watersheds while addressing impacts from anticipated NCDOT transportation projects and permitted impacts from other development projects."*

North Carolina Forest Service

Mission Statement: "*To protect, manage and promote forest resources for the citizens of North Carolina."*

North Carolina Natural Heritage Program

Mission Statement: "*To provide science and incentives to inform conservation decisions and support conservation of significant natural areas in our state."*

The Nature Conservancy

Mission Statement: "*To conserve the lands and waters upon which all life depends.*"

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Development Team and Public Input

A Bertie County Game Land Management Plan Development Team was formed in September 2015 consisting of NCWRC biologist and staff from various areas of expertise. Topics addressed by the team included guiding policies and partnerships, adjacent land uses and management, what makes these game lands special, key game and non-game species, game land user groups, landscape and habitat level goals, future acquisitions, existing data and data gaps, threats to the game lands and game land goals, forest management, game land infrastructure, natural resources stakeholders, and enforcement issues.

Public comment was gathered at a Public Input Meeting held at the Roanoke Cashie River Center in Windsor on December 1, 2015. After a presentation on Bertie County Game Land, the 10 attendees were split into groups and NCWRC facilitators worked through a list of questions to gather input (Appendix IV). Attendees included hunters, fishermen, a Bertie County government official, and other interested members of the public. Nine questionnaires were returned after the meeting. Some attendees opted to post comments on the online "Comment on Game Land Plans" link through the NCWRC website. Attendees who returned questionnaires at the meeting could also submit comments using the online comment link. Online public comments were accepted 15 November 2015 to 15 January 2016 for the same seven questions that were presented at the public input meeting. All comments are listed in Appendix IV with plan responses to many of them.

One letter from the North Carolina Department of Environment and Natural Resources, North Carolina Natural Heritage Program was also received. This letter emphasizes the natural significance of the Bertie County Game Land (Appendix V).

After natural resources stakeholders and public comments were considered, a draft plan was developed by the Development Team and circulated for in-house review and edits made. The draft plan was presented to the NCWRC Land Use and Access Committee. After Committee review and edits made, the final draft was available for public comment online for 30 days. A draft plan was available for public comment online from February 14, 2018 through March 15, 2018. No public comments were received. This final plan was presented to the Land Use and Access Committee and the full Commission.

Appendices

I. Archeological Resources Protection Act

Archaeological Resources Protection Act North Carolina General Statutes Chapter 70, Article 2

This statute applies to all state-owned, occupied or controlled property except for highway rights-of-way.

The purpose of the statute is to provide for the protection of archaeological resources on state lands. Major provisions of the law are as follows:

1. Archaeological resources are defined as any material remains of past human life or activities which are at least 50 years old and which are of archaeological interest, including pieces of pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, rock paintings, rock carvings, intaglios, graves or human skeletal materials.
2. Permits are required in order to conduct archaeological investigations on state lands.
3. (The 1991 amendment to ARPA, effective July 1, 1991, transferred to the Department of Cultural Resources--from Department of Administration--the authority to issue permits under G.S. 70, Article 2.)
4. Information on archaeological site locations is exempted from unrestricted public access may result in damage to or destruction of the archaeological resources
5. All archaeological resources, equipment and vehicles utilized in conjunction with violation of the law are subject to forfeiture.

Prohibitions and penalties under the law are as follows:

1. No person may excavate, remove, damage or otherwise alter or deface any archaeological resource located on state lands without a permit.
2. No person may sell, purchase, exchange, transport, receive or offer to sell, purchase, exchange, transport or receive any archaeological resource excavated or removed from state lands in violation of the law.
3. Any person who knowingly and willfully violates or employs any other person to violate any prohibition of the law, shall upon conviction, be fined not more than $2,000 or imprisoned not more than six months, or both.
4. Each day on which a violation occurs shall be a separate and distinct offense.
5. Civil penalties may also be assessed against any person who violates the provisions of the act.

II. Articles of Dedication through the North Carolina Natural Heritage Program

North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Britt Cobb, Secretary

January 19, 2010

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 **Bertie County Game Land**, Bertie 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.

This real property is currently administered by the North Carolina Wildlife Resources Commission as a portion of the Bertie County Game Land and consists of approximately 1,991 acres located in Bertie County, and composed of:

1. Bertie County Game Land tract (Primary Area)	1,894 acres
2. Bertie County Game Land (Buffer Area)	97 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 **Bertie County Game Land Dedicated Nature Preserve.**

Mailing Address:
1301 Mail Service Center
Raleigh, NC 27699-1301

Telephone: (919) 807-2425
Fax (919) 733-9571
State Courier #51-01-00
e-mail britt.cobb@doa.nc.gov
An Equal Opportunity Affirmative Action Employer

Location Address:
116 West Jones Street
Raleigh, North Carolina 27603

Dedication of the qualified portion of the tract fulfills the terms of any prior grant agreement, including that of the Clean Water Management Trust Fund and the Ecosystem Enhancement Program.

The Governor and Council of State have approved the dedication of the State-owned lands herein above described as the Bertie County 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 4th day of August, 2009.

Sincerely,

Britt Cobb

BC:ke

Attachments

CONSENTED AND AGREED TO:

Secretary Dee Freeman
Department of Environment and Natural Resources

Gordon S. Myers, Executive Director
Wildlife Resources Commission

EXHIBIT A

BERTIE COUNTY GAME LAND
DEDICATED NATURE PRESERVE

COUNTY: Bertie County TOPO QUAD: Windsor, Woodard 7.5 minute quads

SIZE OF AREA: ca. 1,991 acres total (primary area 1,894 acres; buffer area 97 acres).

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

LOCATION: Along both sides of the Cashie River, from the southeastern edge of Windsor, downstream roughly 6 air miles. Access is by water from boat ramps at the edge of Windsor and at the end of Johnson's Mill Road. The preserve also includes area on Wading Place Creek, roughly 1.5 air miles upstream from NC 308; see Maps (***)

DESCRIPTION: Most of the Bertie County Game Land lies in the wetlands along the lower Cashie River. A band of swamp up to one mile wide lies on the deep organic deposits that have filled the floodplain of the river. The river in this stretch is deep, with black tannin-stained water, no visible current, and is influenced by wind tides. The lower reaches of tributaries also are deep and tidally influenced. A small area is upstream on Wading Place Creek, where it is a flowing blackwater creek.

Most of the area of the swamp is a Tidal Cypress–Gum Swamp community. The canopy is dominated by a mix of water tupelo (*Nyssa aquatica*) and swamp tupelo (*Nyssa biflora*), with a significant minority of bald cypress (*Taxodium distichum*). The understory and shrub layers include species characteristic of Tidal Cypress–Gum Swamps, such as red bay (*Persea palustris*), water ash (*Fraxinus caroliniana*), ironwood (*Carpinus caroliniana*), swamp rose (*Rosa palustris*), alder (*Alnus serrulata*), sweetspire (*Itea virginica*), and highbush blueberries (*Vaccinium fuscatum, Vaccinium corymbosum*). The herb layer is patchy, reflecting the pronounced hummock and hollow forms of the ground surface. This extensive community varies in condition, but most parts are quite mature. Substantial areas have numerous old, gnarled tupelo trees exceeding 16 inches in diameter, and many parts have old cypress trees with them. Some areas were subject to helicopter logging in the 1990s, and have canopy gaps where old cypress where cut. However, even these areas have numerous old tupelo trees.

Some areas within the swamp interior and on its upland edges are slightly higher in elevation and do not appear to be influenced by wind tides. They support a Nonriverine Swamp Forest community. The canopy in these areas consists of swamp tupelo, along with red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), and in places a little Atlantic white cedar (*Chamaecyparis thyoides*). The understory includes red bay, red maple, and sweet bay (*Magnolia virginiana*). The shrub layer is fairly dense, and includes some species characteristic of pocosins, such as sweet gallberry (*Ilex coriacea*) and bitter gallberry (*Ilex glabra*).

The upstream floodplain area along Wading Place Creek includes both a Cypress–Gum Swamp (Blackwater Subtype) community and a series of beaver ponds that support Coastal Plain Semipermanent Impoundment communities. Swamp tupelo and bald cypress are the characteristic canopy in both. The swamp has little shrub layer, and supports characteristic herbs such as netted chain fern (*Woodwardia areolata*) and false nettle (*Boehmeria cylindrica*).

Most of the upland parts of the site are heavily altered and are not included in the primary area. Some areas of fairly steep bluffs are present, and support remnants of Mesic Mixed Hardwood Forest communities.

The Cashie River in this stretch is a significant aquatic site, notable for populations of two rare mussels: the alewife floater (*Anodonta implicata*) and tidewater mucket (*Leptodea ochracea*). The substantial river frontage and buffering wetlands in the preserve help protect the water quality and hydrology of the river.

BOUNDARY JUSTIFICATION: The primary boundary is drawn to mostly include the natural communities that remain in good condition. This consists primarily of the swamp communities. A few small areas of upland bluff are included. Additionally, areas of lower quality are included within the primary area if they lie within 300-feet of the Cashie River Significant Aquatic Habitat or within 100-feet of perennial tributaries draining into the river, based on funding source mandates for protection of aquatic resources. The linear footage of 300-feet riparian areas specifically satisfies the funding mandate of the Ecosystem Enhancement Program on tracts acquired with their funding. The buffer area includes areas of natural communities in poorer condition, which occur on the bluffs, swamp edges, and small drainages in the uplands. These areas serve to connect and buffer the primary areas.

MANAGEMENT AND USE: The dedicated nature preserve is a portion of the Bertie County Game Land owned by the State and used for public hunting, trapping and fishing. Most of the area has soft muck soils and is not readily visited. No special management needs are identified at present, beyond allowing the forests to continue to mature. Rising sea level is likely to increasingly affect the forests and some parts may ultimately turn into marshes. At present there is little evidence of stress from rising sea level.

Populations of the invasive *Murdannia keisak* were noted, and may become a significant threat to the herb layer in the Tidal Cypress–Gum Swamp. No stands of common reed (*Phragmites australis*) were seen, but this species is a potential future problem as sea level continues to rise.

THIS DEDICATION OF THE BERTIE COUNTY 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 Bertie County 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 1,894 acres) and a Buffer Area (approximately 97 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 Tidal Cypress-Gum Swamp, Nonriverine Swamp Forest, Coastal Plain Semipermanent Impoundment, and Mesic Mixed Hardwood Forest natural community types. Several rare mussel species are associated with the adjoining Cashie River. 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 primarily of adjoining pine plantations.

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 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.

The Primary Areas defined along the Cashie River Thunderbolt and Baltimore Tracts (AKA Bertie County Game Land DNP) were protected through fee simple acquisition by the State of North Carolina and deed restrictions were imposed by the Ecosystem Enhancement Program. These deed restrictions are recorded in Bertie County, NC, Register of Deeds, August 29, 2005, Deed Book 843, Pages 825 and 832.

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 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."

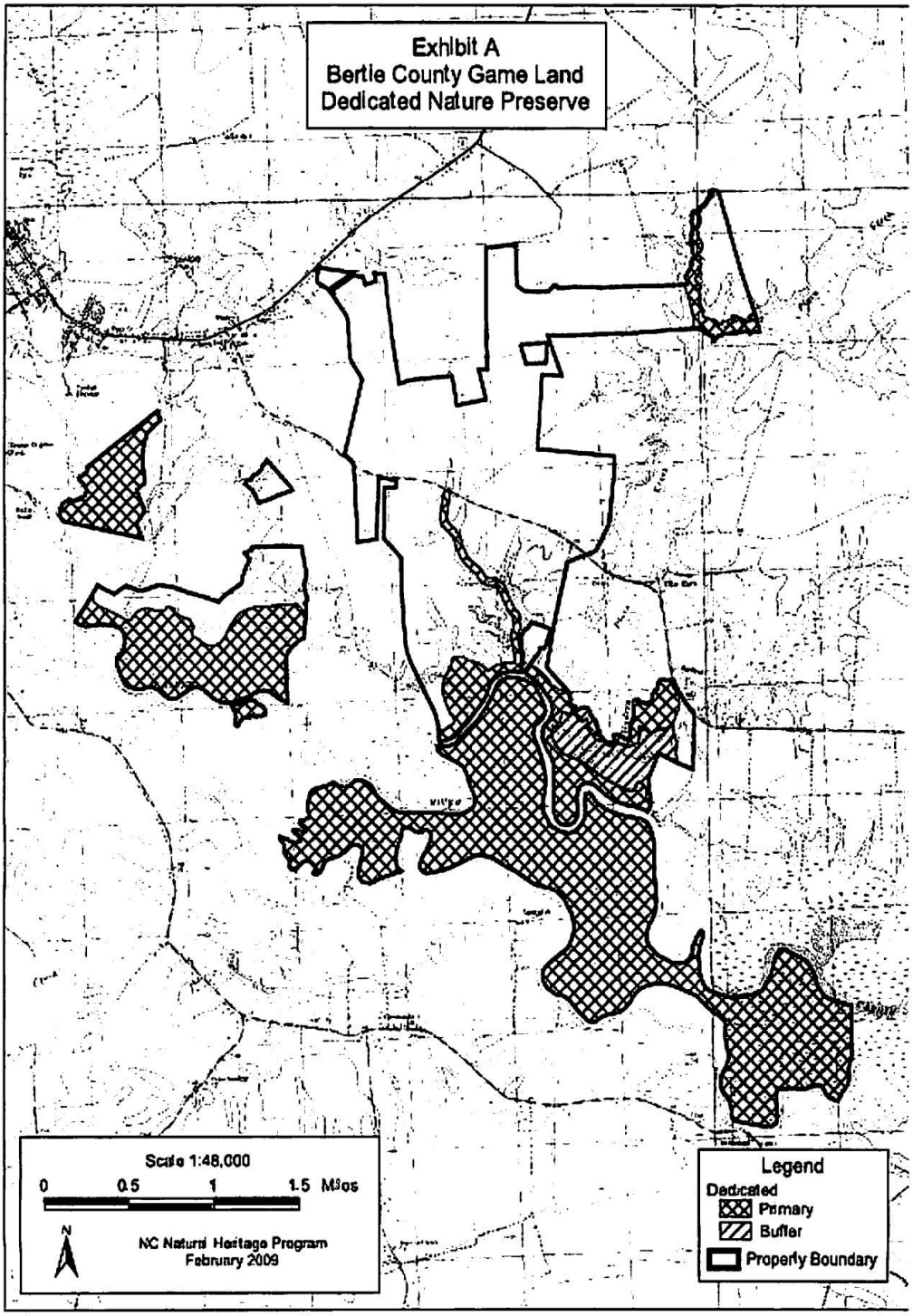
Exhibit A
Bertie County Game Land
Dedicated Nature Preserve
Scale 1:48,000
0 0.5 1 1.5 Miles
N
NC Natural Heritage Program
February 2009
Legend
Dedicated
Primary
Buffer
Property Boundary

III. Species Ranking Sheet

Descriptions and definitions are gathered from LeGrand et al. (2013) and Gadd and Finnegan (2013).

North Carolina Status Designations for Animals

Status Code	Status	Definition
E	Endangered	“Any native or once native species of wild animal whose continued existence as a viable component of the State’s fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild animal determined to be an ‘endangered species’ pursuant to the Endangered Species Act.” (Article 25 of Chapter 113 of the General Statues; 1987).
T	Threatened	"Any native or once-native species of wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a threatened species pursuant to the Endangered Species Act." (Article 25 of Chapter 113 of the General Statues; 1987).
SC	Special Concern	"Any species of wild animal native or once-native to North Carolina which is determined by the Wildlife Resources Commission to require monitoring but which may be taken under regulations adopted under the provisions of this Article." (Article 25 of Chapter 113 of the General Statues; 1987).
SR	Significantly Rare	Any species which has not been listed by the N.C. Wildlife Resources Commission as an Endangered, Threatened, or Special Concern species, but which exists in the state (or recently occurred in the state) in small numbers and has been determined by the N.C. Natural Heritage Program to need monitoring. This is a NC Natural Heritage Program designation.) Significantly Rare species include "peripheral" species, whereby North Carolina lies at the periphery of the species' range as well as species of historical occurrence with some likelihood of re-discovery in the state. Species considered extirpated in the state, with little likelihood of re-discovery, are given no N.C. Status (unless already listed by the N.C. Wildlife Resources Commission as E, T, or SC).

North Carolina Rank Designations of Animals by the North Carolina Natural Heritage Program

Rank	Number of Extant Occurrences	Description
S1	1-5	Critically imperiled - Critically imperiled in North Carolina due to extreme rarity or some factor(s) making it especially vulnerable to extirpation (local extinction) from the state. Typically 5 or fewer occurrences or very few remaining individuals (<1000).
S2	6-20	Imperiled - Imperiled in North Carolina due to rarity or some factor(s) making it very vulnerable to extirpation from the state. Typically 6-20 occurrences or few remaining individuals (1,000-3,000).
S3	21-100	Vulnerable - Vulnerable to extinction in North Carolina either because rare or uncommon, or found only in restricted range (even if abundant at some locations), or due to other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
S4	100-1000	Apparently secure - Apparently secure and widespread in North Carolina, usually with more than 100 occurrences and more than 10,000 individuals.
_B	1-?	Rank of the breeding population in the state. Used for migratory species only.
_N	1-?	Rank of the non-breeding population in the state. Used for migratory species only.

Federal Status Designations for Animals

Status Code	Status	Definition
FSC	Species of Concern	"The Service remains concerned about these species, but further biological research and field study are needed to resolve the conservation status of these taxa. Many species of concern will be found not to warrant listing, either because they do not qualify as species under the definition in the [Endangered Species] Act. Others may be found to be in greater danger of extinction than some present candidate taxa. The Service is working with the States and other private and public interests to assess their need for protection under the Act. Such species are the pool from which future candidates for listing will be drawn." (Federal Register, Feb 28, 1996). The Service suggests that such taxa be considered as "Species of Concern" which as no official status.

Global Rank Designations of Animals by NatureServe

Rank	Number of Extant Occurrences	Description
G3	21-100	Vulnerable - Vulnerable globally either because very rare throughout its range, found only in restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4	100-1000	Apparently secure - Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery) and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern. Typically with more than 100 occurrences and more than 10,000 individuals.
G5	1000+	Secure - Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

T_	-	The rank of a subspecies or variety. As an example, G4T1 would apply to a subspecies of a species with an overall rank of G4, but the subspecies warranting a rank of G1.
Q	-	Questionable taxonomy that may reduce conservation priority. Distinctiveness of this entity as a taxon at the current level is questionable. Resolution of this uncertainty may result in change from a species to a subspecies or inclusion of this taxon in another taxon, with the resulting Element having a lower-priority conservation status rank.

IV. Public Comment Questions and Public Comments

Game Land Management Plan

Public Input Meeting

Your input is important to us, so please participate. You can provide written comments on this form, comment online at @ www.ncwildlife.org then click on "Comment on Game Land Plans", or provide verbal comments during the breakout session.

Core Questions

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?

Game Land:

Date:

Affiliation:

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

HABITAT TYPE	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
Waterfowl Habitat	5	38%
Deer	3	23%
Rabbit	3	23%
Pine/Upland	3	23%
All/Mix of Habitats	2	15%
Turkey	2	15%
Quail	2	15%
Small Game	2	15%
Hardwoods and Hardwood Bottomlands	2	15%
Big Game	1	8%
Squirrel/Raccoon	1	8%
Swan and Snow Goose	1	8%
Open Stands	1	8%

Public Input Meeting/Online	COMMENT
Public Input Meeting	rabbit habitat, open stands
Public Input Meeting	waterfowl improvements, potential new acquisitions, uplands for gamebirds
Public Input Meeting	deer and duck
Public Input Meeting	all
Public Input Meeting	deer, rabbit, turkey, squirrel, raccoon
Public Input Meeting	quail and duck
Public Input Meeting	wetlands, big and small game habitats
Public Input Meeting	deer, duck, and turkey
Online	This applies to NE NC: The Commission needs fields in its game lands on which to hunt snow geese and swans. Otherwise, most people must go through an outfitter to pay about $100-$200 per day to hunt those birds. You need green fields (winter wheat) on your game lands. Perhaps in the Spring the wheat could be harvested, corn planted, and those fields be used in the early Fall for dove fields. However, whatever the management plan, fields are needed on NE NC game lands.
Online	There needs to be a good mix of successional habitat.
Online	Hardwood bottom areas to be protected. Thin and properly manage pine stands as needed

Online	I would like to see a more diverse habitat with hardwoods and a variety of long-leaf pine or something similar to replace the hybrid pine forest there now. Texas Plantation should be a model for all other game lands. Need more small game cover. Everything has been geared towards the deer and turkey hunting in NC.
Online	Upland Game

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?

SPECIES	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
Deer	9	56%
Quail	7	44%
Turkey	5	31%
Waterfowl	4	25%
Squirrel/Raccoon	3	19%
Small Game	2	13%
Rabbit	2	13%
Dove	2	13%
All Game/Species	2	13%
Bear	1	6%
Swans and Snow Geese	1	6%

PUBLIC INPUT MEETING/ONLINE	COMMENT
Public Input Meeting	rabbit, deer, turkey, bear, dove, quail, squirrel
Public Input Meeting	game species
Public Input Meeting	deer and duck
Public Input Meeting	deer, duck, quail, turkey
Public Input Meeting	quail, waterfowl
Public Input Meeting	quail
Public Input Meeting	quail
Public Input Meeting	deer
Public Input Meeting	deer, rabbit, turkey, squirrel, raccoon
Public Input Meeting	deer, dove, turkey
Public Input Meeting	deer, ducks
Online	Quail
Online	Small game quail, rabbit and squirrel should be included in the long term plan as well as deer and turkey.

Online	Improve the ability to attract swans and snow geese through fields. NC hunters usually must rely upon outfitters $$$ to hunt those birds.
Online	Whitetail deer should be managed more. Like a minimum 6 point rule or something.
Online	All species are important, protect and improve them all.

3. How do you use this game land?

NUMBER OF REPONSES	NUMBER OF RESPONSES	PERCENTAGE OF REPONSES
Hunting	9	69%
Deer Hunting	6	46%
Small Game Hunting (Dove, Rabbit, Squirrel, Quail, Raccoon	4	31%
Waterfowl Hunting	3	23%
Wildlife Viewing/ Photography/ Sightseeing	2	15%
Do Not Use/ Have Not Used	2	15%
Turkey Hunting	1	8%

PUBLIC INPUT MEETING/ONLINE	COMMENT
Public Input Meeting	wildlife viewing (ride and look), dove and waterfowl hunting
Public Input Meeting	never have
Public Input Meeting	hunt deer
Public Input Meeting	yes
Public Input Meeting	dog hunt, still hunt
Public Input Meeting	I do not use them
Public Input Meeting	run squirrel dogs - small game
Public Input Meeting	duck and dove hunting
Public Input Meeting	duck hunting
Public Input Meeting	to observe wildlife mainly
Online	Deer and Turkey hunting.
Online	I try to quail hunt and occasionally deer hunt but until deer season goes out the game land pretty much belongs to 2 groups of dog hunters. There have been several instances of confrontations between these groups and still hunters in the past. It's basically the last place I would go to deer hunt now.
Online	Hunting deer, etc.

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

CURRENT LEVEL OF ACCESS	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
More Restrictive	5	38%
Keep As Is	2	15%
Increase	6	46%
Open More Gates	3	23%
Allow ATV/UTV	1	8%

PUBLIC INPUT MEETING/ONLINE	COMMENT	PLAN RESPONSE
Public Input Meeting	acquisition to improve access where roads already exist (Blades-Piland tract)	NCWRC will consider any land acquisitions that help improve access to current tracts.
Public Input Meeting	Limit access on CC Road due to impacts to adjacent hunt club	The CC Road is a major access point to a large portion of the game land.
Public Input Meeting	satisfied with current access	
Public Input Meeting	open gates more during off season	Gates will continue to be closed during the off season. Besides protecting wildlife, the closed gates limit trash dumping and allows staff to repair roads.
Public Input Meeting	open some trails for disabled ATV use	
Public Input Meeting	gates are often locked but should be open	Addressed above. Internal gates will remain closed for vehicular access to protect habitats and provide areas for still hunters to hunt without having vehicles riding by.
Public Input Meeting	Access is satisfactory, easy and open access is how it should be.	
Public Input Meeting	State is allowing too much dog hunting for deer.	The NCWRC supports the use of dogs for hunting on game lands where it is conducive to do so.
Public Input Meeting	There should be complete road access to all game lands, not just boat access	Were we have public access to a tract the road is open.

Public Input Meeting	I think access is more than satisfactory. In fact the CC Road being open causes conflict with property that our organization leases.	Addressed above.
Public Input Meeting	There is a lot that is not accessible for my dad and his buddy who are in their 70's.	
Online	There is too much access by vehicles now. Where allowable, the roads need to be gated at least 1/2 before end to encourage foot travel and less disturbance to wildlife. Currently, there are too many roads in the tract.	The amount of access at BCGL is adequate to meet the needs of most users.
Online	I think access needs to be limited further to walk in areas only to reduce pressure and make the hunting better.	The amount of access at BCGL is adequate to meet the needs of most users.

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

SUGGESTIONS ON HOW THE GAME LAND IS MANAGED	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
Restrict/Limit the Use of Dogs for Deer Hunting	8	44%
Waterfowl Impoundment/Habitat	3	17%
More Access	2	11%
Maintain Current Management	1	6%
More Disabled Blinds	1	6%
Allow Baiting	1	6%
Institute All Users Fee	1	6%
More Food Plots	1	6%
Restrict Rifles/Keep as Shotgun Only	1	6%
Develop Camping Opportunities	1	6%
Continue to Allow Hunting With Dogs	1	6%
Early Successional Habitat as a Priority	1	6%
NC Citizens as a Priority	1	6%

PUBLIC INPUT MEETING/ONLINE	COMMENT	PLAN RESPONSE
Public Input Meeting	require game land use permit for all users	Comment noted.
Public Input Meeting	emphasis on traditional uses i.e. dog deer hunting	The NCWRC supports the use of dogs for hunting on game lands where it is conducive to do so.
Public Input Meeting	waterfowl impoundment	Land acquisition funding sources restrict the management that NCWRC can do on the land. Creating a waterfowl impoundment in Dedicated areas is prohibited. The NCWRC will consider for acquisition any open land that may be able to develop waterfowl impoundments. No area currently exists within the boundaries of BCGL.
Public Input Meeting	limited dog deer hunting access	The NCWRC supports the use of dogs for hunting on game lands where it is conducive to do so. To limit or restrict the use of dogs for deer hunting on BCGL will require a public hearing and the comments and management suggestions be brought before the NCWRC Commission for consideration.
Public Input Meeting	NC citizens first, limit deer dog hunting	See above about use of dogs. Sportsman from any state that possess a NC hunting license, in a way, support the management of the game lands and should not be restricted.
Public Input Meeting	stay shotgun only, more access	Ideally we would like to have vehicular access to all the BCGL tracts. As opportunities arise, NCWRC will evaluate properties for purchase.
Public Input Meeting	I think the game land management is fine as it is.	
Public Input Meeting	Move gates from the South Road on streaks 1, 2, 3 to the foot of the lightline.	NCWRC believe that these gates are in the correct places while still allowing for good access to that portion of the game land.
Public Input Meeting	Do away with dog deer hunting. A few are running the whole situation - this is wrong.	Addressed above.
Public Input Meeting	Regulate the use of dogs for deer hunting.	Addressed above.

Public Input Meeting	Deer hunting with dogs should be outlawed in game lands. More waterfowl hunting opportunities. More disabled blinds.	Addressed above.
Public Input Meeting	Develop more duck habitat	Addressed above.
Online	Limit Deer Dog Hunting or do away with it all together.	Addressed above.
Online	More food plots for small game and early successional areas for small game to feed, nest, and use for cover. I would like to see a 100' buffer on each side of powerline right-of-way. Food plots in right-of-way and early successional habitat on each border should greatly enhance small game nesting and cover.	As timber management progresses with thinning and prescribed burning, early successional habitats should be improved. New sites for adding food plots will be considered.
Online	Allow baiting for deer.	Regulations prohibit the use of bait on game land. It is not recommended to change that for any game land.
Online	The dog hunting for deer needs to be stopped. If you drive down Cooper Hill rd. you will see where all the dog hunters are tearing the roads up. Spinning out with their trucks chasing dogs in the middle of traffic. The heavy dog hunting is deterring people from out of down coming to Windsor for a relaxing hunt.	Addressed above.
Online	Allowing Cashie River access only camping. Camping within 100 feet of the Cashie River.	The NCWRC is considering this recommendation. The Roanoke River Partners operate a camping platform on the Williams Tract and many accessible off the Roanoke River.
Online	No hunting deer with dogs.	Addressed above.

6. What would encourage you to start using, or to continue using, Bertie County Game Land it more actively?

SUBJECT	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
Restrict/Limit Dog Hunting	5	29%
Better Mapping/ Information	2	12%
Limit Access	2	12%
Provide Camping Opportunities	1	6%
More Access	1	6%
Do Not Hunt/ Do Not Use	1	6%
Improve Deer Hunting	1	6%
Regulate Hunting More	1	6%
Increase Waterfowl Habitat	1	6%
I Will Continue to Use	1	6%
Upland Game Opportunities	1	6%
Still Hunting	1	6%

PUBLIC INPUT MEETING/ONLINE	COMMENT	PLAN RESPONSE
Public Input Meeting	limit access to dog deer hunting	The NCWRC supports the use of dogs for hunting on game lands where it is conducive to do so. To limit or restrict the use of dogs for deer hunting on BCGL will require a public hearing and the comments and management suggestions be brought before the NCWRC Commission for consideration.
Public Input Meeting	educate public that there is a game land and what it is for	Information on all game lands can be found on our website at www.ncwildlife.org. Kiosks are being installed at most major entrances to game lands with some information and maps.
Public Input Meeting	develop more duck habitat	Land acquisition funding sources restrict the management that NCWRC can do on the land. Creating a waterfowl impoundment in Dedicated areas is prohibited. The NCWRC will consider for acquisition any open land that may be able to develop waterfowl impoundments. No area currently exists within the boundaries of BCGL.

Public Input Meeting	regulate hunters more closely	Many of our game lands are hunted by permit only. The permit system allows us to limit the number of hunters on the game land. The hunter will have to plan ahead of time to hunt the game lands. Having game lands, like Bertie County Game Land, allows hunter to hunt without the need to plan ahead or drawing a permit. Enforcement of the game lands is done through the NCWRC Enforcement Division, with officers having county and area wide responsibilities.
Public Input Meeting	better chances of killing deer	
Public Input Meeting	limit time to access - the game lands need a "rest period"	Our gate closure policy during the "off seasons" limit vehicular access to the game lands, however, walking is allowed anytime.
Public Input Meeting	I don't hunt	
Public Input Meeting	will continue to use the game land as long as management allows it to be useable for our organization.	
Public Input Meeting	more access	NCWRC will consider properties for acquisition that provide access the tracts where vehicular access does not exist.
Public Input Meeting	more information	Addressed above.
Online	Upland Game	As timber management progresses with thinning and prescribed burning, early successional habitats should be improved.
Online	I personally think that all Game Lands should be off limits to taking wild game with Dogs. It creates tremendous hunting pressure and seriously decreases chances for still hunters, who don't ACTUALLY have anywhere to hunt but the Game Lands. Plus it makes it harder to get the kids involved as well. Its very discouraging. Please look into this.	Addressed above.
Online	Being able to camp on Game land within 100 feet of the Cashie River.	The NCWRC is considering this recommendation. The Roanoke River Partners operate a camping platform on the Williams Tract and many accessible off the Roanoke River.

Online	I would probably still hunt the game lands if their wasn't so much dog hunting. Everyday of the week there are people with hounds running. This ruins the still hunting.	There are game lands in the area that do not allow the use of dogs to hunt deer and on other game lands that do allow the use of dogs, hunting with dogs is not conducive. Although hunting is by permit only, the Roanoke River National Wildlife Refuge in Bertie County does not allow the use of dogs for deer hunting. On the State owned tracts of the Lower Roanoke River Wetlands Game Land, the use of dogs is allowed, just not conducive.
Online	Not allow dog hunting. It ruins the hunt sometimes for those still hunting.	Addressed above.
Online	No dogging for deer and less vehicular travel. Way too much vehicular activity on the property.	Addressed above.
Online	Less Deer dog hunting allowed.	Addressed above.

7. What additional comments do you have about Bertie County Game Land?

SUBJECT	NUMBER OF REPONSES	PERCENTAGE OF REPONSES
Restrict/Limit the Use of Dogs	2	22%
Satisfied	2	22%
Continue to Allow Easy Access	1	11%
Continue to Allow Use of Hounds	1	11%
More Early Successional Habitat	1	11%
Good Hunting Location	1	11%
Allow ATV	1	11%

PUBLIC INPUT MEETING/ONLINE	COMMENT	PLAN RESPONSE
Public Input Meeting	UTV use would be helpful	Bertie County Game Land is included in the Disabled Access Program allowing ATV use on roads that are open for vehicular travel. The permit does not allow ATV use on openings or in the woods or behind closed gates. The benefits of the program on Bertie County Game Land is limited since so many of the roads are open to anyone.

Public Input Meeting	Please continue to allow easy access as well as continue to allow all kinds of hunting including dog hunting for deer.	The NCWRC recognizes the tradition of hunting with hounds and supports their use where appropriate.
Public Input Meeting	great place to deer hunt	
Public Input Meeting	Why is this tract allowing deer dog hunting? A few mess it up for a lot of folks. It has turned into a private hunting club by a few. Totally wrong. "The State is not a good neighbor" allowing this to happen.	The NCWRC supports the use of dogs for hunting on game lands where it is conducive to do so. To limit or restrict the use of dogs for deer hunting on BCGL will require a public hearing and the comments and management suggestions be brought before the NCWRC Commission for consideration.
Public Input Meeting	Currently satisfied with most policies	
Public Input Meeting	none	
Public Input Meeting	I'm happy it exists	
Online	The Bertie game land is overrun with dog hunters from the start of rifle deer season to the end. This prevents others from enjoying this public resource. Please limit the amount of dog hunting or do away with it all together so everyone can enjoy the game land.	See above.
Online	About 7-8 years ago there were 3 coves of quail on the powerline from the highway to the river. Now you may see one covey if you are lucky. The game land needs to be a model for other landowners to duplicate to enhance wildlife not just another pine plantation like the rest of eastern NC. WRC needs to purchase more farm areas to manage for small game rather than eastern NC swamps which are not usable by public.	As timber management progresses with thinning and prescribed burning, early successional habitats should be improved. Our pine stand goals typically call for a reduction in basal area far below what would be considered normal for an industrial pine plantation. On BCGL, as of this plan, 1,363 acres of 1,678 pine stand acres have been thinned. Once thinned, we have instituted a prescribed burning regime, providing forage, nesting, and bedding habitats for many species. Many times, our funding sources dictate what type of land we can purchase. Most of the upland portion of the BCGL, as well as, many upland acres were recently purchased as a part of the International Paper deal in the mid-2000's.

V. Game Land Management Plan letter from the North Carolina Natural Heritage Program

Natural and Cultural Resources

PAT McCRORY
Governor

SUSAN KLUTTZ
Secretary

MISTY BUCHANAN
Director, Natural Heritage Program

January 12, 2016

David Turner, Northern Coastal Management Biologist
North Carolina Wildlife Resources Commission
david.turner@ncwildlife.org

Dear Mr. Turner:

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 Bertie County Game Land. 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 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.

Bertie County Game Land includes land along the Cashie River, as well as upland pine plantation lands. All of the dedicated area lies in the river bottom, most of it effectively at sea level and affected by wind tides. Mature Tidal Swamp (Cypress—Gum Subtype) communities cover most it. Some inland portions are slightly above wind tide levels and are occupied by Nonriverine Swamp Forest communities. No special management is needed in any of these areas, beyond protection from cutting. Sea level can be expected to continue rising. The Tidal Swamp will eventually begin the transition to a marsh community, with canopy trees showing stress and dying, and a diverse herbaceous layer arising beneath them. When this occurs, there is a need to allow natural marsh vegetation to develop, and to avoid invasion by common reed (*Phragmites communis*). If common reed is present on the game land, likely in ditches or along forest roads, we could encourage removal of it before substantial new habitat for it develops.

The Bertie County Game Land 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

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diversity to remain viable. Thank you for your contribution to the conservation of our natural resources in North Carolina. Please contact us or other NHP staff if you would like additional information.

Sincerely,

Mike Schafale, Community Ecologist

Laura Robinson, Botanist