

**Neuse River
Game Land Management Plan
2018-2027**



EXECUTIVE SUMMARY

Neuse River Game Land is 4,860 acres in size. The game land is owned by the State of North Carolina, with the North Carolina Wildlife Resources Commission as the primary custodian. Neuse River Game Land occurs exclusively in Craven County, NC. and lies within the Neuse River basin. Initial land acquisition began in December 1987 when six islands totaling approximately 100 acres were donated to the North Carolina Wildlife Resources Commission by Ducks Unlimited. Land acquisitions have continued through 2008 when the 400 acre Whitehurst Tract was acquired. Neuse River Game Land is managed for its primary users which include hunters, trappers, anglers, and wildlife viewers. Priority species include white-tailed deer, black bear, wild turkey, the eastern fox squirrel, and the red-cockaded woodpecker, *Picoides borealis*. In addition to the primary users, there are an increasing number of non-traditional users on Neuse River Game Land which include hikers/walkers, bikers, paddlers, horseback riders, researchers, and target shooters. Four major habitat types occur on Neuse River Game Land, the largest of which is the pocosin habitat which covers greater than 52% of the Game Land. Management goals include providing a diversity of habitat types and forest age classes that are properly interspersed and juxtaposed across the landscape, ensure that a wide variety of terrestrial and aquatic wildlife species are maintained on the game land, support game species at huntable levels through science based land management and sound regulations, provide quality habitat for endangered, threatened, and rare species, to ensure their populations are maintained or increased, and provide sufficient infrastructure and opportunity to allow all game lands users a quality experience with minimal habitat degradation and conflict among user groups . To assure these goals are met, the North Carolina Wildlife Resources Commission will need to collect various types of information regarding species and users of the game land, secure funding to accomplish management goals, acquire additional properties as they become available, maintain and develop regulations that promote the sustainable use of natural resources, and develop relationships with conservation partners that help meet management goals.

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

Neuse River Game Land

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INTRODUCTION

North Carolina Wildlife Resources Commission Mission Statement

“To conserve North Carolina’s wildlife resources and their habitats and provide programs and opportunities that allow hunters, anglers, boaters; other outdoor enthusiasts to enjoy wildlife-associated recreation.”

Creation of North Carolina Wildlife Resources Commission

The North Carolina Wildlife Resources Commission (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 NCWRC (NCWRC Employee Handbook). 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 History

Prior to 1971 game land use was tightly controlled for a limited number of species on Wildlife Management Areas. For example, hunting on Holly Shelter Game Land was limited to only white-tailed deer and bear. The current Game Lands Program began in 1971 with the addition of approximately 800,000 acres of land to be used for the purpose of hunting and fishing. The most significant inclusions were the four United States Department of Agriculture Forest Service (USDAFS) National Forests, The Croatan, Uwharrie, Pisgah, and the Nantahala.

The primary goals and objectives for the game lands were to provide public lands for hunting, fishing, and trapping opportunities. The NCWRC currently manages over 2 million acres of State, Federal, and private lands in the game lands program. Land acquisition and management are funded, in part, by the Federal Aid in Wildlife Restoration act of 1937, also known as the Pittman Robertson Act; which is administered by the U.S. Fish and Wildlife Service (USFWS). What is now called the Wildlife and Sport Fish Restoration Act provides a 75/25 match to states for the selection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management research, and the distribution of information produced by those projects. The dollars are derived from an 11 percent excise tax on sporting arms, ammunition, and archery equipment, and a 10 percent tax on handguns. Monies are appropriated to each state using a

formula considering the total area of the state and the number of licensed hunters in the state. To date the NCWRC has received approximately 258 million dollars.

Historically, primary game land users were hunters, trappers, and fishers. We must keep in mind that there is currently a national surge in “non-consumptive” users. 2011 Surveys conducted by the USFWS showed that there were more wildlife watchers than hunters and fishers combined. The 2011 National Survey of Hunting, Fishing, and Wildlife Associated Recreation showed that 71.8 million people fed, photographed, or observed wildlife in 2011, as opposed to 33.1 million fishers and 13.7 million hunters (2011 USFWS). North Carolina is no exception. Currently, the NCWRC is receiving increasing numbers of requests for more “non-traditional” game land use.

Given these facts, the NCWRC must be mindful that the user base is expanding and allowances must be made to provide equal opportunities. The NCWRC’s game land program mission statement recognizes these needs. Lands administered by the Wildlife Resources Commission through the Game Lands Program, follow the Program’s 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 lands 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.”

Land acquisition is the primary tool for land conservation and management. Recent reductions in license sales have forced the NCWRC to look to other funding sources for land acquisition. Sources as the Clean Water Management Trust Fund, Natural Heritage Trust Fund, The Forest Legacy Program, the Department Of Defense’s Recovery and Sustainment Program (RASP), and the North American Wetland Conservation Act have become primary funding sources. These funds are tax based and have contributed to the purchase of 162 million acres since their creation (2005, NCWAP p.61).

Game Lands Program Objectives:

1. To provide, protect, and actively manage habitat conditions to benefit aquatic and terrestrial wildlife resources.
2. To provide public opportunities for hunting, fishing, trapping, and wildlife viewing.
3. To provide 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.
4. To provide an optimally sustainable yield of forest products where feasible and appropriate and as directed by wildlife management objectives.

Purpose and Need for the Plan

The purpose of this Game Land Management Plan is to provide a guide for managers to follow in the creation of future wildlife and land management prescriptions. Fisheries and wildlife habitat enhancements will be given priority; outdoor and wildlife related requests/activities will be 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 collaboration.

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 operations.
- Provide clear management objectives to ensure that these actions are consistent with the game lands program goals.
- Lastly, this plan will provide a basis for future budgetary operational expenses.

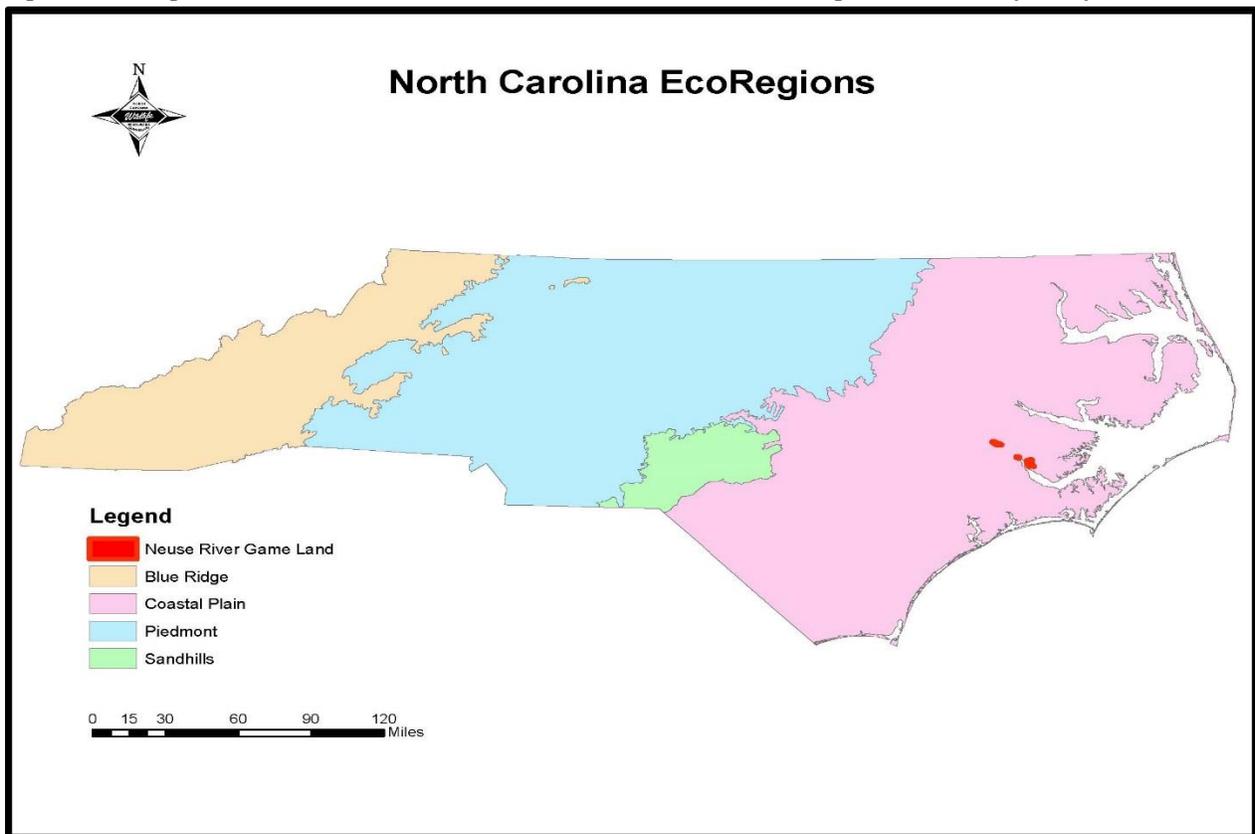
A development team, natural resource stakeholders, and the public have provided input to achieve a “Desired Future Condition” within the 10-year planning horizon. This will be a living document which may be amended as needed.

REGIONAL CONTEXT

Information on Eco-Region

Neuse River Game Land (NRGL) is located in the Mid-Atlantic Coastal Plain which occupies 26 million acres east of the fall line between the Piedmont and Atlantic Coastal Plain, south of the James River in Virginia and north of Charleston Harbor in South Carolina (*Figure 1*). About two thirds of this very rich ecoregion is in North Carolina. “This is the land of longleaf pines and bald cypress trees; of bottomland hardwood forests and swamps; of pocosins and palmettos; of Carolina Bays and Carolina Sandhills; of the Outer Banks and some of the world’s best and most active coastal dunes, sounds, and estuaries; of natural fires, floods, and storms are so dominant in this region that the landscape changes very quickly.” (Landscape, 2013)

Figure 1: Ecoregion delineations in North Carolina (data source: NC GAP; ecoregions as defined by Bailey (1995))



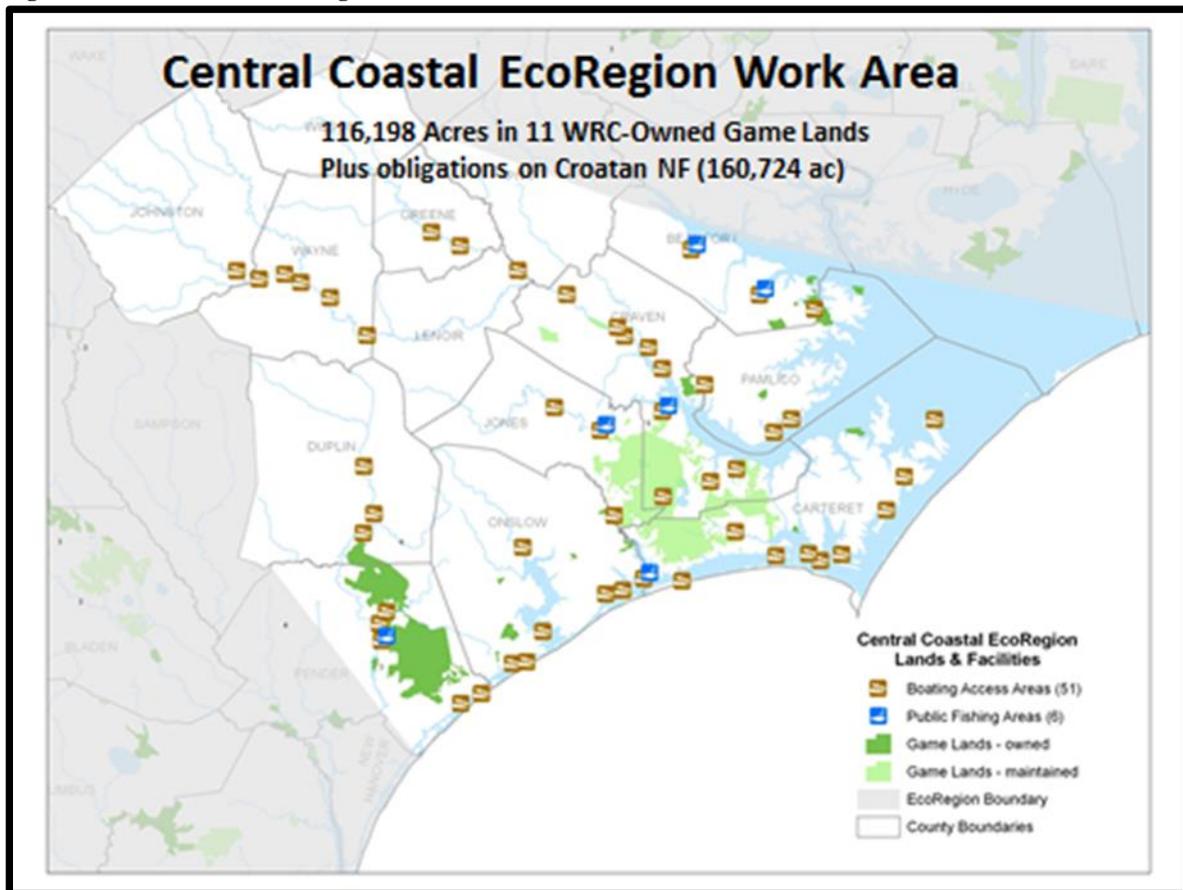
In North Carolina, a huge diversity of fish and wildlife habitats exist across the three distinctive regions of the state: the Coastal Plain, the Piedmont, and the Mountains. These regions fall within larger Eco-Regions that span state borders and link North Carolina to neighboring states. Elevations 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 (NCWAP, 2005).

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 (NCWAP, 2005).

Within North Carolina's borders, NRGL is located in the Central Coastal Eco-Region. This area consists of 8,416 mi² in 14 Counties. This particular Eco-Region contains 4 major River Basins, the Pamlico, Neuse, New, and the Northeast Cape Fear. NCWRC field staff are responsible for management obligations on 116,198 acres on 11 NCWRC owned Game Lands plus land management practices on the 160,724 ac. Croatan National Forest. Work responsibilities also include the maintenance of 51 Boating Access Areas, 6 Public Fishing Areas and 452 navigational aids bi-annually. Four depots are located within the Eco-Region; Holly Shelter, Chinquapin, Rhems, and New Bern (*Figure 2*).

Figure 2: Central Coastal EcoRegion Work Area.



Role and Importance

The purpose of Neuse River Game Land is to manage habitats to benefit aquatic and terrestrial wildlife resources and flora on the property. The Game Land provides opportunities for public hunting, fishing, trapping, wildlife viewing, and other outdoor based recreational activities. These are the primary public uses of the Game Land. The Game Land also provides other public outdoor recreational opportunities to the extent that these uses are compatible with the conservation and management of the resources located there and do not displace primary users. The Game Land also provides forest products as allowed by topography, hydrology, and other factors. Silvicultural practices conducted on the NRGL are directed by wildlife management objectives. Lastly, the marshes of NRGL act as a primary nursery area for many species of fish and crustaceans dependent on the conserved estuarine habitats found there.

Partnerships and Collaborations

The Game Lands Program is vital to many conservation efforts and partnerships within the Central Coastal Eco-region. NCWRC enjoys a long standing alliance with the USDAFS with wildlife resources on forest service lands cooperatively managed by both agencies. The Natural Heritage and Clean Water Management Trust Funds have provided significant and critical funding for the acquisition of key properties that have been added to the Game Lands Program. Many of the properties acquired with these funding sources have been established as or have enhanced existing State Natural Heritage Areas and/or have been dedicated as Nature Preserves by the N.C. Natural Heritage Program.

As a result of funding from The Natural Heritage Trust Fund and The Clean Water Management Trust funds, certain areas of NRGL are designated as “Dedicated Nature Preserves.” Figure 3 shows the locations of these areas on NRGL and their designations as being primary, buffer, or restoration areas. Descriptions of dedications can be found in Appendix III.

NRGL lies within the Onslow Bight Conservation Forum Landscape. This Conservation collaborative, administered by the Nature Conservancy, connects Natural Resource professionals to aid each other in land acquisition and funding projects (*Figure 4*).

Figure 4: Location and type of dedicated lands on Neuse River Game Land.

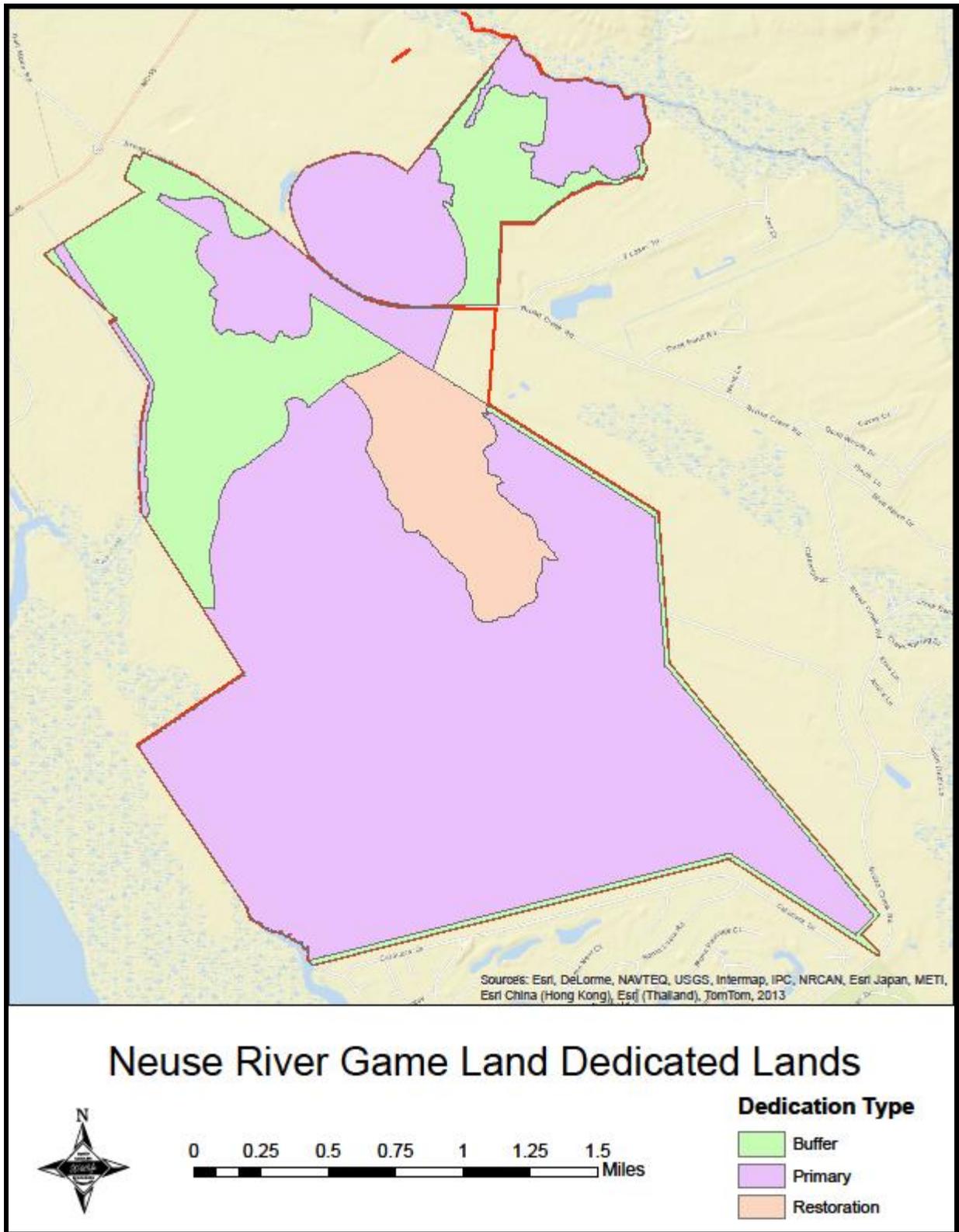
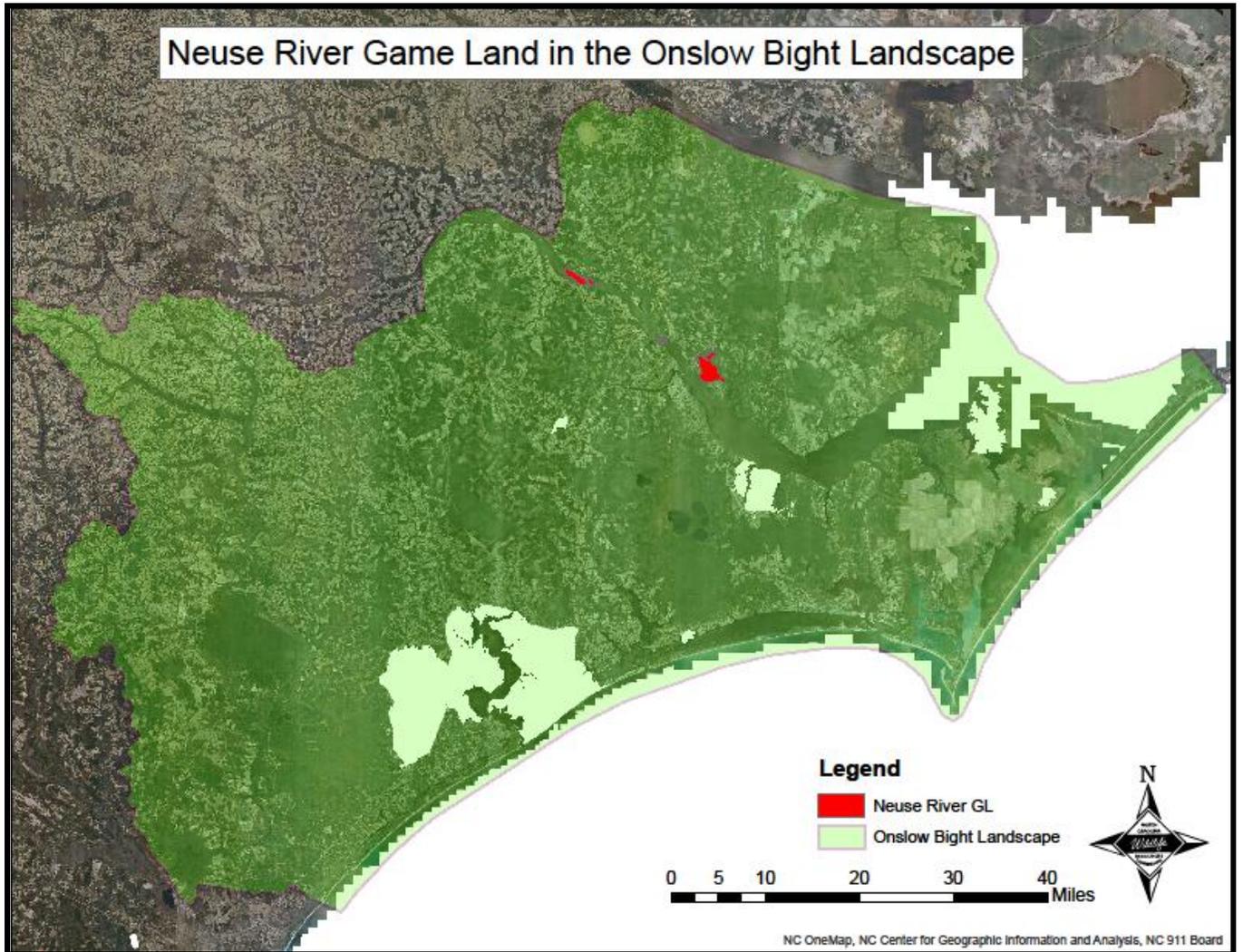


Figure 4: Neuse River Game Land situated within the Onslow Bight Conservation area.



Adjacent and Use

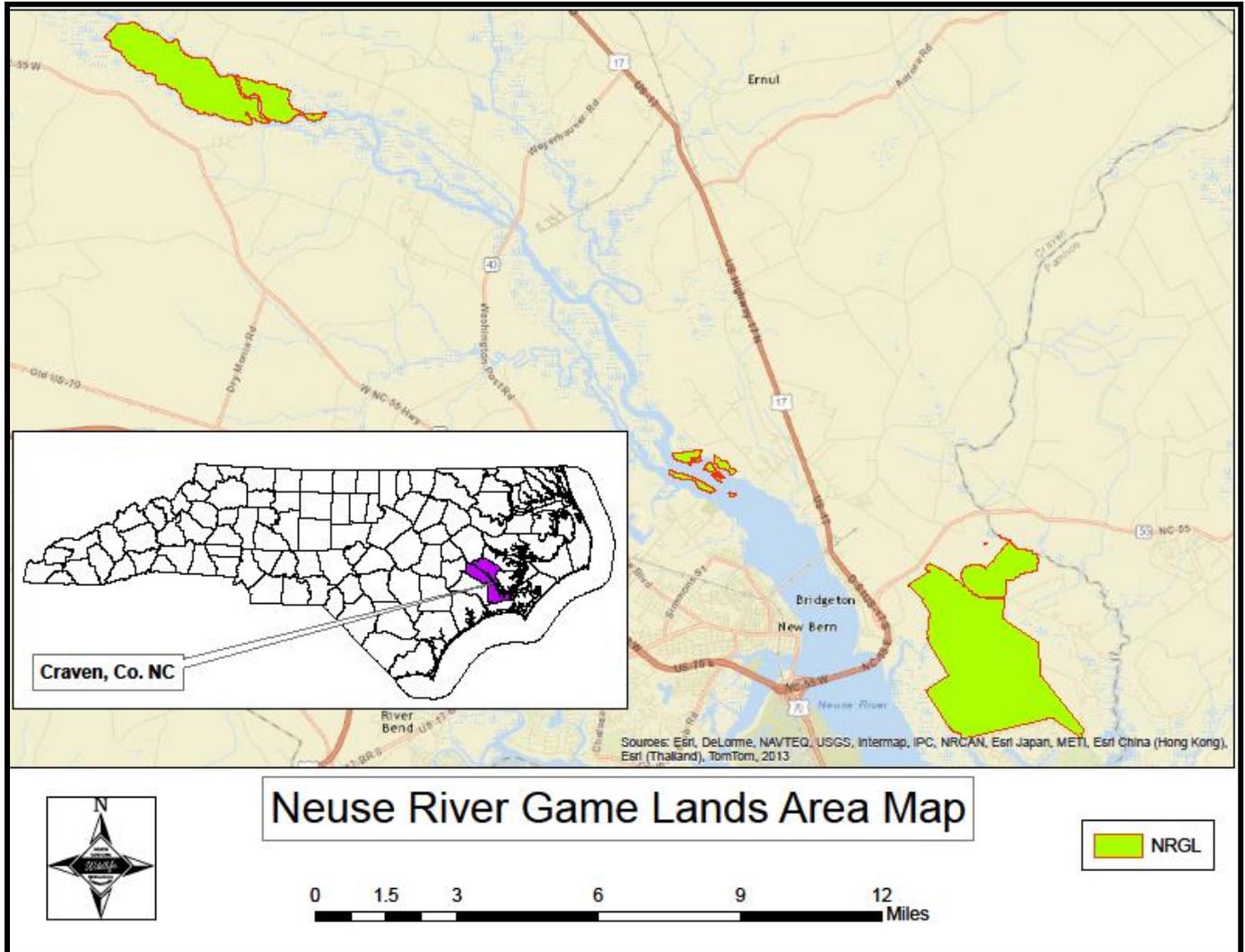
Lands in Craven County are primarily, agricultural or protected lands which comprise approximately 87% the total County acreage. Population change in Craven County is “low/modest with a net out-migration.” Census data, however, shows a 13.20% population increase from 91,436 individuals in year 2000 to 103,505 in 2010 (<http://censusviewer.com/county/NC/Craven>). Fluctuations in local population are greatly attributed to deployments and reassignments of personnel at MCAS Cherry Point. Modest growth is expected adjacent to NRGL within the 10-year planning horizon of the plan (Data compiled from: Craven County, Joint CAMA Land Use Plan).

GAME LAND SPECIFIC INFORMATION

Location

Neuse River's Game Land's four tracts; Duck Creek, the Whitehurst Tract, Glen Burnie Islands, and the Turkey Quarter Islands are located entirely in Craven County in Eastern North Carolina (Figure 5). The Game Land was named after the Neuse River which runs adjacent to much of the Game Land. All tracts combined total approximately 4,800 acres.

Figure 5: Neuse River Game Land area map.



Cultural Resources

North Carolina is not only known for its Natural history, but also its rich historical/cultural resources. Archaeological sites may exist on NRGL that may well provide tangible evidence of the varied use of the property by the past residents of the area. Because these sites can be easily damaged, unauthorized artifact collecting activities on all state owned property including Commission owned lands are prohibited by the Archaeological Resources Protection Act (G.S 70 Article 2) (*Appendix IV*).

Physical Attributes

Climate

The climate around in the vicinity of NRGL is characterized by hot humid summers with temperatures frequently exceeding 95 degrees with a record high of 106 degrees on 27 June, 1954 at New Bern. Winters are moderate, with temperatures rarely going below 20 degrees with a record low of -4 degrees on 25 December, 1989 (<http://climate.ncsu.edu/climate>, 11/5/15). Average first frost is 9 November. Average last frost is 22 March, giving approximately 232 growing days (<http://content.ces.ncsu.edu/>, 11/5/15). Average annual precipitation is 54.5 inches with a record daily rainfall of 12.23” occurring on 24 Sept 19, 1955. Snowfall is rare, on the average, less than 3 inches per year with a record snowfall of 12.5 inches on 30 January, 1965 (USDA, 1984).

In most summers North Carolina's weather is dominated by the "Bermuda High" pressure system. This gives calm, virtually cloudless conditions. Weather is generally hot and humid in the summer, with sea breezes cooling Coastal areas. This phenomenon is the primary cause for the numerous thunderstorms that occur from April through September. Winds in the vicinity of NRGL are predominantly southwesterly year-round. Average wind speed is 12 miles per hour (USDA, 1984).

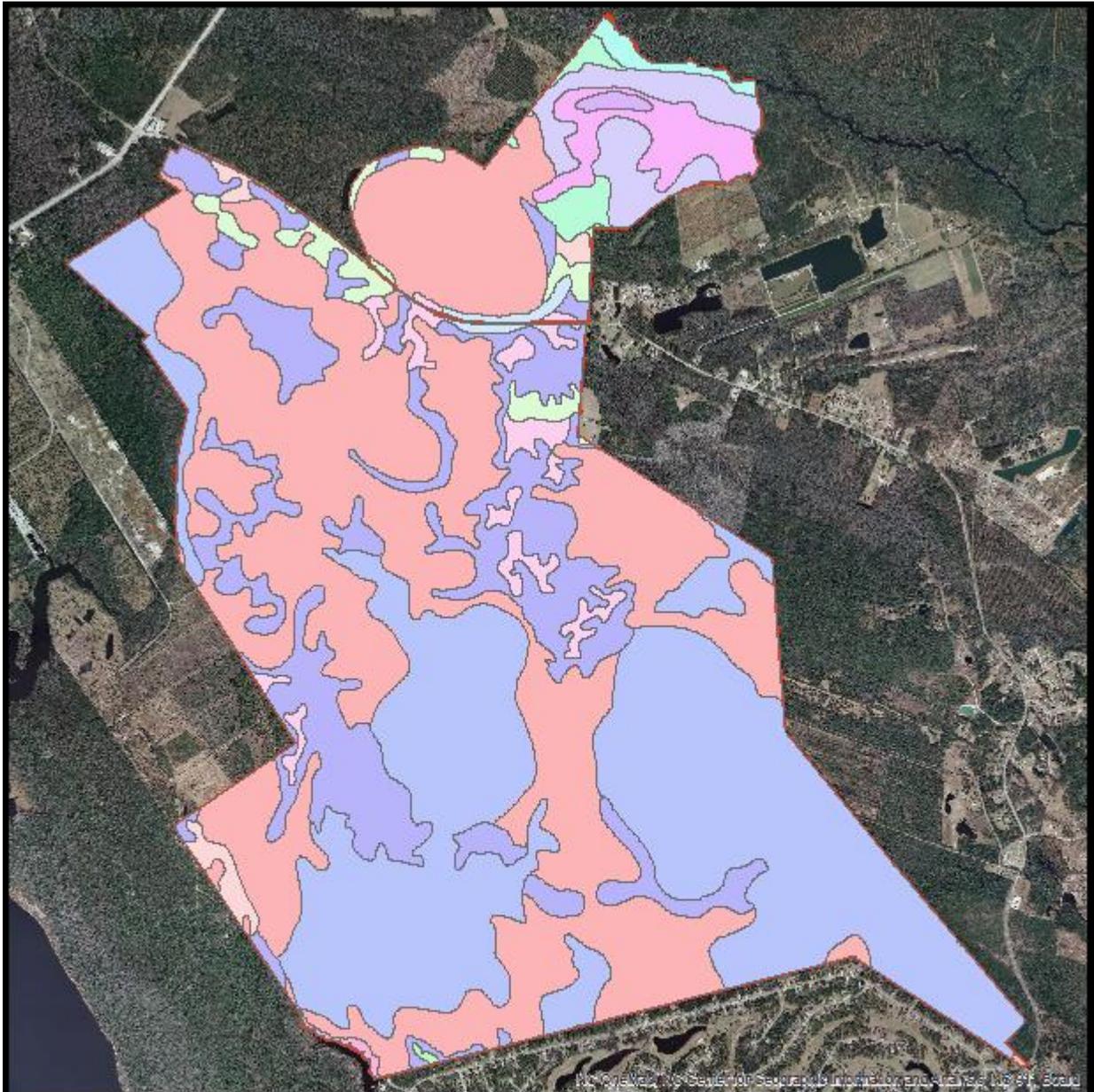
North Carolina is outside the principal tornado area of the United States, but still averages two to three per year. They occur mostly east of the Mountains during early spring (SCONC).

Soils

Elevations of Craven Co., NC range from sea level to approximately 63 feet above sea level at Dover. According to Craven Co. soil surveys, lands in Craven County are nearly 88% level, 11% gently sloping, and roughly 1% is explained as moderately steep. Soils are generally very poorly to poorly drained. Less than 10% of Craven Counties soils are described as well drained.

Sixteen soil types occur on NRGL (*Figures 6, 7, and 8*). Most soils, approximately 75%, found on NRGL are poorly to somewhat poorly drained soils consisting of high organic content. The remaining soils are moderately well drained.

Figure 6: Neuse River Game Land Soils Map.



Neuse River Game Land Soils Map

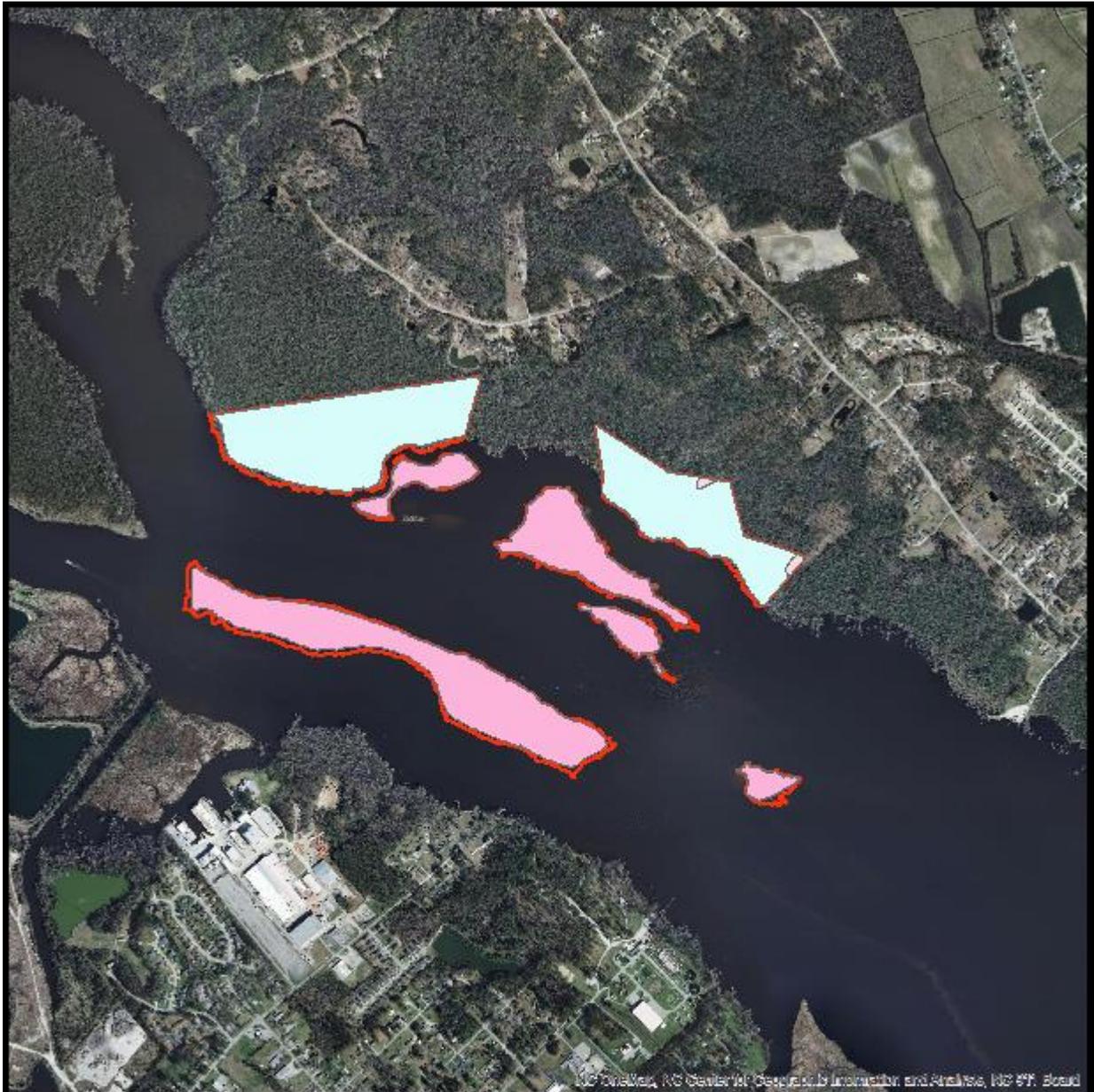
Soil Type

| | | | |
|---|---|---|--|
|  Altavista |  Dare |  Lafitte |  Seabrook |
|  Augusta |  Dorovan |  Leon |  Suffolk |
|  Bragg |  Deloss |  Masontown |  Tarboro |
|  Conetoe |  Kureb |  Murville |  Tomotley |



0 0.25 0.5 0.75 1 Miles

Figure 7: Neuse River Game Land Soils Map.



Neuse River Game Land Soils Map

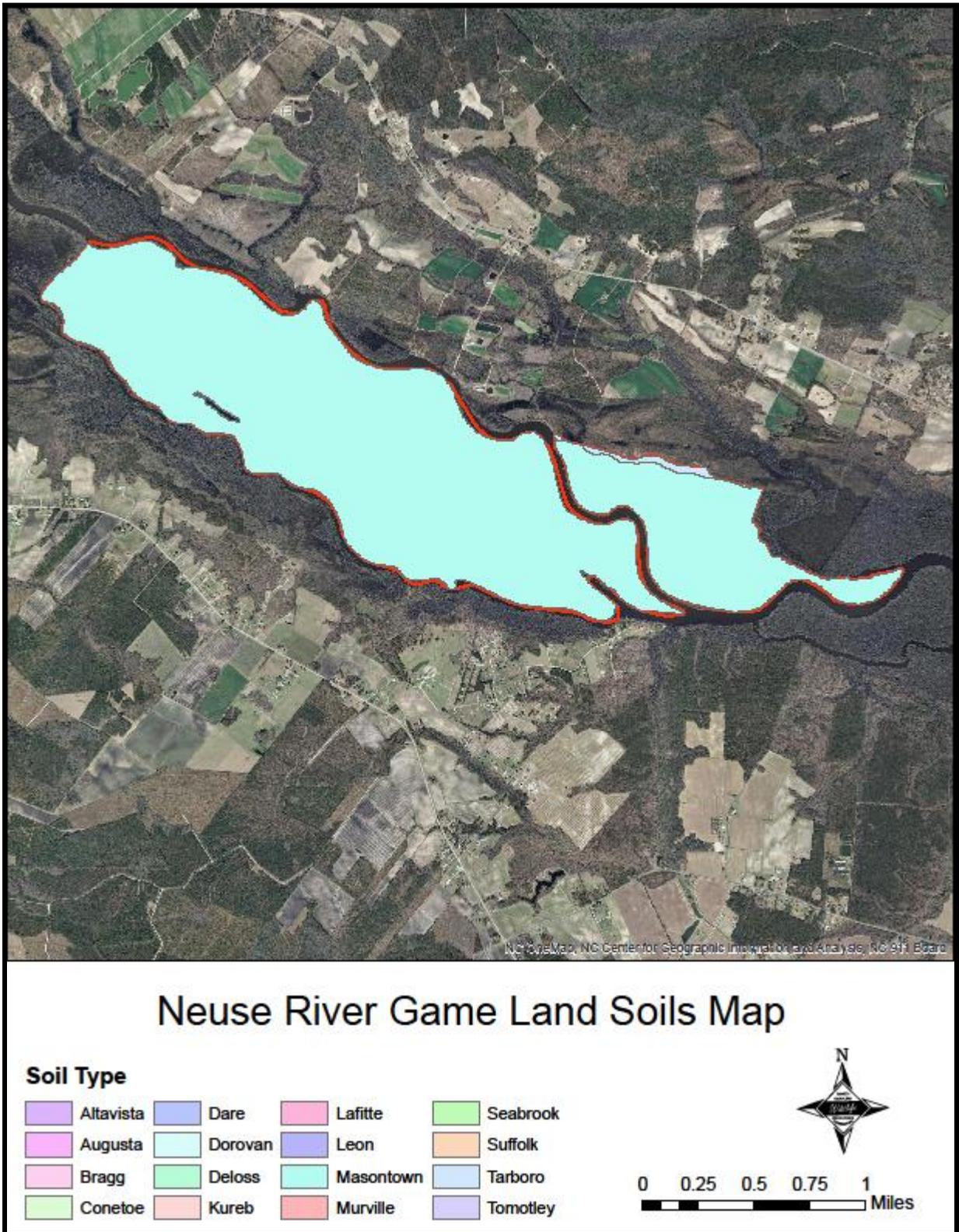
Soil Type

| | | | |
|-----------|---------|-----------|----------|
| Altavista | Dare | Lafitte | Seabrook |
| Augusta | Dorovan | Leon | Suffolk |
| Bragg | Deloss | Masontown | Tarboro |
| Conetoe | Kureb | Murville | Tomotley |



0 0.25 0.5 Miles

Figure 8: Neuse River Game Land Soils Map.



Hydrology

Neuse River Game Land occurs in the Neuse River Basin; which originates in Orange and Person Counties. The Neuse River Basin encompasses 6,234 square miles, with approximately 3,000 stream miles in 23 Counties and supports 14.9% of the State's population. Approximately one-third of freshwater streams within this Basin are impaired.

(<http://www.water.ncsu.edu/neuse.html>, 11/16/15)

Groundwater is generally collected from three sources; the superficial sand, the Black Creek, and the Castle Hayne aquifers (<http://ncwater.org>, 11/16/15). The superficial sand is the shallowest, and the most susceptible to contamination. The surficial aquifer is also very sensitive to variations in rainfall amounts. Therefore, it is first to dry-up during drought conditions. The aquifer is composed of very fine to fine "salt and pepper" sands. Wells typically yield 200-400 gallons per minute. The Castle Hayne aquifer is composed of limestone, sandy limestone, and sand. This aquifer is the most productive aquifer in North Carolina. Wells typically yield 200-500 gallons per minute, but can exceed 2000 gallons per minute. (ncwater.org, 2/9/2015)

Habitats

Three major habitat classes make-up NRGL (*figures 9, 10, and 11*); mesic mixed hardwood/pine forest, 46%, floodplain forest, 34%, and mixed pine savanna, 12%. Other noteworthy habitat types include, Coastal salt marsh, 1.6%, and Carolina bay, 7%. Ponds, and openings comprise less than 1% of NRGL collectively.

Figure 9. Neuse River Game Land Habitat Map.

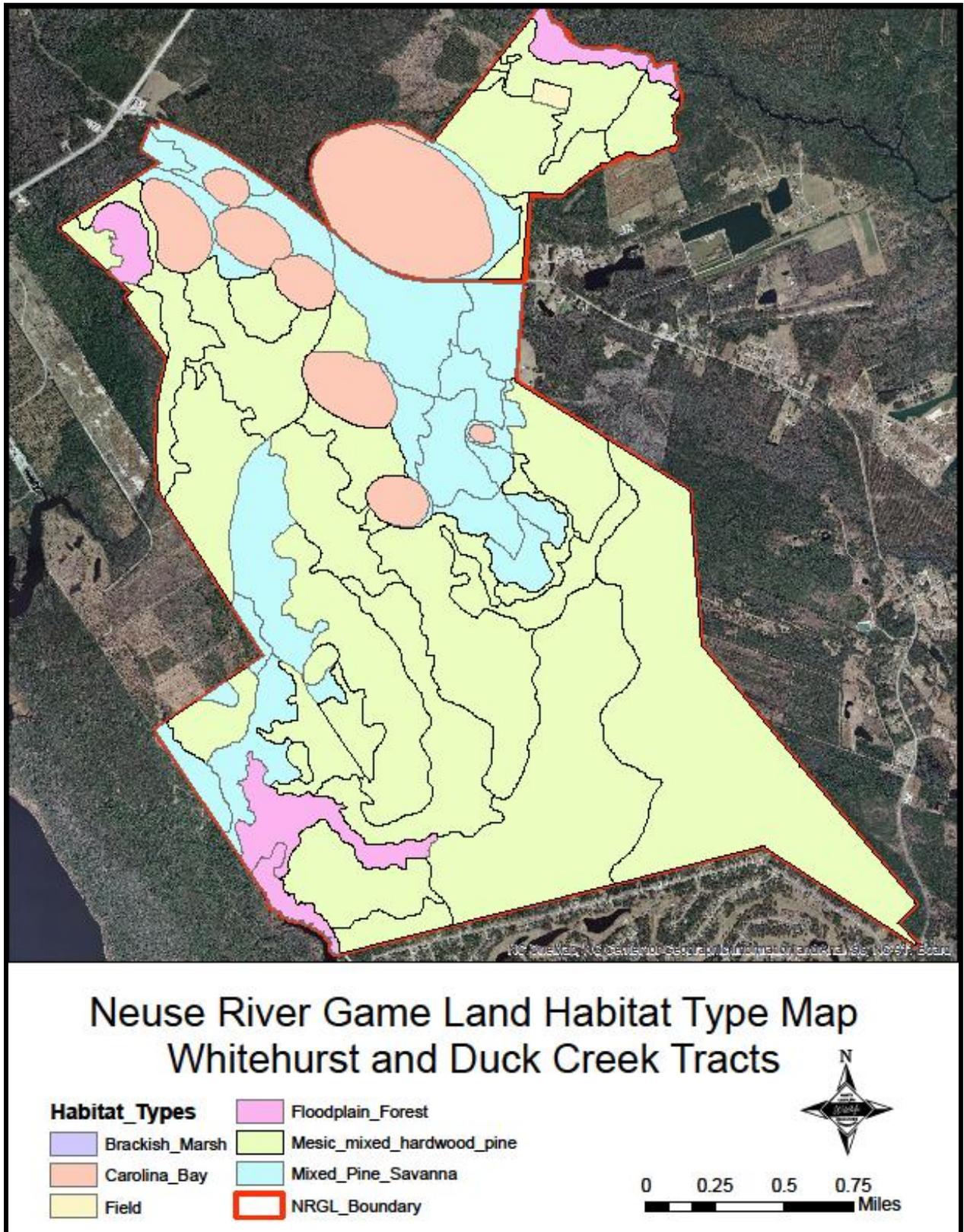


Figure 10: Neuse River Game Land Glenburnie Islands Habitat Map.

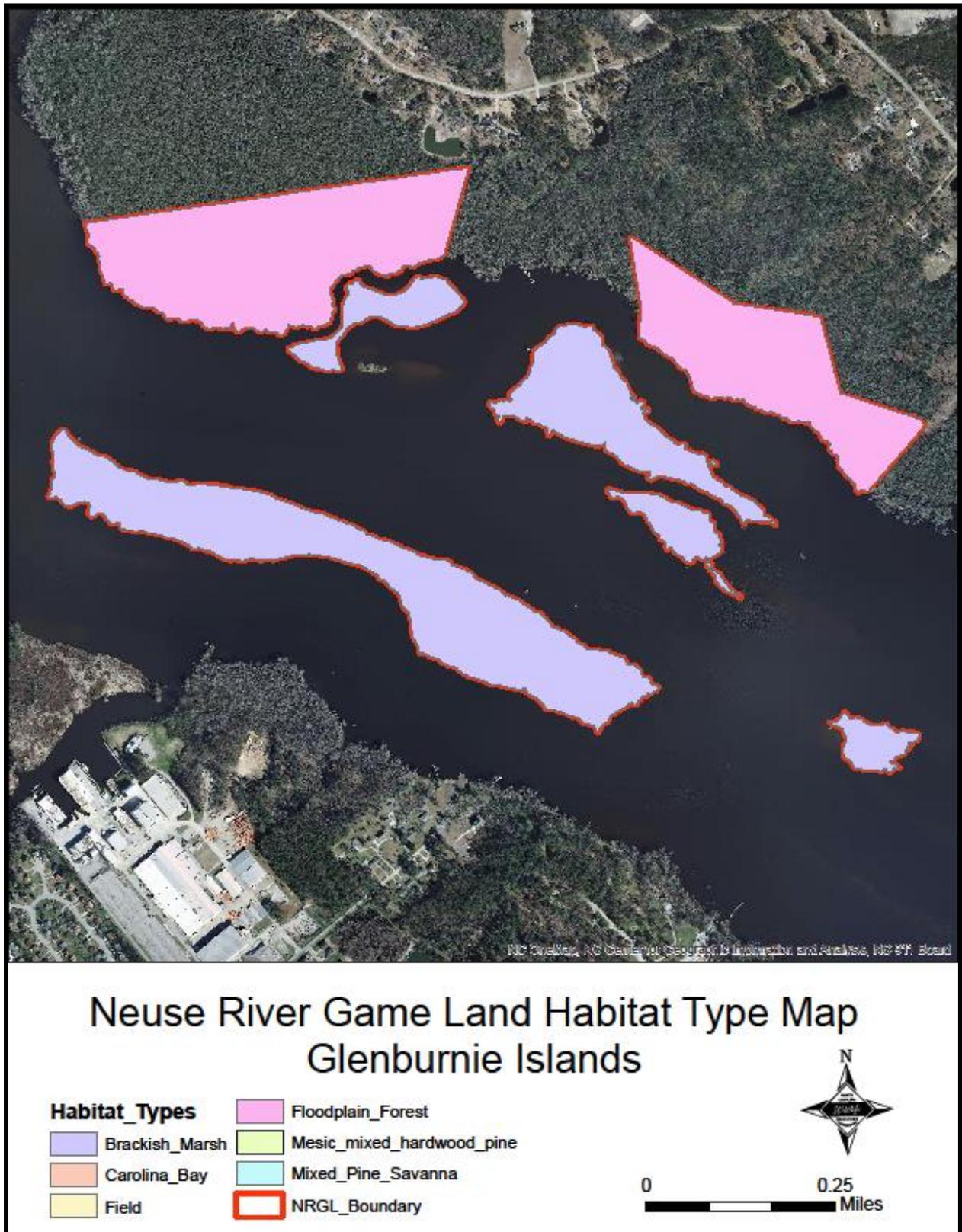
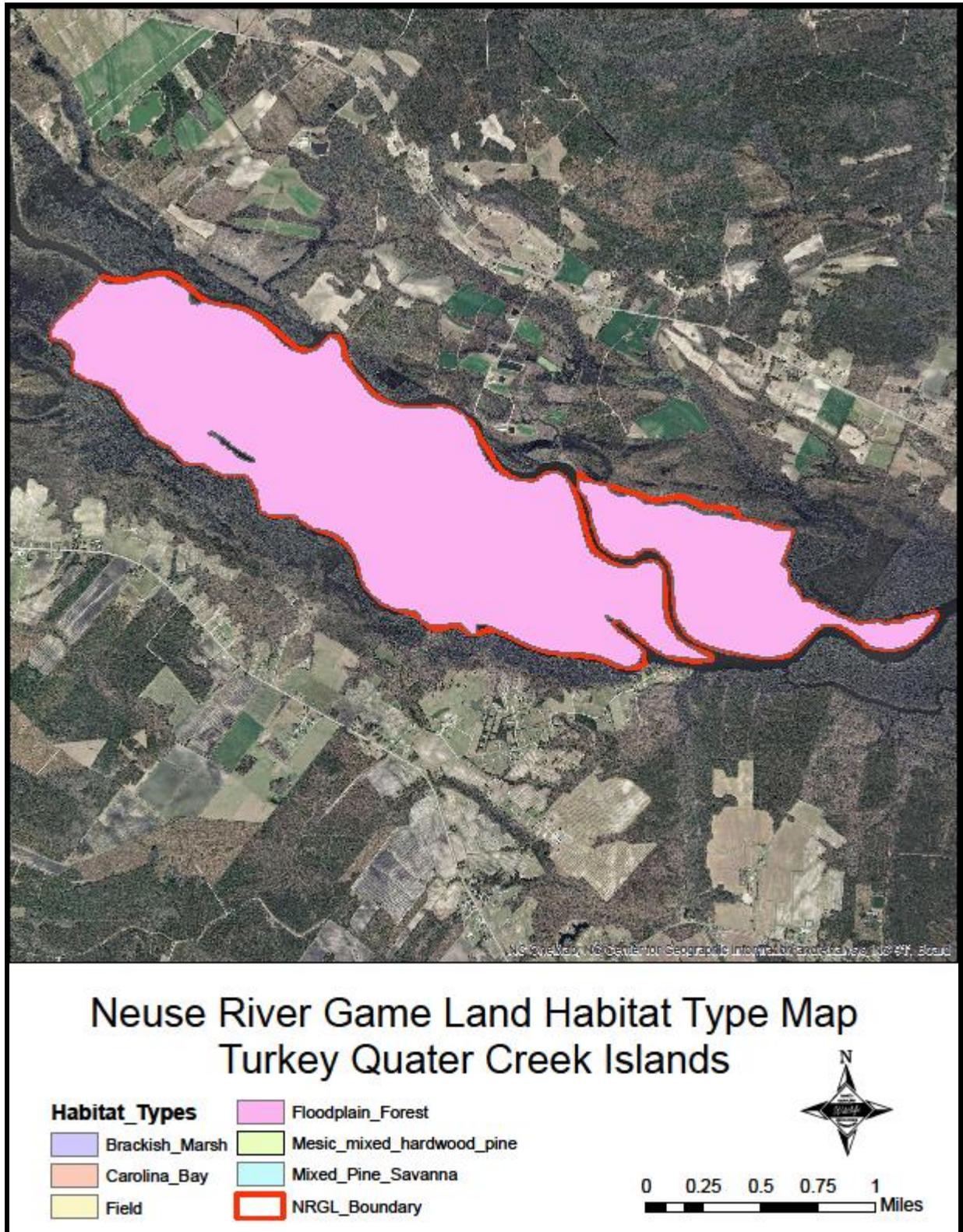


Figure 11: Neuse River Game Land Turkey Quarter Creek Islands Habitat Map.



Acquisition History

Acquisition of NRGL began in 1988, with the acquisitions of the Glen Burnie islands from Ducks Unlimited. Subsequent tracts have been acquired via The Nature Conservancy, Coastal Land Trust, and Whitehurst Family LLC (Table 1). Numerous easements and Right-of-ways exist on NRGL. These documents may be found via the North Carolina State Property Office.

Table 1. Neuse River Game Land acquisition history.

| Grantor/Tract Name | Acq. Date | Acreage (+/-) | Purchase Price | (source of funds) |
|--|---------------------------|----------------------|-----------------------|--------------------------|
| Ducks Unlimited | Aug-1988 | 100.5 | Land Donation | N/A |
| Coastal Land Trust/Turkey Quarter Islands | Jan-1998 | 1149.2 | Land Donation | CLT, CWMTF |
| TNC/Duck Creek | Jun-00 | 2711.28 | 1,231,000.00 | TNC |
| Whitehurst Family LLC/Duck Creek Tracts 1-4 | May-03- May-06 | 149.79.00 | 1,000,000.00 | CWMTF |
| Whitehurst Family LLC (Whitehurst Tract) | Dec.-08 | 402.65 | 3,300,000 | CWMTF |

Purpose of Game Land

The purpose of Neuse River Game Land is to manage habitats to benefit aquatic and terrestrial wildlife resources and flora on the property. The game land provides opportunities for public hunting, trapping, wildlife viewing, and other wildlife based recreational activities. These are the primary public uses of the game land. The game land also provides other public outdoor recreational opportunities to the extent that these uses are compatible with the conservation and management of the resources located there and do not displace primary users. The game land will eventually also provide a sustainable yield of forest products as allowed by topography and other factors. All forestry conducted on the game land is directed by wildlife management objectives.

Historical Management and Use

Lands of the Duck Creek and Whitehurst Tracts of NRGL have been family owned since a land grant from the King of England. These lands remained undeveloped and mature timber was harvested for wood production in a manner to allow for natural regeneration. Beyond timber harvest, lands were generally protected from natural disaster and were severely fire suppressed. Since acquisition, the NCWRC has worked with Sportsman groups and other Cooperators to initiate a burning regime and create a long leaf pine restoration program on suitable sites. As more acres are added to the prescribed burning program, further timber management and site suitable habitat restoration efforts should be executed.

Game Land Goals and Measures of Success

Goals

- Provide for a diversity of habitat types and forest age classes through science based land management practices that are properly interspersed and juxtaposed across the landscape to ensure that a wide variety of terrestrial and aquatic wildlife species are conserved on the game land.
- Conserve popular 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 all game lands users a quality experience while on the game land with minimal habitat degradation and minimal conflict among user groups.

Measures of Success will be identified if

- Inventories/surveys indicate that a wide variety of species are present at sustained levels and are properly managed for on the game land.
- Surveys and inventories of target game species indicate that population levels of these species are being managed at sustained levels.
- Inventories/surveys indicate that populations/habitats of endangered, threatened, and rare species found on the game land are being maintained or restored.
- Inventories/surveys indicate that previously unknown populations or previously unknown endangered, threatened, and rare species are found on the game land.

Habitats

Mesic Mixed Hardwood/Pine Forest

Bay forests and pond pine woodlands collectively account for 2,558 acres, or 52%, of NRGL. These communities occur on peatlands of poorly drained interstream flats, and peat-filled Carolina bay depressions and swales of the eastern Coastal Plain (Schafale and Weakley 1990).

Extremely acidic in nature due to organic soils, these habitats are generally nutrient poor and usually continuously saturated. Fires were historically associated with droughts, and fire frequency and intensity strongly influence vegetative structure dominance, composition, stature, and diversity. All but the streamhead communities occur along a gradient of moisture, nutrients, and peat depth and typically occupy different locations with the domed peatlands of interstream flats and Carolina bays and swales. The wettest sites, typically the center of bays, may contain only low shrubs and stunted pond pine, with beds of sphagnum, pitcher plants, and cranberry. Higher, drier sites are characterized by an extremely dense shrub layer.



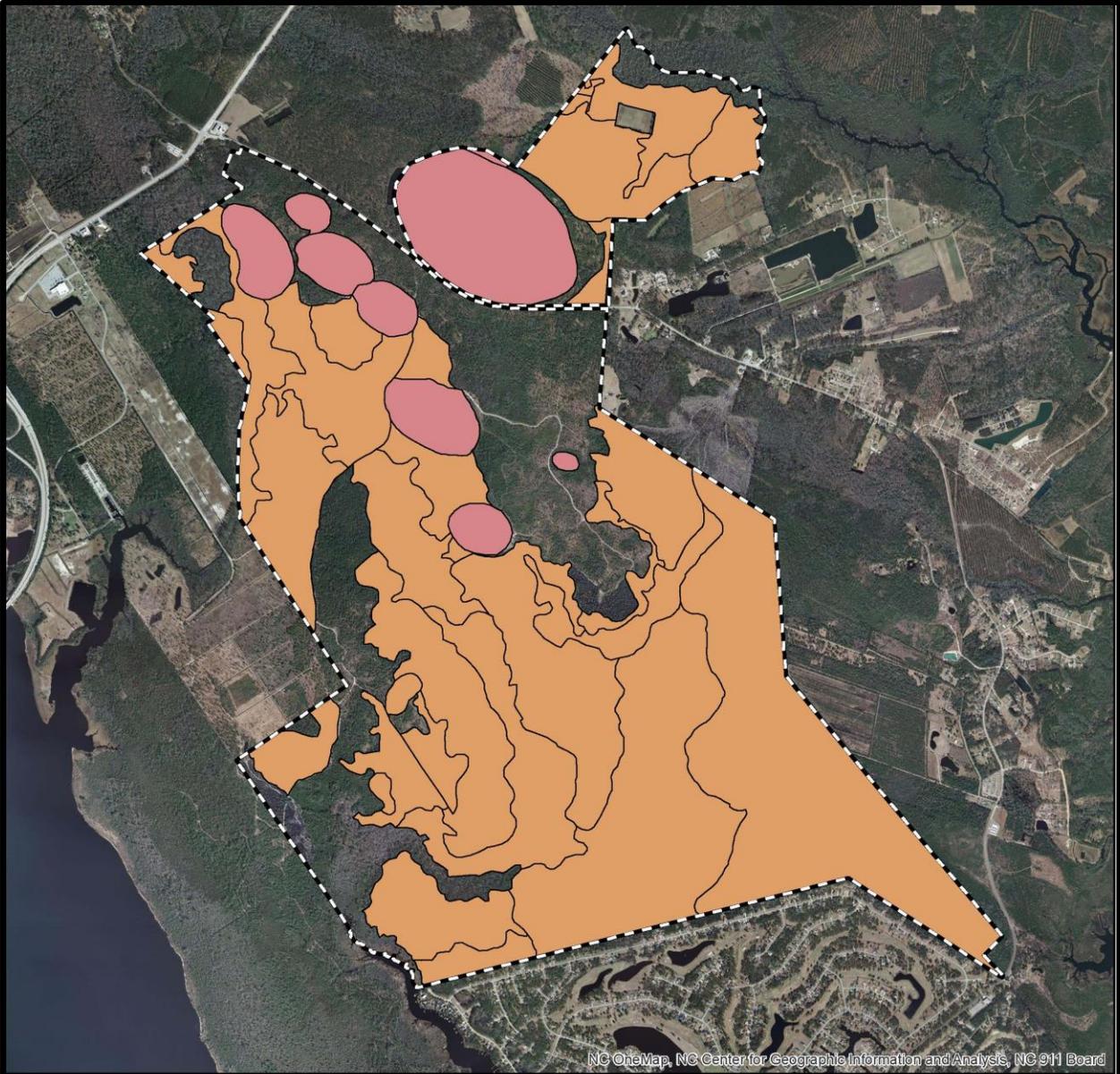
Bay forests occur throughout the Duck Creek and the Whitehurst Tracts. According to Schafale and Weakley (1990), this sub-type typically exist as a mosaic with other pocosin communities. They occur on shallow organic soils and the canopy is dominated by loblolly bay, sweet bay, and red bay. Bay forests are believed to be a late-successional community that replaces other pocosin communities after a long absence of fire. These bay forests may be solely a product of fire suppression, or there may be sites which naturally supported them (Schafale and Weakley, 1990).



Location and condition of habitat (Map12)

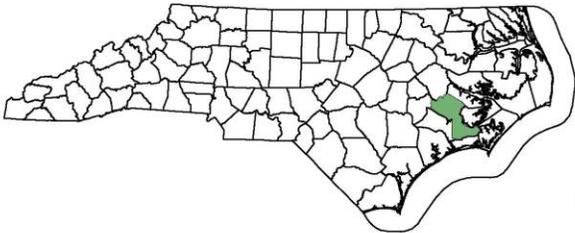
The condition of mesic mixed hardwood/pine forest habitat in NRGL and, in fact, much of the Coastal Plain is poor due to fire suppression, changes in hydrology, intensive silviculture, and conversion of forest types. Fire suppression has undoubtedly altered the condition of this habitat on this game land. Fire has been reintroduced into these communities where safe and feasible. However, ever increasing obstacles of using prescribed fire (e.g., smoke sensitive areas and public misconceptions) coupled with the fact that some of the mesic mixed hardwood/pine forest habitats on NRGL are very large limits the feasibility and opportunity to reintroduce fire into these communities. The ecotones between upland sites and the lowland sites are burned when feasible. Smaller mesic mixed hardwood/pine forests that are found within upland communities or sites that allow substantial fire breaks to be installed have been burned in initial prescribed fire efforts.

Map 12 – Mesic Mixed Hardwood/Pine Forest habitat on Neuse River Game Land.



NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board

Neuse River Game Land Habitat Location Map Duck Creek and Whitehurst Tracts



NRGL Habitat Types

-  Carolina_Bay
-  Mesic Mixed Hardwood/Pine
-  NRGL_Boundary

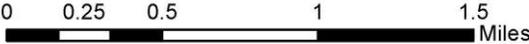


Table 2: Priority non-game species associated with mesic mixed hardwood/pine forest habitat

| Taxonomic Group | Common Name | Scientific Name | State Status (Federal Status) | Natural Heritage Program State and Global Rank |
|-----------------|---------------------|------------------------------|-------------------------------|--|
| Mammals | Star-nosed Mole | <i>Condylura cristata</i> | SC | S ₂ , G ₅ T ₂ Q |
| Amphibians | Oak Toad | <i>Bufo aquercicus</i> | SR | S ₃ , G ₅ |
| Bat | Southeastern myotis | <i>Myotis austroriparius</i> | SC | S ₂ ?, G ₃ G ₄ |

Table 3: Priority game species associated with mesic mixed hardwood/pine forest habitat

| Taxonomic Group | Common Name | Scientific Name |
|-----------------|-------------------------|-------------------------------|
| Mammals | American Black Bear | <i>Ursus americanus</i> |
| | White-tailed Deer | <i>Odocoileus virginianus</i> |
| | Raccoon | <i>Procyon lotor</i> |
| Birds | Northern bobwhite quail | <i>Colinus virginianus</i> |
| | Wild turkey | <i>Meleagris gallopavo</i> |

Problems affecting species and habitats

Fire suppression is an important factor threatening much of the mesic mixed hardwood/pine forest habitats on NRGL due to the strong influence fire has on their vegetative structure, composition, and diversity. As stated previously, the location and size of much of the mesic mixed hardwood/pine forest habitat coupled with the constraints associated with prescribed fire, reintroduction of fire into these communities creates a challenge for game land managers. The volatility of fuels in these communities and smoke management concerns also pose perpetual challenges to addressing this threat. It is our concern that the build-up of fuels due to the lack of fire will result in these stands burning in wildfire conditions and that the fire will be so intense that the ground will burn, thus killing the entire stand. Some wildfires can be beneficial, acting as a renewing force, releasing nutrients that stimulate seed germination and quick regrowth from root sprouts, regenerating plant communities. Intense fire is a natural part of pocosin systems, but extensive peat consumption, especially in ditched peatlands, is a significant impact.

Conservation actions necessary to conserve the species and habitat and priorities for implementation

The most important action necessary to manage this habitat type is the application of prescribed fire. It can be used to increase the heterogeneity in these pocosin like habitats related to vegetative dominance, stature and diversity. Growing season fires should be encouraged, although seasonality is not as important as frequency (Robbins and Myers 1992). Fire will increase vegetative structure and should promote the establishment of herbaceous groundcover in some community types. Rare species associated with peatland mesic mixed hardwood/pine forest are dependent on the combination of wet conditions and frequent fire.

Since acquisition, prescribed burning on NRGL has been accomplished on upland sites with the use of fire breaks between the upland sites and mesic mixed hardwood/pine forest habitats. Burning operations are primarily conducted during the dormant season when moisture serves to prevent ground fire and prevent wildfire like conditions. Efforts should continue to be made to burn in this manner and ecotone management should be prioritized based on feasibility of burning without fire breaks.

Because mesic mixed hardwood/pine forest habitats are particularly important for wintering birds due to the high amount of soft mast available, protection and proper management is necessary to provide for these species. These pocosin like habitats also provide for a greater number of wildlife species including black bears. In a study done by Jones and Pelton (2003), black bears preferred pocosins and clearcuts over managed pine habitats presumably because of the superior cover and food provided by these cover types. This has also been reported for pocosin habitats by Landers et al. (1979), Hellgren and Vaughan (1988), Hellgren et al. (1991), and Lombardo (1993). These pocosin like habitats also provide for black bears a sanctuary from human activity by providing areas of impenetrable escape and hiding cover.

Though extensive amounts of pocosin like lands are already protected, some specialized types require more protection, such as the Carolina bays found on NRGL. Acquisition through conservation partners will be important. Opportunities may be presented to take advantage of initiatives and programs that promote pocosin restoration such as Forest Landbird Legacy Program, Partners for Wildlife, and the North American Wetland Conservation Act. Identified funding sources for potential land acquisition include the North Carolina Clean Water Management Trust Fund, Coastal Wetland Grants, Forest Legacy, and Recovery Land Acquisition Grants.

Desired future condition

Our desired future condition for this cover type is for the plant communities within mesic mixed hardwood/pine forest habitats to include permanent water, seasonally flooded areas, areas dominated by cane and diverse herbaceous plants with open canopy, and other areas dominated by dense shrubs.

We intend to continue to maintain our mesic mixed hardwood/pine forest habitats with prescribed fire when it can be done safely and effectively. It is unknown when or if these acres had ever been burned before.

As stated earlier, size and location of mesic mixed hardwood/pine forest habitats on NRGL pose challenges to using prescribed fire in many cases. The characteristics of these mesic mixed hardwood/pine forest (*i.e.*, large size, proximity to residential properties, high fuel loads, and inaccessibility) make it impossible to control fires set under prescription. Smoke management guidelines also present their own unique challenges when burning these areas containing such high fuel loads.

One metric for successful management of these habitats will be to identify the pocosin habitats with high wildfire risks and to work closely with the North Carolina Forest Service to manage wildfires in these areas to maximize the ecological benefits in the case of these events. This will include but is not limited to maximizing burnout operations to include pocosin communities and minimizing the use of plowed and/or pushed lines to safely contain wildfires.

Additional management actions we may use to manage this cover type include increasing the size of burn compartments, conducting aerial ignition burns, and/or contract burning some of these areas. Other options will be entertained as they arise.

There are currently approximately 12 miles of plowed fire breaks on this property. Nearly all fire breaks are created and maintained with a traditional tractor-fire plow combination. In an effort to generate mesic mixed hardwood/pine forest burn units additional fire suppression lines would be installed using either roller-choppers, a grinding head machine, or a combination of both. As conditions allow, it is our desire to use a tractor and forestry disk harrow to establish and maintain fire breaks whenever possible. Every attempt shall be made to rehabilitate 100% of plowed lines within 6 months of creation.

Future forest management

Approximately 75% of mesic mixed hardwood/pine forest habitat on this game land have been dedicated as Primary areas by the North Carolina Natural Heritage Program. In these areas, the cutting or removal of dead or alive trees is prohibited. Furthermore, due to frequently saturated soils and the high risk of rutting and ground damage due to logging operations, no active forest management will take place in these areas on NRGL. One exception, being in the case of restoration after natural catastrophic events.

Floodplain Forest

Floodplain forests occur on 1,635 acres or approximately 34% of NRGL. Flood plain forests on NRGL are generally of cypress-gum swamp type. This ecotype contains just a few tree species, all of which are tolerant of nearly permanent flooding: bald cypress, pond cypress, and swamp black gum. These communities get little input of nutrients due to the poor inorganic sediment load. The infertile acidic soils and wetness produce slow growth in the trees (Schafale and Weakley, 1990). The difference between cypress and gum dominance is probably related to logging history, but environmental factors such as flooding frequency and depth, water chemistry, soil type and latitude also contribute (Schafale and Weakley, 1990). Since cypress-gum swamps flood for long periods of time their vegetative diversity is usually low but they may serve as important habitat for some aquatic animals and plants. Hollow cypress and swamp black gum are particularly important for bats, chimney swifts and other cavity dwelling species. In addition, several colonial waterbird species rely on swamp forests for nesting habitat (NCWAP, 2005). Table 4 shows the priority species associated with floodplain forests on NRGL.

Table 4: Priority game and non-game animals associated with Floodplain forests.

| Taxonomic Group | Common Name | Scientific Name | NC Status (Federal Status) | Natural Heritage Program State and Global Rank |
|-----------------|-----------------------|---------------------------------|----------------------------|--|
| Birds | Bald Eagle | <i>Haliaeetus leucocephalus</i> | T (T) | S ₃ B, S ₃ N, G ₄ |
| Birds | Mississippi Kite | <i>Ictinia mississippiensis</i> | SR | S ₂ B, G ₅ |
| Mammals | Star-nosed Mole | <i>Condylura cristata</i> | SC | S ₂ , G ₅ T ₂ Q |
| Mammals | Red Bat | <i>Lasiurus borealis</i> | | |
| Mammals | Southeastern Bat | <i>Myotis austroriparius</i> | SC | S ₂ ?, G ₃ G ₄ |
| Reptiles | Canebrake rattlesnake | <i>Crotalus horridus</i> | SC | S ₃ , G ₄ |

| Taxonomic Group | Common Name | Scientific Name | NC Status (Federal Status) | Natural Heritage Program State and Global Rank |
|-----------------|-------------------|-------------------------------|----------------------------|--|
| Mammals | Black Bear | <i>Ursus americanus</i> | N/A | N/A |
| Mammals | White-tailed deer | <i>Odocoileus virginianus</i> | N/A | N/A |

Current Location and Condition

Maps 13, 14, and 15 show locations of Floodplain forests on NRGL. This habitat type occurs on all tracts of NRGL, and is thought to be in excellent condition. Habitats of this type on NRGL contain species assemblages similar to those described by LeGrand et. Al. 1992.

Figure 13: Neuse River GL Floodplain forest; Turkey Quarter Creek.

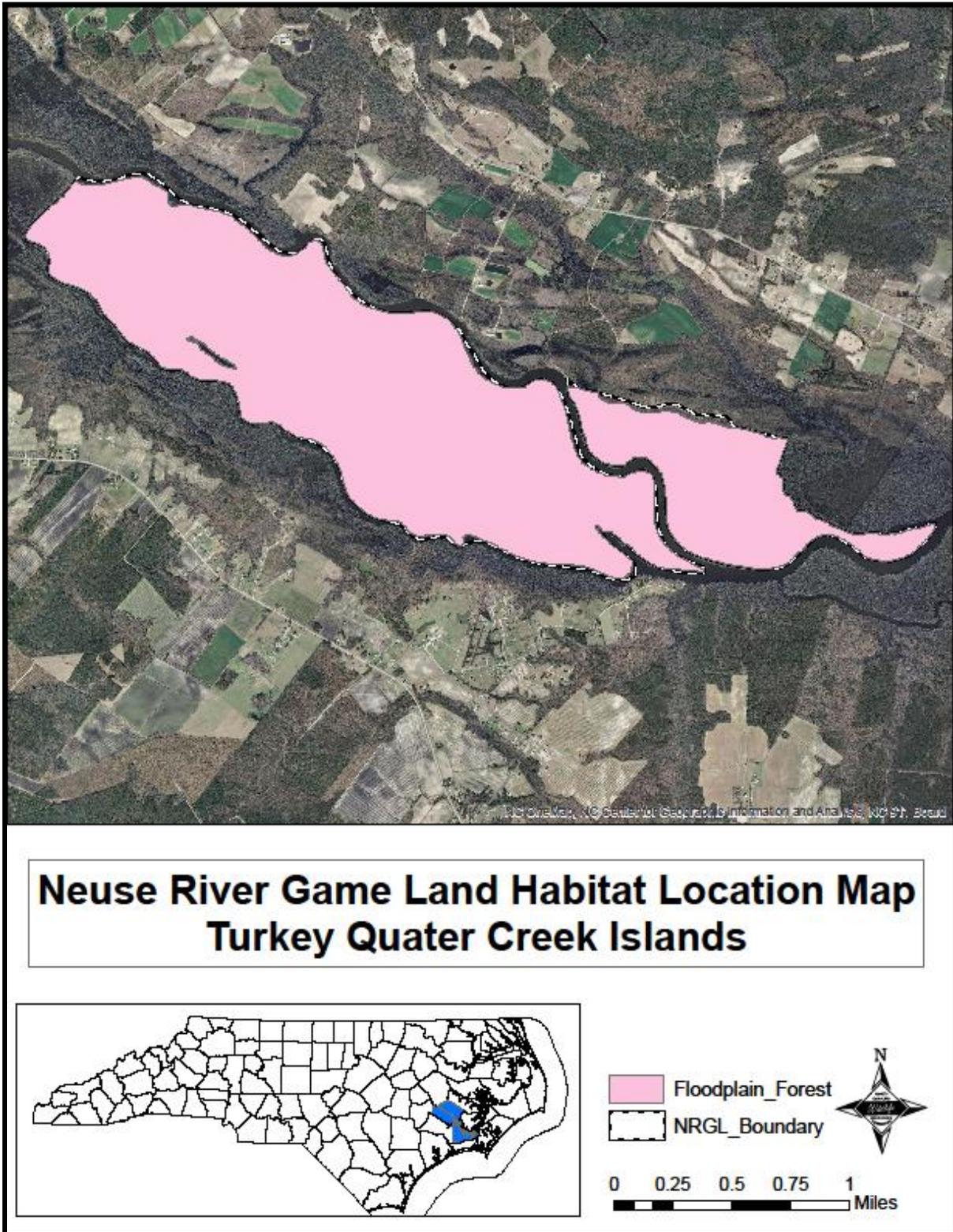


Figure 14: Neuse River GL Floodplain forest; Glenburnie Islands

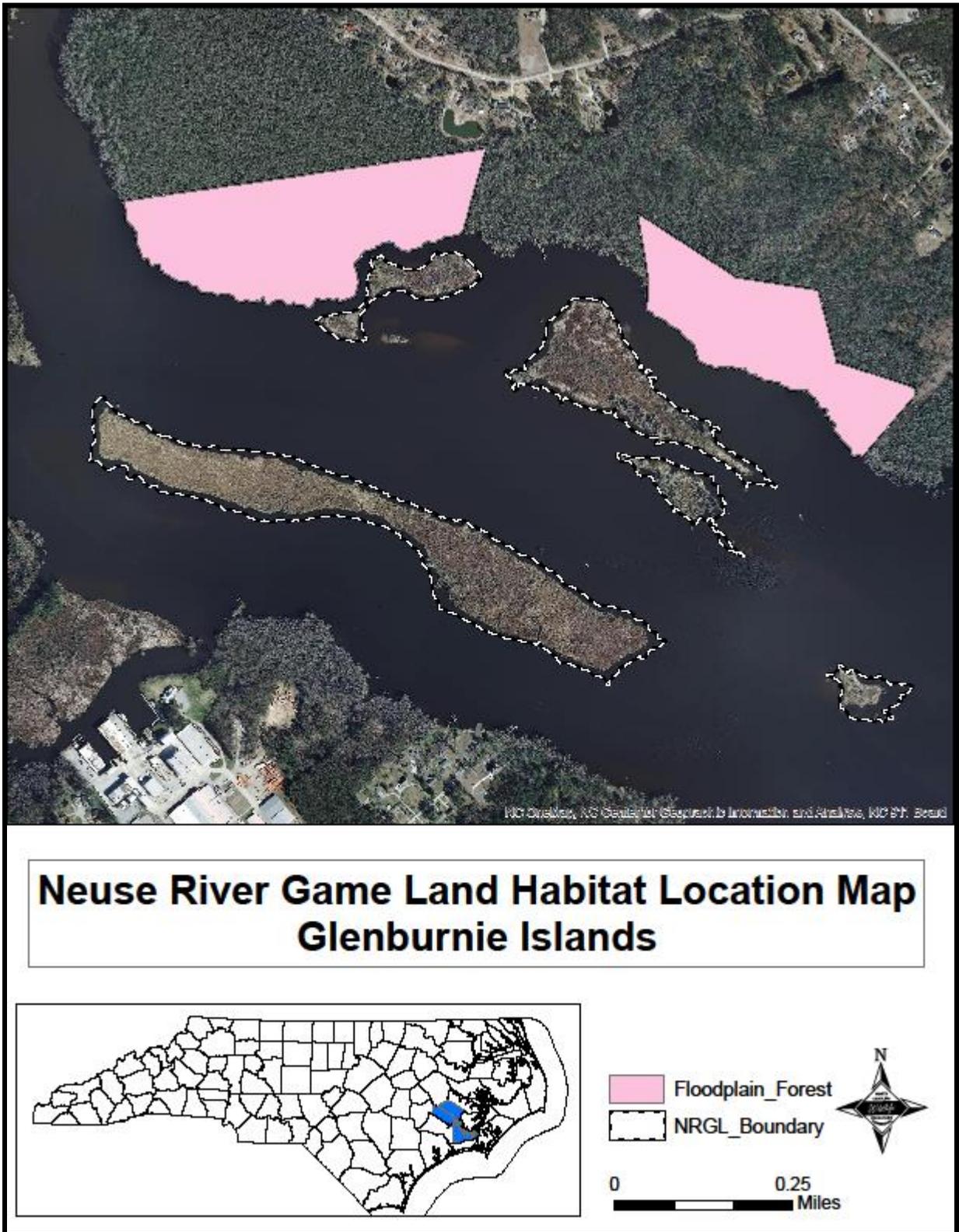
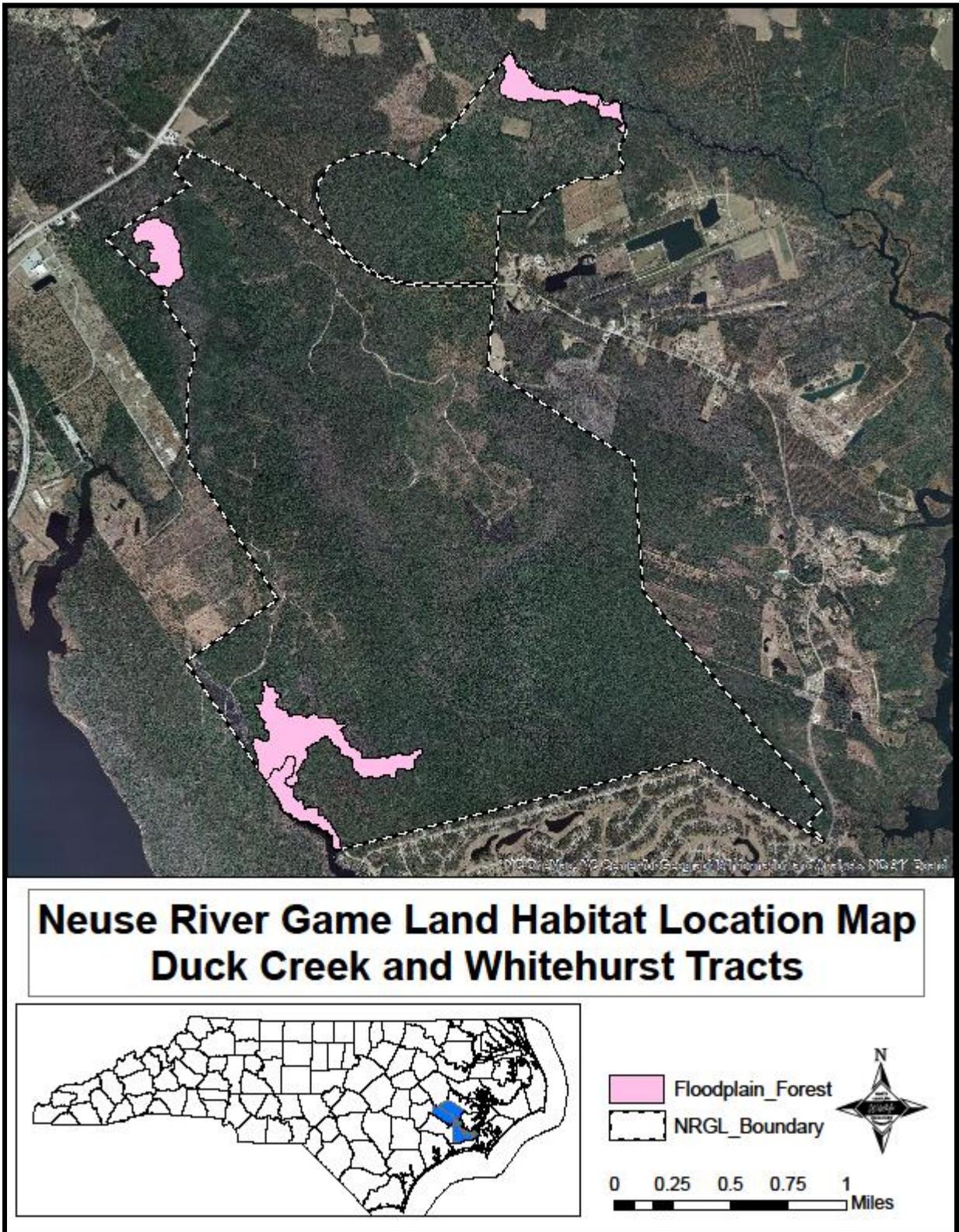


Figure 15: Neuse River GL Floodplain forest; Whitehurst and Duck Creek Tracts.



Factors affecting Habitat

Factors impacting this habitat type include changing flood regime patterns caused by development, habitat fragmentation, changes in water chemistry and organic matter loads, increased nitrogen from agricultural and development-related runoff, and exotic species. All of these factors, individually or interactively, produce abrupt or gradual changes in floodplain plant and wildlife communities.

Desired Future Condition

The desired future condition for Floodplain forest habitats on NRGL shall be to protect areas of this habitat type from wildfire during drought conditions and to allow the same areas to reach a mature age structure. These conditions can be met by continuing with regular prescribed burning operations and being aware of timber trespass.

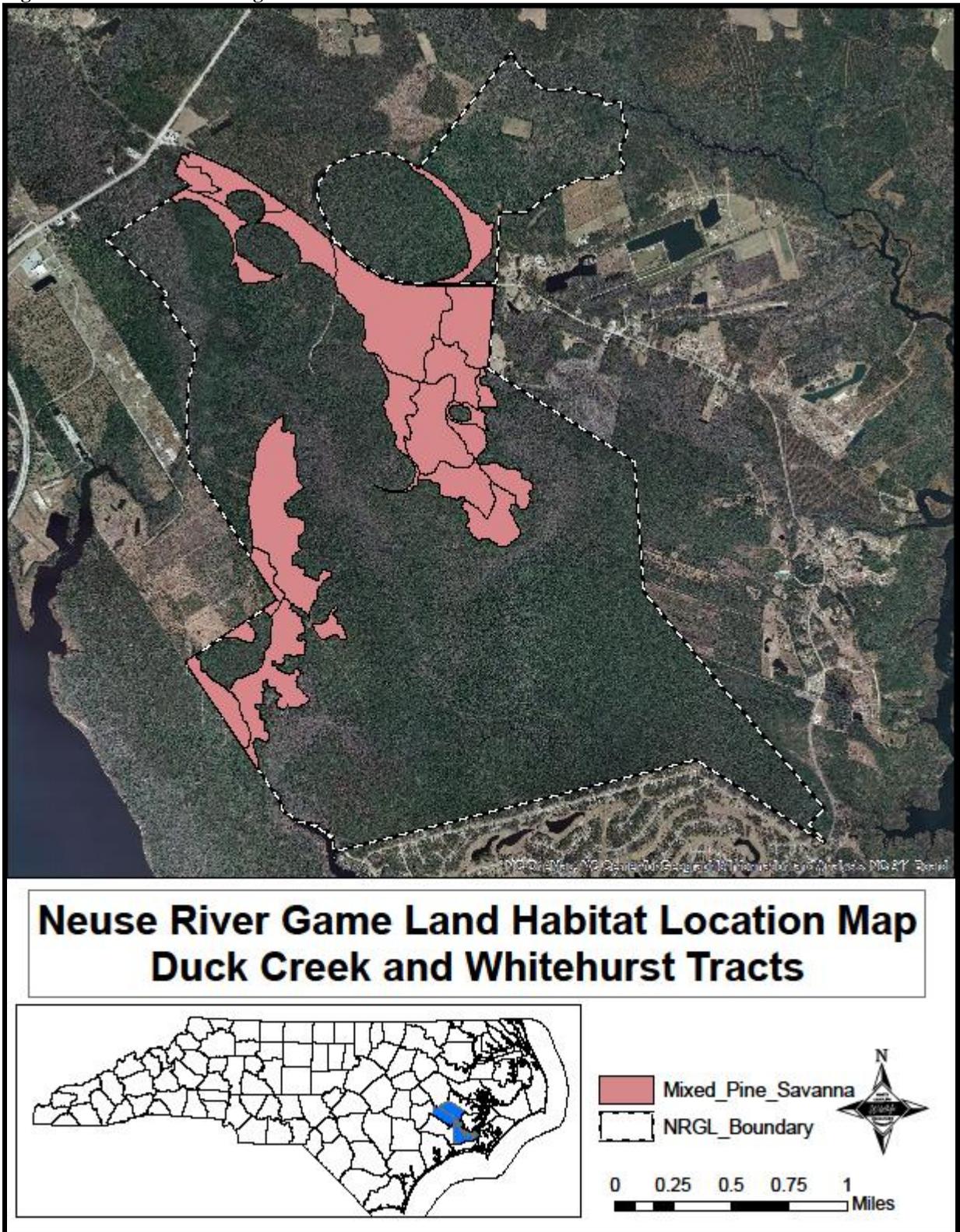
Mixed Pine Savanna

Mixed pine communities occur on approximately 584 acres, or 12.0% of NRGL (*Figure 16*). Different subtypes detected on NRGL are Wet Pine Flatwoods, Pine Scrub Oak Sandhill, and Xeric Sandhill Scrub. These communities often grade into each other or occur as a mosaic on the landscape.

These communities typically occur on flat to generally flat sediments in the Coastal Plain. Historically, frequent, low intensity fires were experienced, except in areas lacking sufficient herbaceous ground cover to carry a fire (Schafale and Weakley 1990). Overstory is dominated open to sparse canopy of longleaf pine, scattered scrub oaks. Understory plant composition is largely based on location in relation to elevation on slope. Understories range from vaccinium, *Illex*, and *Persea* with mixed wiregrass on wetter sites to sparse shrub layer containing *Taylussia* and *Toxicodendron* and a dense herbaceous layer of predominantly *Andropogon*. Frequent fire maintains the canopy dominated by longleaf pine, an open midstory, and a diverse understory dominated by wiregrass or other grass/forb ground cover. With long-term fire suppression, scrub oaks and shrubs increase in dominance, non-pyrophytic litter buildup occurs, and changes in the microenvironment allow for invasion by more mesic species, leading to a reduction in herbaceous diversity.



Figure 16: Locations of Longleaf Pine Habitat on NRGL.



Location and condition of habitat

This cover type is currently in restoration. Since acquisition NCWRC has reintroduced fire to all but 22 acres of this habitat type since the original boundary establishment in 2002. The herbaceous composition of these sites varies from wiregrass dominated to *Andropogon sp.* and fern species on more disturbed sites. Table 5 shows priority wildlife species associated with mixed pine savanna habitats.

Table 5: Priority non-game and game species associated with longleaf pine communities.

| Type | Common Name | Scientific Name | State Status (Federal Status) | Natural Heritage Program State and Global Rank |
|---------------------|-------------------------|-------------------------------|-------------------------------|--|
| Non-game | Bachman's sparrow | <i>Peucaea aestivalis</i> | SC | S ₃ B, S ₂ N, G ₃ |
| | Henslow's sparrow | <i>Ammodramus henslowii</i> | SR | S ₂ B, S ₁ N, G ₄ |
| | Red-cockaded Woodpecker | <i>Picoides borealis</i> | E (E) | S ₂ , G ₃ |
| Game animals | Eastern fox squirrel | <i>Sciurus niger</i> | SR | S ₃ G ₅ |
| | Whitetailed deer | <i>Odocoileus virginianus</i> | | |
| | Wild turkey | <i>Meleagris gallopavo</i> | | |
| | Northern bobwhite quail | <i>Colinus virginianus</i> | | |

Problems affecting species and habitats

The proximity of smoke sensitive areas and inherent challenges they present to the application of prescribed fire is the greatest obstacle to effective management of the mixed pine savannas on NRGL. Relatively small burn unit size and high fuel loads in Carolina bays are also areas of concern.

Conservation actions necessary to conserve the species and habitat, and priorities for implementation

The highest conservation priority in this cover type is to establish and maintain a 3-year burn rotation on all mixed pine communities. This will minimize the hardwood midstory, reduce hazardous fuel loads, and promote a diverse, pyrophytic groundcover.

Maintaining a diverse vertical structure with large diameter trees across the landscape should also be a priority.

Desired future condition

The desired future condition for this cover type is an open savanna with an uneven-aged mixed pine canopy, an open midstory, and a diverse herbaceous groundcover. Frequent fire will suppress hardwoods; however, a minor oak component in the midstory is a natural condition and beneficial to wildlife.

Frequent prescribed fire is the primary method used to promote and maintain desirable species/community associations. Currently this habitat type is in a 3 year burn rotation. Our goal for the 10-year planning horizon is to maintain this 3-year fire return interval.

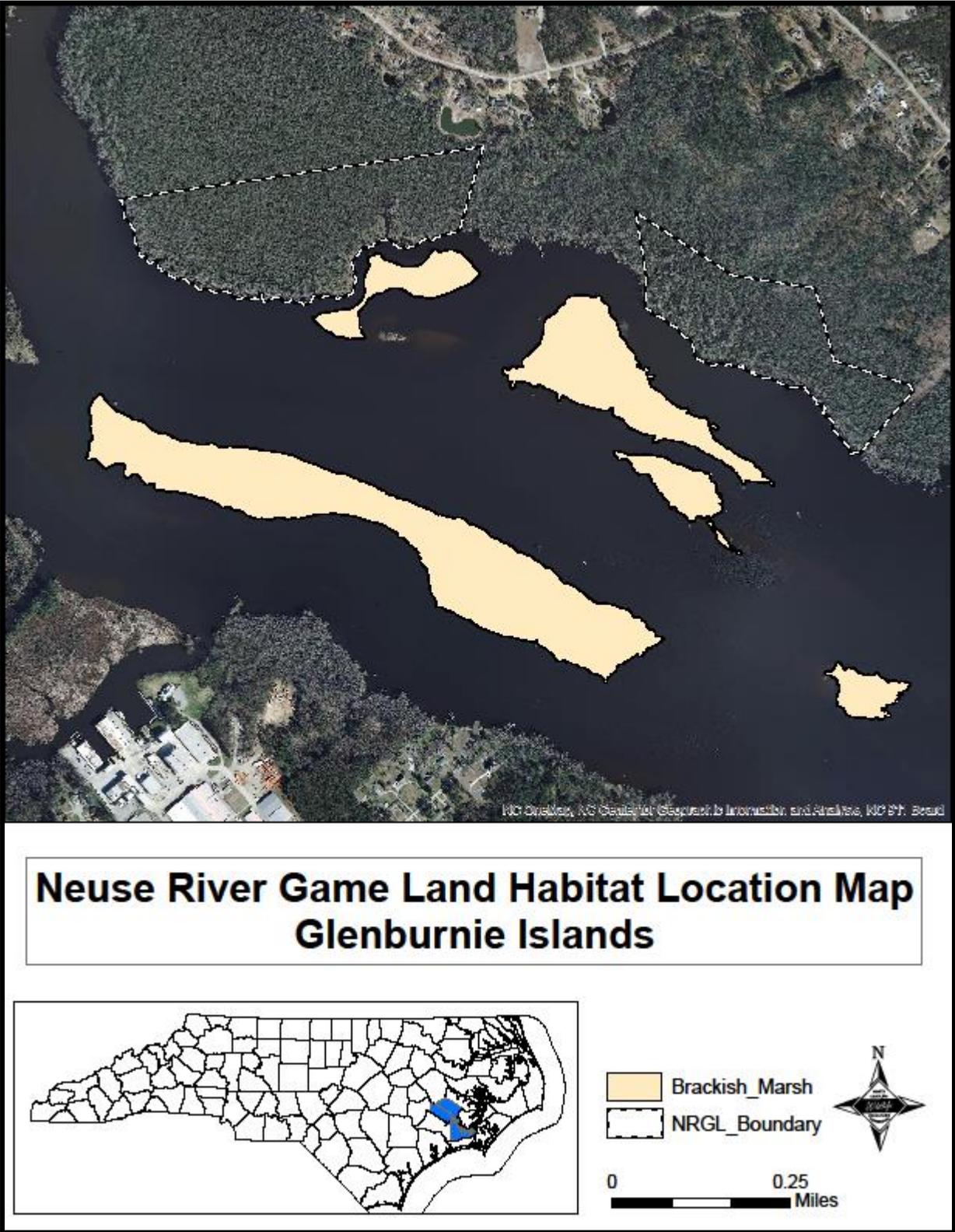
Marsh

The Coastal Brackish Marsh habitat type (Estuarine Communities NCWAP equivalent) occurs on 76 acres or 1.6% of NRGL. Brackish Marshes occur in areas where the tidal waters are partly diluted by fresh water. These marshes contain a relatively low plant diversity, with black needle rush, and *Spartina sp.* usually dominating vast areas. The abundance of invertebrates such as mollusks and crustaceans indicates the transitional nature of these communities between terrestrial and marine systems (NCWAP 2015).

Location and Current Condition

As indicated in figure 17, brackish marsh habitat occurs solely on the Glenburnie Islands area of NRGL. Acres in this habitat type are thought to be in fair condition, largely due to the periodic prescribed burning that happens on NRGL. This management practice removes the annual thatch, as well as any "wrack" that continually washes ashore during storm events. Priority species for NRGL's marsh habitats are listed in table 6.

Figure17: Neuse River Game Land Marsh Habitat Locations.



Problems Affecting Species and Habitat

Degraded water quality:

Marsh habitat losses from point and non-point source pollutants are negligible on NRGL. Farming, forestry, and mining operations all contribute to degraded water quality which, in time, could threaten marsh habitats. (www.water.ncsu.edu/watersheds_2/25/15).

Sea Level Rise:

Sea Level rise will lead to widespread marsh loss. Whether partial or complete inundations, this threat will eventually erode and destroy NRGL's current marshland.

Increased SSA's/Rural Development:

Citizens continually pursue Coastal living. This increased shoreline development indefinitely changes existing or potential marsh lands. This increase in local populations has an adverse effect on our ability to effectively manage NRGL, principally our ability to conduct prescribed burning operations on NRGL.

Conclusions:

It's not likely that one factor would have detrimental effects on the marshes associated with NRGL. It's the cumulative effects of all the stated factors and unforeseen others, however, that will have the most damaging effects on the marshes of the lower Neuse River.

Table 6: Priority species associated with NRGL marshes:

| Species | Scientific name | NC Status (Federal Status) | Natural Heritage Program and Global Rank |
|-------------------------|-----------------------------------|-----------------------------------|--|
| Waterfowl | | None | None |
| American Bittern | <i>Botaurus lentiginosus</i> | SR | S ₁ B, S ₃ N, G ₄ |
| Least Bittern | <i>Ixobrychus exilis</i> | None | S ₃ B, SZN, G ₅ |
| Little Blue Heron | <i>Egretta caerulea</i> | SC | S ₃ B, S ₃ N, G ₅ |
| Yellow rail | <i>Coturnicops noveboracensis</i> | SR | S ₂ N, G ₄ |
| Northern Harrier | <i>Circus cyaneus</i> | SR | S ₁ B, S ₄ N, G ₅ |
| Diamond-backed Terrapin | <i>Malaclemys terrapin</i> | SC | S ₃ , G ₄ T ₄ |

Desired Future Condition

Our Desired Future Condition should be to maintain or increase the acres of Coastal Brackish Marsh associated with NRGL. This can be accomplished in several ways. In the short term, continued use of prescribed fire should be applied to marshes in conjunction with ongoing burning operations. This practice will ensure the propagation of beneficial native plants and accommodate the many native animals that require this habitat. As water levels continue to rise, marsh habitats will move inland occupying

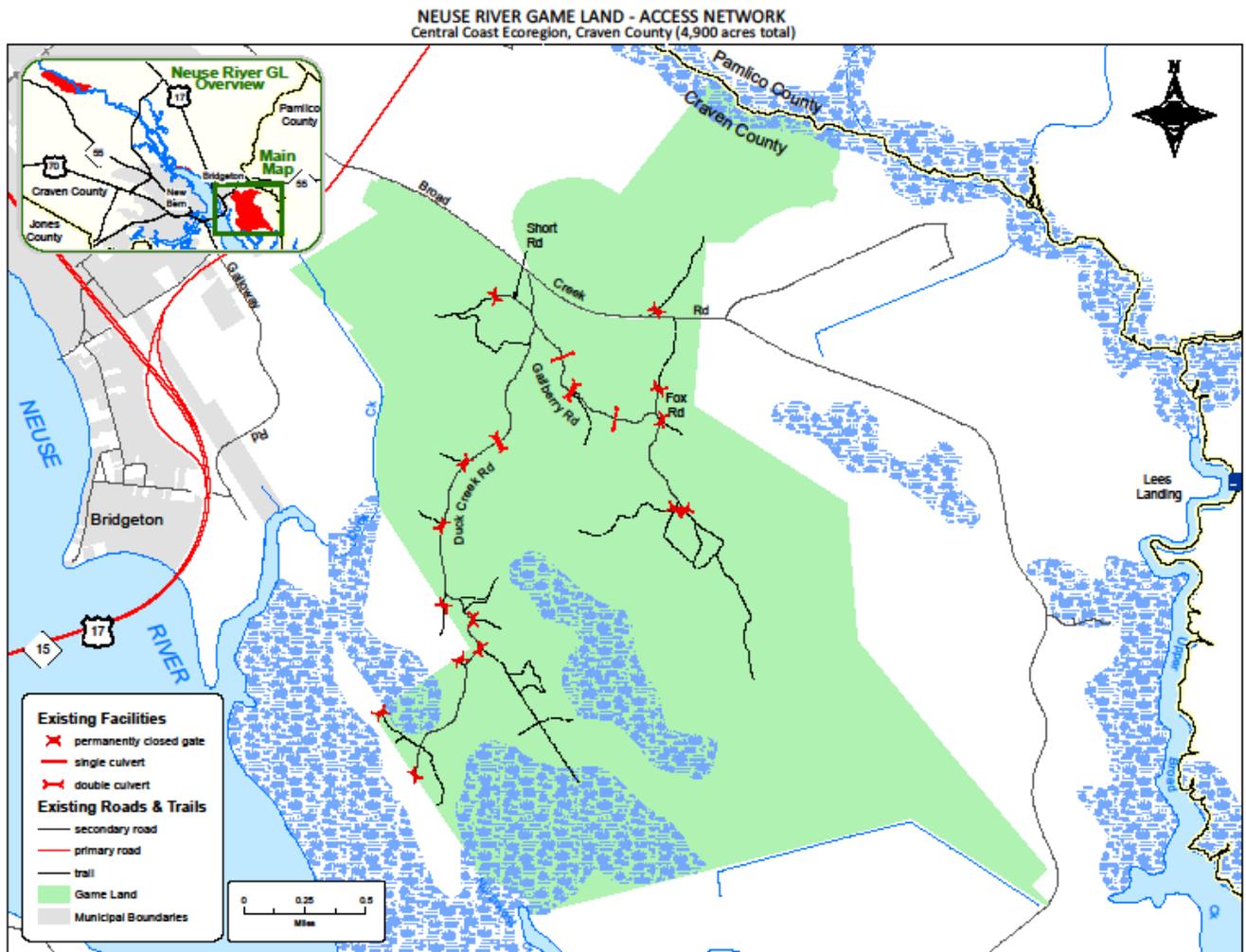
former woodlands. Given this information, the WRC should continue to explore acquisition opportunities adjacent to NRGL.

Infrastructure

Infrastructure Assessment

Assessments of existing infrastructure throughout the NRGL were conducted by Division of Engineering & Lands Management staff in November of 2015. The infrastructure maps included in this document show the locations of existing public roads, administrative access roads, trails, parking areas, dams and gates within the NRGL. The results of the assessments along with recommendations for maintenance and improvements are discussed by category below. Map 18 shows the current locations of infrastructure described below.

Figure 18: Neuse River Game Land Infrastructure Assessment Map



Road Assessment

The NRGL has four roads within two tracts of land. These roads were inspected by Engineering staff on November 4 of 2015. Coastal Region field staff met with Engineering staff to discuss the current infrastructure conditions and future needs.

Good access is provided to the majority of the game land. There are two main types of roads located on the game land: roads open to vehicular travel and trails/fire breaks. For the purposes of this infrastructure assessment, the trails/fire breaks have not been inspected, but are further described in other portions of the Plan. The roads on Neuse River are used by WRC staff to access the game land for maintenance and conservation work. They are also used by the public for hunting, hiking, geo-caching, wildlife viewing, and other outdoor recreational purposes.

Existing Road Conditions

Most of the major roads within the NRGL are in good condition. The observed conditions of these roads are as follows:

Duck Creek Road

This road is a major road through the Duck Creek Tract section of the game land at 2.36 miles long. It provides access from Broad Creek Road to the southern portion of the game land. This road has been recently resurfaced with gravel. There is a gravel parking area with kiosk and fencing approximately 250' off of Broad Creek Road. Although this road is a single lane, it is wide enough for two-way access, and is in very good condition. There are sections of this road with shallow ditches and sections with no ditches. Some of the shallow ditches had standing water at the time of observation. There are two observed culverts under this road, both of which appear to be functioning well. At the .70 mile mark, there is a small gravel parking area and turn around. The gravel was recently placed and is in good condition. At the 2.25 mile mark, there is another gravel parking area that provides access to an unimproved road, currently used as a walking trail. This gravel was recently placed and is in good condition. At the end of Duck Creek Road, there is a large cul-de-sac type turn-around and parking area. The gravel here was also recently placed and is in good condition. Along Duck Creek Road, there are several trails/firebreaks that are gated, allowing walking access only.

Gallberry Road

This road is a left turn at the .22 mile mark of Duck Creek Road and provides access to the eastern portion of the Duck Creek Tract. The road is 1.16 miles long and has been recently resurfaced with gravel. At the .73 mile mark, the road intersects with Fox Road. Fox Road is an unimproved road that runs .40 miles north to Broad Creek Road and is used as a walking trail. Gallberry Road is relatively flat with only a few shallow grass swales for drainage. At the end of this road, there is a large cul-de-sac type turn-around and parking area. The gravel here was also recently placed and is in good condition. At this point, there are a several walking trails allowing further access into the game land. There are four observed culverts under this road, all of which appear to be functioning well.

Short Road

At the .16 mile mark of Duck Creek Road, Short Road turns to the right and provides access to a western portion of the site. This road is a one lane unimproved dirt/sand road and is gated a short distance from Duck Creek Road. The remainder of the road is closed to vehicles and used as a walking trail. The road is approximately .57 miles and ends in a small clearing.

Unnamed Road (Whitehurst Tract)

This road provides access to the Whitehurst Tract, north of Broad Creek Road, approximately .63 miles to the east of Duck Creek Road. This road is more of a parking area than a road. The parking area is delineated with a fence and there is both an entrance sign and kiosk. There is an old single lane road beyond the gate that is used as a walking trail. This trail continues into the site for approximately .40 miles on the east side of the large Carolina Bay. Upper Broad Creek forms the northern border of this tract, approximately .90 miles from Broad Creek Road.

All of the roads currently used for vehicular traffic are in very good condition and require few immediate improvements. The future road improvements have been broken down into high and low priorities. It should be a goal to perform the high priority projects over the next ten years, and the low priority projects done next as resources allow. At the end of this ten year period, a new assessment will be performed and new priorities set.

Future Road Improvements

Maintenance and needs for future improvements were identified on the existing sections of NCWRC access roads. The recommended road improvements discussed in this section are grouped by priority as follows:

High Priority

Over the next ten years, the highest priority roads for upgrade are the following:

- Duck Creek Road

Duck Creek Road

Duck Creek Road is the most utilized road within the Neuse River game land. The current condition is good and there are adequate parking opportunities in several places along the road. Although there is enough space now for two cars to pass, Duck Creek Road could be widened further if two lanes of traffic are found to be needed. This road has been put into the high priority category due to the lack of adequate drainage between the .70 mile mark and the 1.10 mile mark. The current ditches are large yet unimproved and acting as detention areas for stormwater. Twin culverts have been installed at a low point around the .70 mile mark to reduce flooding. If flooding worsens along this road, an alternative method to discharge stormwater should be studied. The road side ditches should be cleared of brush and re-shaped to improve drainage. There may be an opportunity to run a ditch from the west side of Duck Creek Road to Duck Creek.

The section of road needing improvement is approximately 2.36 miles and will have an estimated cost of \$60,000.

The section of drainage needing repair and construction is approximately .40 miles and will have an estimated cost of \$100,000.

Low Priority

The above mentioned roads have been rated as having the highest priority for repair over the next ten years. However, they are not the only roads in need up upgrade. The following roads are considered medium priority and should be repaired after the high priority projects are completed.

- Gallberry Road
- Unnamed Road (Whitehurst Tract)

Gallberry Road

This road is the second most used road within the Duck Creek Tract. The road is currently in good condition and does not need immediate improvements. Although there is enough space now for two cars to pass, Gallberry Road could be widened further if two lanes of traffic are found to be needed. Routine maintenance and resurfacing will increase the longevity of this road.

The section of road needing improvement is approximately 1.16 miles and will have an estimated cost of \$30,000.

Unnamed Road (Whitehurst Tract)

This entrance and parking area is heavily used and should be resurfaced with gravel on a routine basis.

The section of road needing improvement is approximately 3,000 sf and will have an estimated cost of \$20,000.

New Road Construction

Currently, there is good access to most areas of both tracts of the game land. There is a large section of the Duck Creek Tract, to the southeast, that is accessible only by foot, through heavy woodlands. There may be opportunities to provide more walking trails to access this section of the game land. It is not recommended that any vehicular roads be built, as this area borders a large residential neighborhood. No new roads are recommended for the Whitehurst Tract.

Road Maintenance

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

Typical Road Maintenance Practices

- Inspect roads regularly, especially before the winter season and following heavy rains.
- Keep ditches and culverts free from debris (see also Culvert Maintenance Section of this Plan).
- Remove sediment from the road or ditches where it blocks normal drainage.
- Regrade and shape the road surface periodically to maintain proper surface drainage.
 - Typical road should be crowned at approximately 4%, or ½" per foot.
 - Some roads may not require a crown, but should have a constant cross slope (super-elevation).
 - Gravel should be distributed at an even depth across the road.
 - Gravel should have an even distribution of fine and course materials.
 - Keep downhill side of the road free of berms, unless intentionally placed to control drainage.
 - Proper maintenance and grading of the road will require a motorgrader and a roller.
- Avoid disturbing soil and vegetation in ditches, shoulders, and cut/fill slopes to minimize erosion.
- Maintain shoulders on both sides of the road to ensure oncoming vehicles have enough room to pass. Shoulders should be relatively flat, with a mowed grass surface.
- Maintain erosion-resistant surfacing such as grass or rip rap in ditches.
- If it is determined that a road needs major repairs or upgrades, contact Regional Supervisor and Design Services to schedule an assessment.

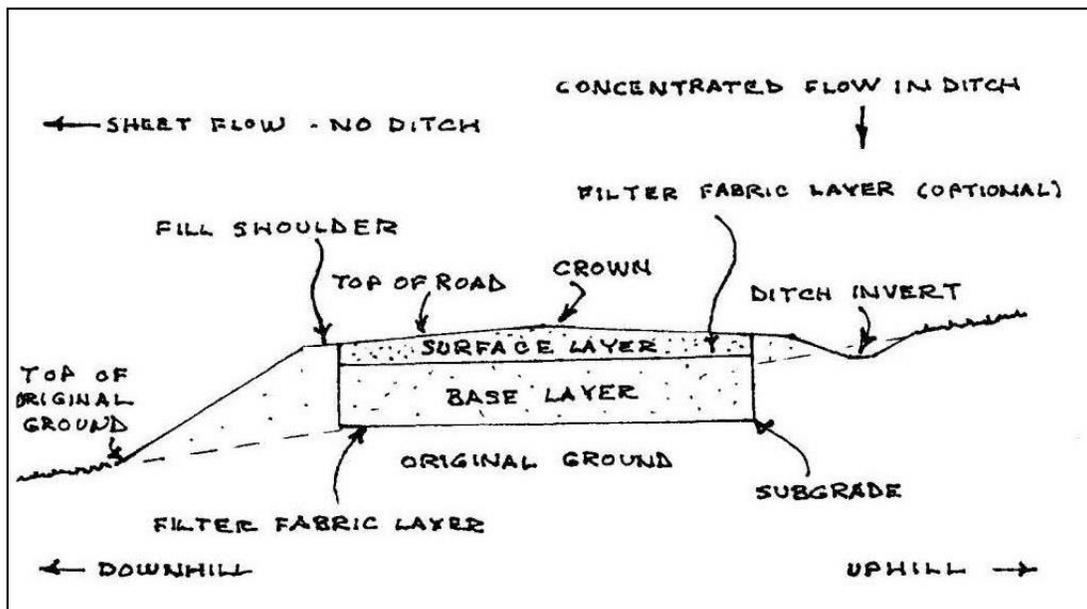


Figure 1 - Typical Road Cross-Section – Canaan, NH Highway Department

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 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.

Gates

Gates should be used on game lands for maintenance and habitat conservation. For maintenance purposes, gates should be used to limit access to roads that are unsafe or are in disrepair, or to limit use on roads to certain times a year in order to minimize the wear and deterioration of the road. If a road is considered unsafe or in disrepair, field staff should contact an engineer. The engineer will perform an inspection to determine the best course of action to repair or upgrade the road.

All gates installed on game lands should be the standard swing gate and painted orange for maximum visibility. No cable gates should be installed, and any existing cables should be replaced.

Troubleshooting

Road Surface Problems

Problem: Longitudinal erosion of the road surface

Possible Causes:

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

Problem: Lateral erosion cutting across the road surface

Possible Causes:

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

Problem: Potholes

Possible Causes:

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

Ditch Problems

Problem: Bottom of ditch is eroding

Possible Causes:

- Slope of ditch is too steep to handle the flow without additional protective measures, which include 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 the back.
- Side slopes need to be stabilized with additional vegetation, erosion control mat, or rip rap.

Parking Areas

The NRGL currently has adequate designated parking areas as described in the **Road Assessment** section above. No new parking areas are recommended at this time.

Gates

There are several gates located throughout the game land, which limit access to certain roads and portions of the game land. The majority of the gates on the game land are swing gates and appear to be in good condition. The game land is typically closed outside of hunting season, with all gates closed and locked. Some of the gates on the game land are closed year round to keep vehicular traffic off of some of the roads which are used as trails. Other gates on the game land are opened/closed during specific times of the year, typically for deer and turkey hunting seasons. A Controlled Access Map has been included in this report, which identifies the times of the year when each gate/road is open to the public.

Drainage Structure Assessment

Dams

There are no built dams that needed to be inspected for this Management Plan.

Culvert Assessment

During the road investigation with field staff, several culverts were inspected and all appeared to be in good condition. These include the following:

Duck Creek Road

Two culverts were observed on Duck Creek Road. These twin CMP culverts were installed in 2015 and are in very good condition. Routine maintenance should be performed to insure the slopes on top of the pipes are stabilized.

Gallberry Road

Four culverts were observed on Gallberry Road. These CMP culverts are in good condition. Routine maintenance should be performed to insure the slopes on top of the pipes are stabilized.

Culvert Maintenance

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

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

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

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

Staff should inspect ditches and culverts as part of their regular road maintenance activities. This inspection is especially important during leaf fall and following periods of heavy rain. Staff should consider the location of the culvert before performing maintenance using heavy equipment. Culverts located in active stream channels, dedicated or critical habitat areas may require special permission or installation of erosion control measures before maintenance can commence.

Leaves and woody debris that have accumulated in or around the inlet of the culvert should be removed immediately using hand tools if possible. Removal of accumulated silt and/or gravel from ditches approaching the culvert inlet should be performed using a small excavator, backhoe or a tractor equipped with a scrape blade. Sediment in or around the immediate vicinity of the pipe inlet or outlet should be removed using hand tools to prevent damaging the culvert. Cleaned out material is to be pulled away from the culvert then hauled and spread at a site where it cannot be washed back to the culvert area.

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

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

Recreational Facilities

Neuse River Game Land provides several recreational uses. These include hunting, geocaching and hiking.

Public Fishing Areas

Neuse River Game Land currently has no designated Public Fishing Areas and no water bodies that would allow for public fishing.

Non-Traditional Uses

Geocaching

Geocaching is a recreational activity, in which participants use a GPS receiver or mobile device to hide and locate hidden containers, or caches, located somewhere outdoors. The NRGL currently has approximately one hidden cache on the main game land. There are no major infrastructure elements required for this non-traditional use, and there is adequate parking for the participants near the start/end of the geocaching trails.

Hiking/Camping

Neuse River Game Land also contains several miles of trails, which have typically been for hunter access. Hiking is becoming a more popular activity and will continue to be a demand on the game land. It is recommended that staff works on a long term plan to build additional trails, which can be used for both hunter access and recreational hikers.

Recreational Facility Maintenance

Maintenance of recreational facilities is critical to the overall operation of the game land program. Typical use of the game lands is dispersed, however, recreational facilities concentrates users on a specific area or feature. This concentration of users, whether it is a boating access, fishing access, shooting range, or other use, results in a need to ensure the facility is safe and functional. Routine site visits for inspection and maintenance will accomplish this goal. Site visits should consist of two actions: (1) Inspection for safety issues and functionality; (2) Actual maintenance activities.

1. Inspections should examine the following items

a. Safety inspection items:

Facility components

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

Slip or trip hazards

- Uneven walking surfaces
- Mud on walking surfaces
- Ponded water on walking surfaces
- Drop offs

Overhead

- Dead trees or limbs
- Overhead utilities

b. Functionality Inspection Items

Parking

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

Ramp

- Blockages (sediment, wood)
- Surface condition

Pier/Dock

- Bollards
- Wooden components
- Bumpers

Shooting range

- Berms
- Target area

- Benches
- Shelter (roof, structure, and floor)

Signage

- Kiosk (entrance, regulation and information)
 - ADA (Americans with Disabilities Act)
 - No Parking
 - Keep Ramp Clear

2. Maintenance activities should include routine and corrective activities

a. Routine Activities include:

- Litter and debris removal
- Grass mowing
- Woody vegetative growth control

b. Corrective activities can include but not be limited to:

- Lumber replacement
- Sign replacement
- Minor grading
- Tree or limb removal

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

Information needs

Current state of knowledge

Our current state of knowledge about wildlife occurrences on NRGL is insufficient. Distributions and occurrences of cryptic species such as reptiles, amphibians, and small mammals (including bats) are under surveyed and their relative abundances are unknown and misunderstood. The same could be said for the relative abundance of our game animals on NRGL. Other than harvest data, there are no surveys in place to track changes in population trends of even the most sought after big game animals (deer, bear, and turkey). At present we must make assumptions based on these hunter harvest data. Management practices and regulations should not be based on assumptions; but on best available science. The following is our current knowledge of our “priority species” on NRGL, 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 manpower and finances are available.

It would seem appropriate to work closely with the Natural Heritage Program or North Carolina State University and other institutions to develop surveys to document the flora and fauna on NRGL.

The identification of Game Land hunters (or other users) would allow the Commission 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 type of survey would be especially helpful in reducing work load and financial hardships on already stretched resources within the agency.

Reports of diseased animals (regardless of species) should be investigated and, when possible, attempts will be made to diagnose what disease process is occurring. Also, as disease surveillance is conducted (CWD, LPDV, etc...), the game land will be incorporated into the surveillance effort when appropriate.

Nongame

Birds

Red Cockaded Woodpecker:

Current Knowledge

No known RCW's currently reside on NRGL. The Game Land lies approximately 10 miles SW of a historical observation site on the Minnesott Ridge and 6.5 mile North of known populations on the Croatan NF. One individual was observed during the fall dispersal period of 2011. Given this information there is some likelihood RCW's use the game land on occasion. Even though the habitat is young, the property is in a suitable location, and with age, RCWs could find the property very useful again in the future.

Inventory/Monitoring Needs

As of writing, there is no need for organized inventory/monitoring on NRGL. Field staff should however be aware and disseminate locations of RCW sign or sightings.

Management Needs

Currently, our land management practices closely follow the recommendations provided by Part I Section 3 of the Fish and Wildlife Service's RCW Recovery Plan. This would include but not be limited to including all burnable acres into a prescribed fire regime with a goal of a 3 year burn rotation. Also, chemical or mechanical midstory control could be employed in adjacent habitats that have been fire suppressed.

Research Needs

No research needs are currently warranted. Opportunities do exist for the research of yearling dispersal across the landscape.

Bald eagle:

Current Knowledge

Bald eagles (*Haliaeetus leucocephalus*) have not been recorded on NRGL. They are, however, likely to occur on all tracts adjacent to open bodies of water.

Inventory/Monitoring Needs

Observations and nesting occurrences should be recorded during annual aerial surveys as well as during routine daily activities on NRGL.

Management Needs

Should nesting bald eagles be detected, Federal guidelines should be followed when implementing management practices in the vicinity of nesting bald eagles.

Research needs

No research needs are warranted at this time.

Reptiles and Amphibians

Current Knowledge

The amphibian and reptile species richness on NRGL is currently unknown partially due to the fact that the GL is still in its infancy and secondly, due to the cryptic nature of these types of animals.

Inventory/Monitoring Needs

Surveys targeted at Wildlife Action Plan priority upland and aquatic reptilian and amphibian species should be created to increase our knowledge of local populations and how they are distributed throughout the landscape. The institution of an incidental observation reporting system should be instituted. Observations of priority species should be reported to help increase our understanding of species distribution. It seems logical to research the potential of using the reporting tool in PAWS to disseminate observations.

Management Needs

Timing of prescribed fire should be discussed among staff to create a plan that poses reduced potential to harm slow moving reptiles and amphibians during late dormant season and growing season burning operations.

During logging operations low ground pressure equipment should be utilized as applicable. It would be preferred that such operations should be conducted during winter months, as much as possible, to reduce the impacts to amphibians and reptiles.

Research needs

No research needs are warranted at this time.

Mammals

Bats:

Southeastern myotis/red bat/big brown bat:

Current Knowledge

The southeastern bat (*Myotis austroriparius*), Eastern red bat (*Lasiurus borealis*), and the Big brown bat (*Eptesicus fuscus*) are known to occur on NRGL. Specimens were captured using mist nets near a small depression on the Whitehurst tract by researchers from UNC Greensboro during the summer of 2013.

Management Needs

Preservation and management of our floodplain forest should be continued. These species occur mainly in swamps and bottomland forests where they roost in hollow trees and under loose bark (mammals in NC 8/4/2014). Foraging habitat may be critical to species survival and should therefore be protected (protect mature floodplain and swamp forests; maintain large hollow tree component of such forests).

Inventory/Monitoring Needs

If manpower allows, a series of mist netting surveys should be implemented in an attempt to collect information to close gaps in the distribution data of the aforementioned bats. A cooperative biological inventory should be conducted with the assistance of the Natural Heritage program to explore and update the small mammal communities on NRGL.

Research Needs

Research interests include the likelihood that bats in the Coastal Plain act as source populations replacing losses from White Nose Syndrome.

Game Animals:

White-tailed deer:

Current Knowledge

White-tailed deer (*Odocoileus virginianus*) occur on the game land with densities that are likely similar to estimated densities for Craven County (30-44 deer/mi², 2015 statewide density map) (*Appendix V*). Peak breeding is also likely consistent with peak breeding for Craven County (November 3rd, *Appendix VI*). Deer hunting on NRGL follows the eastern deer season and hunting currently occurs six days/week. Maximum harvest (either sex the entire season) is allowed. The following data were compiled from the last three hunting seasons (2012-2014) and evaluated based on the biological objectives outlined in the ad hoc deer regulation evaluation tool (*Appendix VII*).

- Average antlered buck harvest per square mile over the last 3 seasons (2012-2014) on NRGL was 2.3.
- Total harvest over the last 3 seasons has been 38.4% does, quite a bit lower than our statewide objective of at least 50% does in the harvest. However, it should be noted that since the maximum season was initiated in 2013-14 season, doe harvest has become approximately 45.6% of the total harvest.
- Sex composition of the harvest that occurs prior to peak breeding is 23.3%, and falls well below our statewide objective of at least 50% does in the harvest prior to peak breeding.

- 57.1% of antlered buck harvest occurs prior to peak breeding which fails to meet the statewide objective that no more than 20% of antlered buck harvest occurring prior to peak breeding.
- Age data is insufficient (n=2) to assess biological objectives related to the proportion of yearling bucks and does in the adult harvest.

Inventory needs

Baseline information should be collected for deer densities and/or population trends on NRGL. These data could be collected via forward looking infrared (FLIR), spotlight, camera trap surveys, hunter observation, or track count surveys. There is also a great need to identify our game land hunters. Without these surveys and biological data from harvested deer we have no way to track deer population trends or sufficiently evaluate deer regulations and management efforts.

The use of FLIR offers a new survey technique that may have use on NRGL. This method utilizes thermal imaging that detects infrared radiation, including body heat. Similar to a spotlight survey, the FLIR camera will allow us to collect deer density/trend data via direct observation. The Wildlife Management Division has conducted FLIR surveys on private and public (Holly Shelter Game Land) in Pender and Duplin Counties. Upon the completion of this survey, field staff will evaluate the effectiveness of the survey technique.

Track counts could be a substitute for the FLIR survey. NRGL has a sufficient road network and fire lines with soils that are suitable for this type of survey. Although not a direct observation, this is a survey method would allow for the collection of general population trend fluctuations. Staff will continue investigating whether new methods may better assist us in monitoring and managing deer on NRGL.

Basic biological data from game land deer harvests are difficult to collect. NCWRC has collected biological data from only 3 deer since NRGL entered the Game Lands Program. At the very least, an informative sign should be placed on kiosks requesting that successful hunters contact staff if interested in having biological data collected from their harvests. If a survey were developed to identify our game land deer hunters, the NCWRC could implement a jawbone/biological mail survey. If not cost prohibitive, response rates could be improved by offering participants something similar to the hats cooperators of the Bear Program receive (e.g., a raffle, a hat, a t-shirt, etc....). These data would give us better knowledge or hunter success per unit effort and allow us to make the science-based regulation changes needed to meet the state deer management goals and objectives mentioned earlier.

Management Strategy

It is our desire to manage deer on NRGL accordance to with the statewide deer management goals and objectives outlined in the ad hoc deer evaluation tool.

As a habitat generalist, the white-tailed deer will benefit from the continuation of current land management practices.

Research needs

No known research needs at present.

Eastern wild turkey:

Current Knowledge

Wild turkey populations on NRGL are believed to consistent with those on other lands in Craven Co. (*Appendix VIII*) Since 2013, average wild turkey (*Meleagris gallopavo*) harvest has been 4.0 (.52/ mi²) gobblers per year. Unfortunately, there is no tracking method available that provides success per unit of effort for game land hunters. If NCWRC were able to identify Game Land turkey hunters, these data would give us better knowledge on hunter success per unit effort and would allow us to make the science-based regulation changes.

Inventory/monitoring needs

Currently there are no baseline data for turkey abundance. Several options are available to gather these data. Two surveys that could be utilized could be the direct observation by chance encounters similar to the Wild Turkey Summer Observation Survey, or a Game Land turkey or deer hunter observation survey, (*Appendix IX*). The combined information gathered would allow the NCWRC to make better science based regulation changes in the future.

Management Strategy

Maintain current level of hunter harvest until better data exists. Primary methods for habitat maintenance/enhancement should be through prescribed fire, long timber rotations, and open land management. The establishment of permanent logging decks and subsequent plantings of these areas could provide nesting and escape cover in close proximity to areas planted to small grains which provide bugging areas as well. Additionally, year-round gate closures should be continued to minimize disturbance.

Research needs

No known research needs at present.

Black bear:

Current Knowledge

Neuse River Game Land is enrolled in the three-week long season and runs from the second Monday in November to the following Saturday and the third Monday after Thanksgiving to the fifth Saturday after Thanksgiving (**15A NCAC 10B .0202**). According to the big game harvest reporting system, two black bears (*Ursus americanus*) have been harvested on NRGL. This is in-large-part to the small size of the Game Land and the amount of residential homes adjacent to NRGL.

Inventory/monitoring needs

Attempts should be made to collect biological data from any bear harvested on NRGL. DWM and DELM staff will continue to cooperate with bear hunters during the opening week of bear season and thereafter to collect these data.

Management Strategy

Bears on NRGL should be managed following the guidelines outlined in the NC Black Bear Management Plan (NCBBMP). Many studies have concluded that black bear habitat preferences are simply a function of food availability, Maehr, (2001)). Therefore, any land management practices to improve or sustain food availability (soft and hard mast) will benefit black bears. Seasonal closure of the game land allows bears to utilize food resources along roads with little to

no disturbance. This practice should be continued in the future. Continued long rotation timber harvest, open land management, and prescribed fire will enhance or maintain habitats for black bears on NRGL.

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 connectivity. Corridors can also assist in reducing human-bear interactions by decreasing the proximity of traveling bears to human development. As such, corridors for movement are important. Continued acquisition of adjacent lands would support efforts to meet the NCBBMP objective 4 (strategies 3, 4, 5, and 6).

As the availability of huntable areas decrease, acquisition of land would also assist in NCBBMP objective 1 and objective 2, strategy 6. NCWRC game lands will become increasingly important in providing bear hunting opportunities and population management via harvest.

Research needs

No known research needs at present.

Furbearers:

Current Knowledge

Hunting opportunities exist for bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and raccoon (*Procyon lotor*). Trapping opportunities exist for bobcat, coyote, raccoon, gray fox, river otter, *Lontra canadensis*, mink, *Neovison vison*, long-tailed weasel, *Mustela frenata*, and muskrat, *Ondatra zibethicus*. Although the resource exists on the NRGL, they are somewhat under-utilized.

Inventory/monitoring needs

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

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.

Research needs

No known research needs at present.

Small game (rabbit, squirrel):

Current Knowledge

Rabbits (*Sylvanigus floridanus*) and squirrels are found on NRGL. Gray (*Sciurus carolinensis*) squirrels occur on the game land. Rabbits and squirrels occur throughout the Game Land.

Inventory/monitoring needs

Inventory and monitoring should be considered on an as needed basis.

Management Strategy

Continue to provide current hunting opportunities. Increased use of mulched/disced fire breaks may well provide additional small game hunting opportunities. Other current land management practices should continue to provide suitable small game habitat.

Research needs

No known research needs at present.

Northern Bobwhite:

Current Knowledge

Northern Bobwhites (quail) (*Colinus virginianus*) occur within the Whitehurst and Duck Creek Tracts of NRGL. Public hunting opportunities exist from mid-November through the end of February.

Inventory/monitoring needs

Due to the relatively small size of the Game Land, there is not enough area to create a quail call route. Harvest and flush rates could likely be gleaned from the annual quail hunter survey.

Management Strategy

Continue to provide current hunting opportunities. All burnable acres should be incorporated into a prescribed fire regime with a goal of a 3 year burn rotation. Chemical or mechanical midstory control could be exercised in existing savannahs that have been fire suppressed. Other current land management practices should continue to provide suitable habitat with an emphasis on early successional habitats and longleaf pine restoration/maintenance.

Research needs

No known research needs at present

Webless migratory:

Current Knowledge

Mourning doves (*Zenaida macroura*), snipe (*Gallinago gallinago*), and American woodcock (*Scolopax minor*) occur on the game land. Hunting opportunities exist for doves in planted as well as adjacent to most roads throughout the Game Land. Snipe and woodcock can be found on wetter sites closer to drains and creeks. Seasons and frameworks are created by the USFWS, but generally run from September through February.

Inventory/monitoring needs

Inventory and monitoring should be considered on an as needed basis.

Management Strategy

Hunting opportunities should be continued following framework set by the USFWS. Current land management practices provide suitable habitat and provide satisfactory numbers of webless migratory game birds for satisfactory hunting opportunities.

Research needs

No known research needs at present.

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 NCWRC 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 pressure to provide public outdoor recreation opportunities. These uses

include traditional activities such as hunting, fishing, trapping, and wildlife viewing, as well as other outdoor recreation pursuits. While hunting, fishing, trapping and wildlife viewing are the primary public uses of state-owned Game Lands, the NCWRC has always allowed and supported other dispersed and non-developed recreational activities. The funding sources of the NCWRC, however, are focused on natural resource management rather than recreational development. 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.

As a response to these increasing pressures, the NCWRC developed a Game Lands Use Evaluation Procedure to provide a statewide framework for determining appropriate and compatible uses for NCWRC-owned or controlled game land properties (*Appendix X*).

Hunting

Hunting is currently allowed on NRGL six days per week. Primary species pursued are Deer, turkey, quail, and waterfowl (see information needs for harvest rates). Small game and webless migratory birds (dove, woodcock, and snipe) are also hunted. Trapping occurs on the game land with raccoon, likely being the primary species sought.

Management strategies directed towards hunting and trapping should include those that help to maintain or increase the current numbers of hunters and trappers using the game land.

Acquisition of properties or easements that provide for better access to remote areas of the game land and improvement of existing unimproved roads would be primary means to help increase the available use of the game land by hunters and trappers.

Hunters attending the public hearing generally felt that access was satisfactory. A focus on active land management in heavily hunted sections of the game land will ensure that adequate numbers of game and furbearer species are present and will keep hunter and trapper interest high. Threats to a quality hunting or trapping experience include conflicts with other game land users, poorly managed habitats, poor access, and low numbers of species hunted.

Geocaching

Geocaching is a recreational activity in which participants hide and seek objects called “caches” using GPS (Geographic Position System), or other devices. Geocaching occurs at an unknown frequency at NRGL.

This is a highly unregulated activity that occurs during hunting seasons (gates are open). When administered in appropriate areas, during appropriate times, geocaching is a great outdoor activity that could be used to promote and educate the public about management activities occurring on game lands.

Target Shooting

Target shooting is reported to occur frequently on NRGL. Wildlife Enforcement has reported that several groups use the Game Land for this purpose. This activity occurs all year on NRGL. Although we

encourage the recreational use of firearms, participants need to exercise extreme caution. There are several factors of concern to management and conservation. Habitat destruction has been observed at many Game Lands throughout the Central Coastal Eco-Region. This recreational activity should be monitored closely, and actions taken if significant habitat degradation is detected. Land investigations should continue until a site suitable for a designated shooting range can be acquired. All target shooting would then be directed to that designated area. Until such lands are acquired, NCWRC should pursue regulatory actions to reduce conflicts between target shooters and other Game Land users. It should be noted that the relatively small acreage accessible to users on this game land, coupled with the lack of topography and close proximity to residential housing puts indiscriminate target shooting in direct conflict with other game lands users, including hunters.

Hiking/Walking

Hiking and walking are very popular activities on NRGL and occur year-round. There are no designated hiking trails currently located on the game land. However, there are numerous maintained paths, roads, and linear wildlife openings available for hiking/walking. Where appropriate, upgrades to unmaintained, existing paths, and roads to a maintained status would increase walking and hiking opportunities. Recent improvements on NRGL will likely increase and enhance hiking opportunities. Directional signage along roads that provide access to the game land, informational signage regarding maintained paths at key access locations (i.e. parking areas), and added signage at kiosks that indicates the best times of the year for hiking, received positive feedback during public input meeting. Infrastructure improvements needed to better facilitate this user group includes signage as noted above, development of parking areas (see infrastructure section), and the establishment of additional kiosks at key access locations. Conflicts among hunters and hikers occasionally occur. Increasing game land information available to the public through online resources and kiosks at key access locations may help reduce this source of conflict among user groups.

Horseback Riding

There are currently no designated horseback riding areas on NRGL. The development of opportunities for horseback riders to use the game land and specific recommendations from the public input meeting were reviewed and discussed by NCWRC staff. Allowing horseback riding on maintained trails would create additional erosion issues, damage to linear wildlife openings, and conflicts with hikers, hunters, and wildlife watchers. Horseback riding also exacerbates the probability of introducing additional exotic species on the game land. For this reason, we would like to prohibit horseback riding on NRGL.

Land Acquisition Plan

The current NCWRC statewide plan will address future land acquisition. Special preference will be given to inholdings, adjacent lands, those lands with critical habitats, or habitats of ecological importance. Acquisitions will be evaluated on a case by case basis, based on available funding, and will be from a willing seller. Acquisition proceedings will be conducted following the State Property Offices land acquisition procedures and Phase I and II land evaluation forms (*Appendix XI*).

Regulations/Enforcement

The following regulations and enforcement issues are identified on NRGL:

- Commercial use of game lands (statewide policy should be developed)
- Use of game lands for large events (statewide policy should be developed)
- Require all users to have game land use permit (statewide policy should be developed)
- Educational group or camp group event use permit (statewide policy should be developed)
- Unauthorized trail development
- Unauthorized camping
- Unauthorized removal of protected species from the game land

Summary of Public Input

As part of the creation of the Neuse River Game Land Management Plan, public input was solicited during the winter of 2015-16. In order to reach as many individuals as possible, Management Biologists and Supervisory staff created a series of questions to gather information that would be most valuable in the creation of Game Land Management Plans. Three venues were utilized to gather comments, public input meetings, and via an online Game Land Management Plan public comment application. Additional comments were collected via email. Public comment was collected via the online/email applications from November 30, 2015 through January 15, 2016. The public input meeting was held on December 3, 2016 at the Craven County Community College's New Bern Campus.

The following is a brief summarization and response to comments received. Comments can be found, in their entirety, in *Appendix XII*.

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

Summarization:

Four comments were received regarding habitat preferences on NRGL. 75 % of the comments received were directly related to habitats associated with game animals; primarily upland game birds. One comment expressed that there were no habitat improvements conducted on the Game Land, and that most of the Game Land is of a pocosin habitat which is claimed as unsuitable habitat for game animals.

Response:

Since acquisition, NRGL has seen significant habitat improvements. All upland acres have had prescribed burns applied at least once; most have seen fire numerous times. 55 acres of uplands, in the north east section of the Duck Creek Tract, received a thinning in 2003 to further improve that habitat type. Although it is correct that most of NRGL is pocosin (52% of Game Land), it is incorrect that it is not suitable habitat for game animals. Large expanses of pocosins are preferred habitat for black bear. This habitat type provides excellent escape and resting cover to numerous other game and non-game animals. This habitat's condition is explained further in the habitat section.

Q2) 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?

Summarization:

Five comments were received. Game animals were thought to be the most important. Specifically, White-tailed deer, turkey, waterfowl, and upland game-birds (quail and woodcock) were thought to be most important to protect and/or improve. Bald eagles and ospreys were also commented on.

Q3) How do you use this game land?

Summarization:

Four responses were received. All respondents use NRGL for "traditional" uses (hunting, trapping, and fishing). Other users represented were campers, and paddlers.

Response:

Although all respondents used NRGL for traditional uses, there were also interests in additional uses such as camping and kayaking.

Q4) Please explain why you think the current level of access is or is not, satisfactory on this game land?

Summarization:

One hundred percent of comments (3) collected regarding access were positive. Comments specifically mentioned improved signage, excellent water access for kayaks and other watercraft, and how limited access restricts unfavorable activities.

Response:

Thank you for comments provided. Limiting access during non-hunting season provides rest for fauna and infrastructure on all Game Lands. Entrance kiosks and informational signage has increased Game Land user numbers, and has also allowed NCWRC to safely manage multiple user groups.

Q5) What suggestions, if any, do you have for changing how this game land is managed and maintained?

Summarization:

Four comments were received. Three of four comments were directed towards land and timber management on NRGL. The fourth addressed waterfowl hunting on NRGL.

Response:

55 upland acres were harvested along Broad Creek Road during 2013. Harvests to reduce basal area and select for longleaf will continue as stands become merchantable. Prescribed burning activities are used, on selected sites, to also improve site index and desirability by both game and non-game animals.

Rules relating to waterfowl hunting on NRGL are consistent with other WRC owned lands. Public marsh and river swamp available for waterfowl hunting are limited. Providing these opportunities and areas for hunting are a vital part of the NCWRC's Mission.

Q6) What would encourage you to start using this game land, or to continue using it more actively?

Summarization:

Two comments were received. One individual would like to observe more game. The other appreciates the increased signage.

Response:

WRC appreciates your comments. Staff feels that game animals are available at sufficient numbers given available habitat and site indices.

Q7) What additional comments do you have regarding this game land?

Summarization:

Two comments were also received for this question. One regarding expanded habitat management and the other, the construction of a primitive campsite for kayakers.

Response:

Given soil and dedication types on NRGL, our primary habitat management technique is prescribed fire and timber management. The creation of elevated camping platforms on the Turkey Quarter Islands are currently cost prohibitive; primarily due to location. Staff recommended only pursuing infrastructure of this type with a “Friends of” style partnership similar to one used on the Roanoke River.

Appendix I.

Glossary of Terms, Acronyms, and Rankings

Bedding-Land prepared before planting in the form of small mounds. The prepared land concentrates topsoil and elevates the root zone of seedlings above temporary standing water. Fertilizer is often incorporated into the bedding.

Cape Fear Arch-The Cape Fear Arch is a special geologic feature stretching from Cape Lookout, NC to Cape Romain, SC that contains nationally significant animal and plant communities. Created in 2006, the Cape Fear Arch Conservation Collaboration is a partnership of organizations and individuals interested in protecting this region while balancing the needs of man and nature. Its mission is to develop and implement a community conservation vision to build awareness, protection and stewardship of the region's important natural resources.

CWD-Chronic Wasting Disease is a transmissible spongiform encephalopathy (TSE) of mule deer, white-tailed deer, elk (or "wapiti"), and moose ("elk" in Europe). TSEs are caused by unusual infectious agents known as prions.

DNP-Dedicated Nature Preserve-

DOD-The mission of the [Department of Defense](#) is to provide the military forces needed to deter war and to protect the security of our country. The department's headquarters is at the [Pentagon](#).

FAS-Fixed Assets-Number assigned to items for monitoring inventory.

Fire Return Interval-The average interval between fires at a given site, or the average interval between fires in an equivalent specified area.

FLIR-Forward looking infrared (FLIR) cameras, typically used on military and civilian aircraft, use an imaging technology that senses infrared radiation.

LPDV-Lymphoproliferative Disease, a cancer of turkey and chickens, is caused by a retrovirus.

NC GAP-The Gap Analysis Program (GAP) is a national program of the US Geological Survey (USGS) Biological Resources Division whose goal is to work with partners to develop data and conservation plans that serve to keep common species common. The North Carolina Gap Analysis Project (NC GAP) is the state level representative of the National Gap Analysis Program.

Onslow Bight-The Onslow Bight extends from the lower Northeast Cape Fear River to the Pamlico River and from offshore waters to approximately 30 miles inland. The area is a unique landform of barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannas and many other coastal ecosystems. In 2002, The Nature Conservancy along with several governmental agencies and private conservation groups and other interested agencies and groups, formed the North Carolina Onslow Bight Conservation Forum. This ongoing collaboration aims to increase land protection, promote appropriate land management, create habitat corridors and reach out to local communities to encourage their involvement.

TPA-Trees per Acre-The number of trees per acre vary by the distance between each tree. In plantations, the number of trees per acre would be determined by knowing the spacing within a row and the spacing between rows. In planting systems, the initial number of trees per acre can be estimated by their spacing. Within general forest management, the spacing between trees and the number of trees per acre can be used to estimate timber volumes and values, prescribe silvicultural treatments, and provide simple examples of forest growth dynamics.

V-Sheering-Slicing or cutting trees or stumps at the ground line. Shearing may be done at harvest or with a KG blade during site preparation.

State rank

S1 (1–5 extant populations): Critically imperiled in North Carolina because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from North Carolina.

S2 (6–20): Imperiled in North Carolina because of rarity or because of some factor(s) making it very vulnerable to extirpation from North Carolina.

S3 (21–100): Rare or uncommon in North Carolina.

S4 (100–1000): Apparently secure in North Carolina, with many occurrences

S5 (1000+): Demonstrably secure in North Carolina and essentially ineradicable under present conditions.

SA (1–?): Accidental or casual; one to several records for North Carolina, but the state is outside the normal range of the species.

SH (0?): Of historical occurrence in North Carolina, perhaps not having been verified in the past 20 years, and suspected to still be extant.

SR (--): Reported from North Carolina, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.

SX (0): Apparently extirpated from North Carolina.

SU (--): Possibly in peril in North Carolina but status uncertain; need more information

S? (--): Unranked, or rank uncertain

_B (1–?): Rank of breeding population in the state. Used for migratory species only.

_N (1–?): Rank of non-breeding population in the state. Used for migratory species only.

_Z (1–?): Population is not of significance conservation concern

Global rank - applies to the status of a species throughout its range, and based on data on the species' status range wide.

G1 (1–5 extant populations): Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.

G2 (6–20): Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 (21–100): Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single physiographic region) or because of other factors making it vulnerable to extinction throughout its range.

G4 (100–1000): Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 (1000+): Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH (0?): Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GX (0): Believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

GU (--): Possibly in peril range-wide, but status uncertain; need more information

G? (--): Unranked, or rank uncertain

G_Q (--): Questionable taxonomic assignment.

T_ (--): The rank of a subspecies or variety.

Appendix II

References and Literature Cited

Craven County Joint CAMA Land Use Plan. October, 2009

Hellgren, E. C., M.R. Vaughan, and D .F. Stauffer. 1991. *Macrohabitat use by black bears in a southeastern wetland*. Journal of Wildlife Management. 55:442-448

Hellgren, E. C., and M. R. Vaughan. 1988. *Seasonal food habits of black bears in Great Dismal Swamp, Virginia- North Carolina*. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies. 42:295-305.

LeGrand, H.E., Frost, C.C., Fussel, J.O. 1992. Regional Inventory for Critical Natural Areas, Wetland Ecosystems, and Endangered Species Habitats of the Albemarle-Pamlico Estuarine Region. Phase 2.

Jones, M. D. and M. R. Pelton. 2003. *Female American black bear use of managed forest and agricultural lands in coastal North Carolina*. University of Tennessee. Knoxville, Tennessee

Landers, J. L., R.J. Hamilton, A. S. Johnson, and R.L. Marchinton. 1979. *Foods and habitat of black bears in southeastern North Carolina*. Journal of Wildlife Management 43:143-153.

Lombardo, C. A. 1993. *The population ecology of black bears on Camp Lejeune, North Carolina*. Thesis, University of Tennessee, Knoxville, Tennessee, USA.

Maehr, D. S., T. S. Hootor, L. J. Quinn, and J. S. Smith. 2001. Black Bear habitat management guidelines for Florida. Technical Report No. 17. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida, USA

North Carolina Wildlife Resources Commission. 2005. North Carolina Wildlife Action Plan. Raleigh, NC.

North Carolina Wildlife Resources Commission. 2015. North Carolina Wildlife Action Plan. Raleigh, NC.

Robbins, L. & Myers, R. (1992). Seasonal effects of prescribed burning in Florida: A review. Tall Timbers Re-search Station Miscellaneous Publication 8. Tallahassee, FL: Tall Timbers Research Station & Land Conservancy.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. North Carolina Natural Heritage Program, Raleigh, NC.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

U. S. Department of Agriculture, Soil Conservation Service, 1989. Soil Survey of Craven County, North Carolina.

http://www.landscape.org/explore/natural_geographies/ecoregions/Mid-Atlantic%20Coastal%20Plain
(11/26/2013)

http://www.nc-climate.ncsu.edu/climate/nc_extremes.php (1/28/15)

<http://ncwater.org/?page=525> (2/9/15)

<http://www.water.ncsu.edu/watershedss/info/wetlands/wetloss.html#ag> (2/25/15)

<http://content.ces.ncsu.edu/average-first-fall-frost-dates-for-selected-north-carolina-locations/>
(11/5/15)

http://climate.ncsu.edu/climate/nc_extremes.php (11/5/15)

<http://www.water.ncsu.edu/neuse.html>, 11/16/15

<http://censusviewer.com/county/NC/Craven> (11/2/15)

<http://content.ces.ncsu.edu/average-growing-season-for-selected-north-carolina-locations/> (11/5/15)

Appendix III.

Articles of Dedication



North Carolina
Department of Administration

Beverly Eaves Perdue, Governor

Moses Carey, Jr., Secretary

February 20, 2012

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

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

Re: Dedication of Portions of the **Neuse River Game Land**, Craven County

Dear Secretary Freeman and Mr. Myers:

Pursuant to Article 9A, Chapter 113A of the North Carolina General Statutes, this letter of allocation is executed for the purpose of dedicating the State-owned lands hereinafter described as a North Carolina Nature Preserve. These articles of dedication replace the articles of dedication dated May 2, 2005.

This real property is currently administered by the North Carolina Wildlife Resources Commission as a portion of the Neuse River Game Land and consists of approximately 3,257 acres located in Craven County, composed of:

- | | |
|-------------------------------------|-------------|
| 1. Neuse River tract (Primary Area) | 2,605 acres |
| 2. Neuse River tract (Buffer Area) | 652 acres |

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

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

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

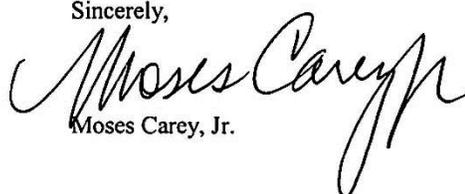
Location:
116 West Jones Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer

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

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

Sincerely,



Moses Carey, Jr.

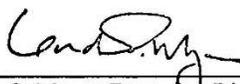
MC

Attachment

CONSENTED AND AGREED TO:

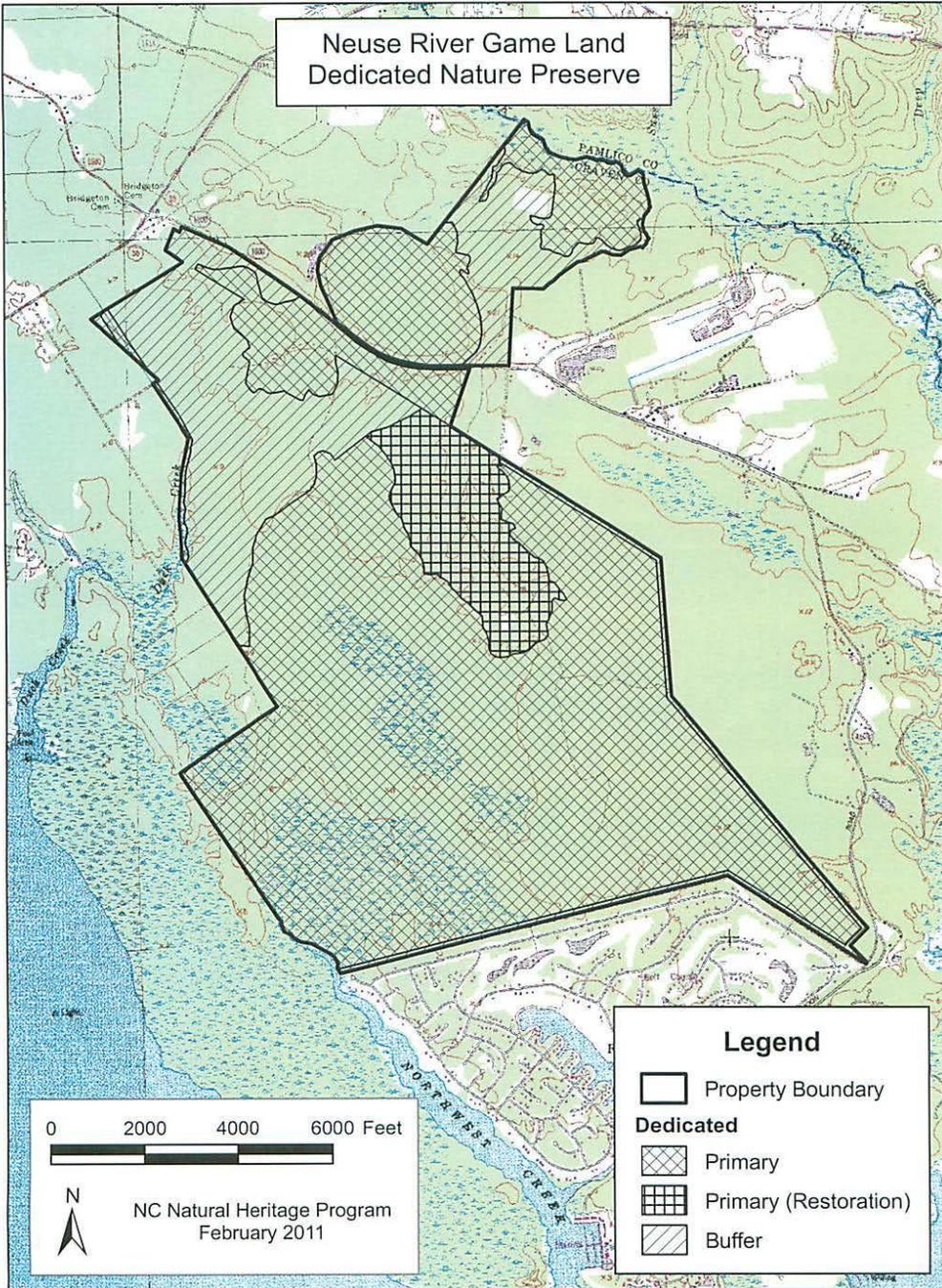


Secretary Dee Freeman
Department of Environment and Natural Resources



Gordon S. Myers, Executive Director
Wildlife Resources Commission

Neuse River Game Land
Dedicated Nature Preserve



Legend

□ Property Boundary

Dedicated

▨ Primary

▩ Primary (Restoration)

▧ Buffer

0 2000 4000 6000 Feet



NC Natural Heritage Program
February 2011

EXHIBIT A
NEUSE RIVER GAME LAND
DEDICATED NATURE PRESERVE

COUNTY: Craven

PHYSIOGRAPHIC PROVINCE: Coastal Plain

TOPO QUAD: Upper Broad Creek, Reelsboro, New Bern

SIZE OF AREA: ca. 3,257 acres (primary area 2,605 acres, including a restoration area of 236 acres; buffer area 652 acres)

OWNER/ADMINISTRATOR: North Carolina Wildlife Resources Commission

DESCRIPTION: The dedicated area includes areas that have been known as Duck Creek Flatwoods and Devil's Garden Sand Ridge. It is a low-lying landscape of gentle sandy ridges and muck-filled swales, with several Carolina bays. It lies near the estuarine lower portion of the Neuse River, and borders several tidal creeks. The natural area supports a mosaic of Coastal Plain natural communities in fair to very good condition, interspersed with areas more altered by logging and other disturbances.

The most extensive communities are Pond Pine Woodland and Wet Pine Flatwoods. The Pond Pine Woodland communities of the swales and Carolina bays have open to nearly closed canopies of pond pine (*Pinus serotina*), with a tall and very dense shrub layer beneath. Sweet gallberry (*Ilex coriacea*) and fetterbush (*Lyonia lucida*) typically dominate the shrub layer. Some of these communities in the primary area have been thinned but have not been pushed beyond the natural range of density, while substantial areas have not had recent disturbance. Most of the Pond Pine Woodlands in the buffer area have been clearcut or heavily thinned.

Wet Pine Flatwoods, occurring on the low sand ridges, have open canopies of longleaf pine (*Pinus palustris*) and pond pine (*Pinus serotina*). There is little subcanopy, and the ground cover is a dense bed of wiregrass (*Aristida stricta*), bracken fern (*Pteridium aquilinum*), and a variety of low shrubs. Most of the Wet Pine Flatwoods have been logged fairly recently, leaving a remnant canopy of young trees depleted in longleaf pine. The Wet Pine Flatwoods in the primary area have substantial amounts of wiregrass that have survived past fire suppression and the disturbance of logging, so that the potential for recovery over time is good. Those in the buffer area are more heavily disturbed or degraded by fire suppression, and have little wiregrass or longleaf pine remaining. One rare plant species, northern white beaksedge (*Rhynchospora alba*), has been reported from this part of the site, but has not been relocated recently.

A few of the highest sandy hummocks and Carolina bay rims support Pine/Scrub Oak Sandhill communities, which are dominated by longleaf pine but have an understory of scrub oaks. The ground cover is naturally dominated by wiregrass. It has an increased component of shrubs,

primarily dangleberry (*Gaylussacia frondosa*), due to lack of fire. Smaller areas of the even drier Xeric Sandhill Scrub also occur on the site.

The northern portion of the site has a mosaic of upland hardwood forest communities on slightly more dissected land above Upper Broad Creek. Dry-Mesic Oak–Hickory Forest, dominated by white oak (*Quercus alba*), is the most abundant. Water oak (*Quercus nigra*), other oaks, loblolly pine (*Pinus taeda*), and hickory (*Carya alba*) also occur in these forests. Lower portions of the upland mosaic are Mesic Mixed Hardwood Forests, with beech (*Fagus grandifolia*), white oak, and swamp chestnut oak (*Quercus michauxii*) making up the canopy. A few small areas are Dry Oak–Hickory Forest, with white oak codominating with southern red oak (*Quercus falcata*) and post oak (*Quercus stellata*). Along the small intermittent streams that drain through this area are Coastal Plain Small Stream Swamp forests dominated by swamp black gum (*Nyssa biflora*), sweetgum (*Liquidambar styraciflua*), and water oak. All of these forests are mature, with trees averaging over 12 inches in diameter. The occurrence of these communities is unusual this far east in the Coastal Plain.

The creek floodplains support communities that are influenced by the freshwater or oligohaline tidal waters from the Neuse River. Along the northern edge of the site, on Upper Broad Creek, is a Tidal Cypress–Gum Swamp. This community is dominated by swamp black gum with abundant bald-cypress (*Taxodium distichum*) and red maple (*Acer rubrum* var. *trilobum*). Wax myrtle (*Morella cerifera*) and switch cane (*Arundinaria tecta*) form a patchy shrub layer. This community has a diverse and well-developed herbaceous layer. Though there are numerous canopy gaps created by recent storms, the forest is otherwise mature.

The head of a small tidal creek occurs on the game land at its southwest corner. It has a small area of Tidal Freshwater Marsh dominated by sawgrass (*Cladium jamaicense*). Also of note here is a beaver pond created by damming the tidal creek within the marsh. This is the only example in the Natural Heritage Program database of a beaver pond in a tidal marsh.

BOUNDARY JUSTIFICATION: The primary boundary is drawn to include the areas of natural communities that are free of recent disturbance and the areas of Wet Pine Flatwoods and Pine/Scrub Oak Sandhill that, though recently logged, retain some longleaf pine component and some wiregrass. These are the portions of these communities that can be expected to readily recover to natural condition with time and fire management. An area with intact ground cover but little longleaf pine component is designated as a primary restoration area.

The buffer area includes more disturbed areas that will not recover to natural conditions without a much longer time or substantial restoration effort, but which provide additional habitat for many of the species characteristic of these communities. The buffer also includes a band of about 100 feet wide where the Pond Pine Woodland community adjoins adjacent properties, to facilitate creation of fire breaks needed to burn this community.

MANAGEMENT AND USE: Neuse River Game Land is managed for wildlife conservation and public hunting.

The most important management activity needed in the dedicated area is prescribed fire. The Wet Pine Flatwoods, Pine/Scrub Oak Sandhill, and Xeric Sandhill Scrub communities depend on frequent fire to retain their natural character and species composition. All have deteriorated to some degree because of past lack of fire. Within the primary areas, much of this damage is likely to be reversible with several fires. In areas with greatly reduced numbers of longleaf pine, planting of longleaf pine seedlings may be appropriate to speed recovery of natural canopy composition. Planting will also be crucial if the longleaf pine communities in the buffer areas are ever to be restored.

The Pond Pine Woodland communities also need fire. Appropriate intervals and fire intensities are not yet well known but initial experimental burning is encouraged. Though more subtle, some deterioration due to lack of fire is visible in these communities. For example, red maple is present in some portions of them.

The upland hardwood forests are not well known to depend on fire, but fire may be important for the long term health of the oak communities. While fire does not appear to be urgent at present, allowing prescribed fires to spread into them under mild conditions may be beneficial.

The wetter communities along the tidal creeks do not have any known special management needs. Rising sea level will gradually change these communities, with the Tidal Cypress-Gum Swamp eventually thinning and developing into Tidal Freshwater Marsh. The tidal areas should be monitored for invasion by common reed (*Phragmites australis*), which represents a threat to the development of native marsh communities.

THIS DEDICATION OF THE NEUSE RIVER 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 Neuse River Game Land Nature Preserve (hereinafter "preserve") for the purposes provided in the North Carolina Nature Preserves Act, as amended, and other applicable law, and said State-owned land, shall be held, maintained, and used exclusively for said purposes.

3. **Primary Custodian:** The primary custodian of the preserve will be the North Carolina Wildlife Resources Commission, which will be responsible for managing the preserve in accordance with State Administrative Code 15 NCAC 12H.300.
4. **Primary Classification:** The primary classifications and purposes of the preserve will be conservation, nature education, wildlife management, hunting, fishing, trapping, and other recreational uses authorized by the Primary Custodian. The ecological significance of the preserve is described in Exhibit A.
5. **Management Areas:** For the purposes of management, the preserve shall be considered to consist of a Primary Area (approximately 2,605 acres) and a Buffer Area (approximately 652 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 Wet Pine Flatwoods, Pine/Scrub Oak Sandhill, Pond Pine Woodland, Dry-Mesic Oak-Hickory Forest, Mesic Mixed Hardwood Forest, Coastal Plain Small Stream Swamp, Tidal Cypress-Gum Swamp, and Tidal Freshwater Marsh natural community types. The Primary Area also includes associated rare species populations.

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

The Buffer Area, which contributes to the management and protection of the Primary Area, consists of disturbed longleaf pine forest communities with lower potential for recovery, based on the condition of the canopy and herb layer.

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

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

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

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

- B. Consumptive Wildlife Uses: Hunting, fishing, and trapping shall be permitted on the preserve subject to regulations and management by the North Carolina Wildlife Resources Commission.
- C. Orientation and Guidance of Visitors: The Custodian reserves the right to orient and guide visitors for educational programs, hunting and fishing uses, scientific research, and for preserve management. Exhibits, programs, and printed materials may be provided by the Custodian in service areas. The Custodian may restrict access to visitors in those instances or in such areas that restrictions may be determined necessary to safeguard sensitive environmental resources in the preserve.
- D. Disturbance of Natural Resources: The cutting or removal of trees, dead or alive, or the disturbance of other natural resources is prohibited except as necessary for removal of hazards to visitors, control of disease that would damage or reduce the significance of the preserve, restoration after severe storm damage, trail clearance and maintenance, or for purposes of maintenance or restoration of natural communities or rare species populations as stipulated in the preserve management plan and that which is consistent with the purposes of these Articles.

Specifically, a component of the management plan, the longleaf restoration plan, will address restoration of areas (identified as Primary (Restoration) Areas in Exhibit A map) which have retained the herbaceous component of longleaf pine communities, but has little longleaf in the canopy. Longleaf restoration will focus on restoring the structure and composition of natural longleaf pine communities. The longleaf restoration plan will be submitted to the Natural Heritage Program for review and approval. Subsequent modification of the longleaf restoration plan may occur through mutual consent of Wildlife Resources Commission and Natural Heritage Program staff, as additional areas in need of restoration or new methods of restoration are determined. Salvage timber cuts which may be necessary due to natural catastrophe will be allowed in both Primary and Buffer Areas, but in a manner that will contribute to the recovery of the prevailing natural conditions of the forest and in consultation with the North Carolina Natural Heritage Program.

- E. Wild Fire Control: 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:** Construction and maintenance of roads, trails, and other access structures within Primary and Buffer Areas of the preserve will be limited to the level necessary to appropriately manage the preserve. New roads shall not be constructed in the Primary Area. When necessary, the Custodian may construct and maintain access limited to staff use for management purposes, such as service paths (single lane vegetated paths) for patrol, right-of-way maintenance, and other management activities, within the Primary Area. Number and width of new paths will be minimized, and sensitive areas avoided when possible. Existing roads that occur within or form a boundary of the Primary Area may be maintained by grading of the roadbed, replacing culverts, or adding stone as needed in order to maintain the integrity of the road for vehicular use. Daylighting of roads within the Primary Area should be minimized, but may be used if necessary to maintain the condition of the road. Access management and construction will be part of the overall management planning process and will include consultation with the North Carolina Natural Heritage Program.
- L. **Other Structures and Improvements:** Structures or facilities shall not be erected by the Custodian within a preserve, except as may be consistent with the purposes of the preserve as stated in this dedication. Site selection shall be consistent with this dedication.
- M. **Management Plan:** The Wildlife Resources Commission, as Primary Custodian of the preserve, shall be required to prepare and submit for approval to the Secretary of the Department of Environment and Natural Resources a management plan for the preserve. The management plan will be part of the larger management plan developed for the gamelands. This plan shall be subject to all the provisions of this dedication and shall additionally be consistent with the management principles set forth in the North Carolina Administrative Code 15 NCAC 12H.0300 and such other regulations as may be established from time to time by the Secretary of the Department of Environment and Natural Resources. In any case where contradictions may arise between this instrument of dedication and other management regulations, the terms of this dedication shall take precedence.
7. **Rules for Management of the Buffer Area(s):** Primary area rules also apply except that additional forestry and wildlife management activities may be planned and carried out as needed. 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."

Appendix IV

Cultural Resources 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.

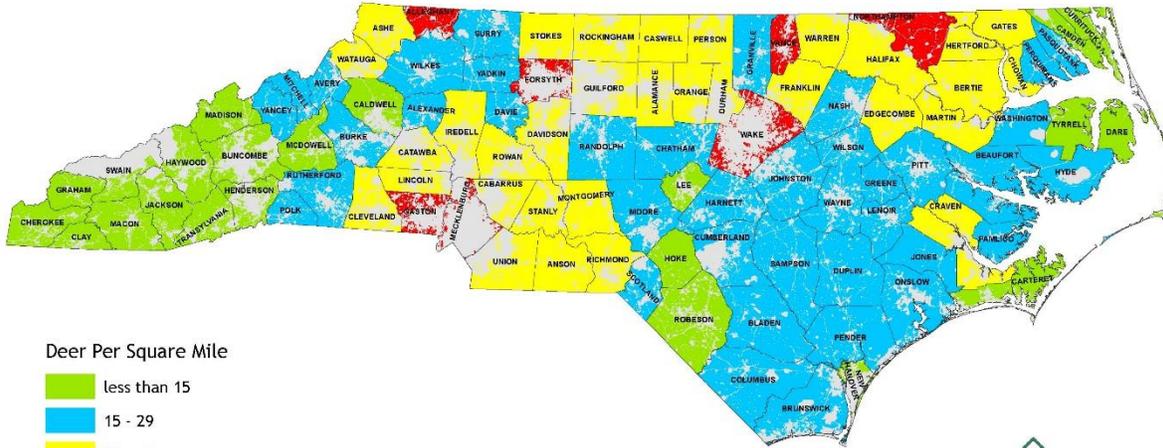
Prohibitions and penalties under the law are as follows:

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.

Appendix V

2015 Deer Density Map

2015 North Carolina White-Tailed Deer Density



Deer Per Square Mile

- less than 15
- 15 - 29
- 30 - 44
- 45 and greater

No Density Estimate

Where harvest data are not available to produce density estimates because hunting is limited or prohibited: includes federal and state parks, municipal boundaries, water bodies, and human density greater than 1 person per 2 acres.



Wildlife Management Division

Appendix VII

Ad Hoc Deer Evaluation Tool



Evaluating Proposed Changes in Deer Hunting Regulations

November 2010

Herein, we present the North Carolina Wildlife Resource Commission's (NCWRC) goal for deer hunting and management, and provide a process using biological and non-biological parameters for evaluating proposed changes in deer hunting regulations. This process was developed during 2010 by an Ad-hoc committee (see page 15) in the Division of Wildlife Management (DWM). Development of this protocol specifically addresses two elements of the NCWRC's Strategic Plan:

Goal 3 - Strategic Objective 2-- Emphasize best available science in the application of fish and wildlife management programs, and

Goal 7- Strategic Objective 2-- Identify and review core processes to ensure efficiency and effectiveness and evaluate how rules and processes are supporting the needs of the resources.

In addition, this effort directly addresses Objectives 2.1.1, 3.3.9, 3.3.11, 3.6.6, 4.1.16, and 5.2.2 in the DWM Strategic Plan.

The deer management goal provided herein is intended to encompass all aspects related to management of the deer herd and deer hunting throughout the state. However, achieving this goal via hunting will be challenging in urban areas or other places where hunting pressure is limited (Figure 1).

Biological and non-biological evaluations of proposed regulation changes should be completed using evaluation sheets on Pages 4 and 5. Although subjective interpretation may be required to overcome some shortcomings and possible biases in the data, the evaluations are designed to be as objective as possible by relying heavily on data. The biological evaluation of a proposal generates a numerical "score" that indicates the expected impacts on meeting the stated biological objectives. Information related to hunter attitudes, fiscal impacts, administration, and other non-biological issues are presented in such a way as to summarize the overall support, impact, and desirability of a given regulation change proposal.

The timeline presented on Page 6 outlines how the biological and non-biological evaluations can be incorporated into the regulatory process. Following the proposed process will enable the NCWRC to proactively promote sound deer management. Doing so will focus efforts toward developing regulations that address hunter satisfaction and other non-biological issues, but only after ensuring that proposed changes will not have negative biological impacts. The biological parameters (e.g., reported deer harvest, sex and age data, estimated breeding dates) used in the evaluation process draw from scientific knowledge, empirical data, and working experience of NCWRC biologists. Although not perfect, this is currently the best information available and is appropriate for this type of evaluation. Future adjustments may be desirable as data collection and reliability improves.

Goal

The NCWRC goal for deer hunting and management is to:

Use science-based decision making and biologically-sound management principles to assure long-term viability of deer populations at desirable levels of health, herd composition, and density with respect to land cover type and use, hunter satisfaction, and overall social acceptance.

Achievement of this goal would be reflected by a well-managed herd that:

- may be managed with hunting as the primary tool,
- carries with it a primarily positive resource value, with acceptable levels of long-term negative impacts to people, property, and other natural resources,
- is capable of supporting a broad range of traditional and new hunting opportunities,
- is capable of accommodating diverse landholder deer management goals,
- does not exceed the land's ability to sustain it, and
- can be evaluated using the following biological parameters:
 1. a viable population is maintained within nutritional carrying capacity,
 2. all age classes of bucks and does are adequately represented,
 3. adult sex-ratios are balanced during breeding season to increase the likelihood of synchronized breeding and parturition,
 4. yearling buck dispersal is adequate,
 5. standing genetic diversity is maintained,
 6. the herd is free-ranging, and
 7. the risk of disease introduction and transmission is minimal.

Biological Evaluation of Proposed Deer Regulation Change

| |
|---|
| Proposal Number: Area and regulation(s): |
|---|

In regard to achieving and/or maintaining biological objectives, are current trends expected to be **improved**, **worsened**, or **not affected** by this proposed rule change?

| Biological Objective | For the area considered, what is the 3-year average and trend? | Points to be awarded in answer to the question above | | | Points |
|---|---|--|----------|-------------------------|--------|
| | | Improved | Worsened | Not Affected or No Data | |
| Harvest of at least 1.0 antlered buck/mi ² , or if less than 1.0 buck/mi ² the area has a stable or increasing trend. | | 30 | -30 | 0 | |
| Total adult doe harvest (i.e., excluding fawns) is comprised of 30-35% yearling does (1.5 years old). | | 10 | -10 | 0 | |
| Total antlered buck harvest (i.e., excluding button bucks) is comprised of no more than 30% yearling bucks (1.5 years old). | | 10 | -10 | 0 | |
| Total harvest is comprised of at least 50% does. | | 10 | -10 | 0 | |
| Sex composition of harvest that occurs prior to peak breeding is comprised of at least 50% does. | | 10 | -10 | 0 | |
| No more than 20% of total antlered buck harvest (i.e., excluding button bucks) occurs before the time of peak breeding. | | 10 | -10 | 0 | |
| Deer are a naturally occurring product of the landscape. There is no genetic manipulation and movements are not restricted. | | 20 | -20 | 0 | |
| The risk of disease transmission is reduced. | | 20 | -20 | 0 | |
| Explanation of Score: A positive (+) score indicates an overall expected improvement over current regulations. A negative score (-) indicates an expectation that the proposed change will hinder meeting biological objectives. The highest possible score is +100% and the lowest possible score is -100%. | Total Points _____ Maximum Points Possible <u>120</u> Biological Score _____ % (% of total points possible) | | | | |
| Comments: | | | | | |

Evaluation of Non-Biological Issues Related to Proposed Deer Regulation Change

| |
|---|
| Proposal Number: Area and regulation(s): |
|---|

In considering whether to support this proposed regulation, what is the current level of support or expected impact for the following parameters?

| | | Direction and Magnitude of Support or Impacts | | | | | | Source of Information | Comments |
|----------------------------|---|---|----------|--|----------|---------|-----------------------|---------------------------------|--|
| | | Positive | | Neutral Support or Little to No Impact | Negative | | Unknown | | |
| | | Strong | Moderate | Impact | Moderate | Strong | | | |
| Parameter | Strong | Moderate | Impact | Moderate | Strong | Unknown | Source of Information | Comments | |
| Constituent Considerations | 1. Deer hunters: Expected level of support | | | | X | | | Example- Professional Knowledge | Example- Some hunters oppose additional either-sex opportunities |
| | 2. Deer hunters: Expected impacts on hunting opportunity/long term satisfaction | X | | | | | | Example- Professional Knowledge | Example - Additional either-sex opportunities not expect to negatively impact herd |
| | 3. Other hunters: Expected level of support | | | | | | | | |
| | 4. Other hunters: Expected impacts on hunting opportunity/long term | | | | | | | | |
| | 5. Landowners: Impacts and/or support as noted in comments | | | | | X | | Example Survey from 2009 | Example - 75% of landowners are opposed to this type of regulation |
| | 6. Non-hunters: Impacts and/or support as noted in comments | | | | | | | | |
| | 7. Fiscal impacts to constituents | | | | | | | | |
| Agency Considerations | 8. Impacts on hunter retention and recruitment | X | | | | | | Example - License data | Example - Similar regulation changes have not impacted license sales in the past |
| | 9. Impacts on enforceability | X | | | | | | Example - DLE comments | Example - LE staff feels this change will improve ability to enforce regulations |
| | 10. Impacts on ability to monitor changes in the deer herd | | | | | | | | |
| | 11. Impacts to agency administration | | | | | | | | |
| | 12. Impacts on regulation complexity | | | | | | | | |
| | 13. Fiscal impacts to NCWRC | | | | | | | | |
| | 14. Other: | | | | | | | | |
| 15. Other: | | | | | | | | | |
| Comments: | | | | | | | | | |

Timeline

Evaluating Proposed Changes in Deer Season Regulations

| Deadline | Task |
|--|---|
| November through January NCWRC Meeting | DWM staff and NCWRC Big Game Committee develop regulation change proposals based on management needs and public input. |
| Mid-January | All proposals related to deer, whether originated by staff or Commissioners, are due to the DWM Rules Biologist. |
| Early February | Evaluation Group (i.e., DWM Deer Committee and biologists from affected areas) meets to make biological evaluations and preliminary non-biological evaluations. Proposals receiving a negative (-) biological score do not continue forward, but are returned to originator with explanation and comments regarding how to improve the proposal if submitted in a future regulation cycle. |
| Mid-February | All non-deer proposals are due to DWM Rules Biologist. |
| March 1-31 | District meetings. Evaluation sheets for biological evaluations and preliminary non-biological evaluations are presented for staff consideration and comment. |
| Mid-April | DWM rules meeting. Final non-biological evaluation (if different from preliminary evaluation made by Evaluation Group) is made based on input from district meetings. |
| Mid-April | Central staff meeting |
| May NCWRC Meeting | Commissioners receive a handout with the proposals and explanations for each. The 1-page evaluation sheets (both biological and non-biological) are attached to deer proposals in this handout. This is an informational handout only with no action required by the NCWRC. |
| July NCWRC Meeting | NCWRC meeting to vote on proposals to send to public hearings. |
| August 1 to October 1 | Public comment period |
| September | Public Hearings |
| October NCWRC Meeting | NCWRC reviews public comments |
| November NCWRC Meeting | NCWRC votes on proposals |
| December | Rules Review Commission reviews proposals |
| August 1st of following year | Approved proposals go into effect |

Biological Objectives and Current Herd Status

Herein, we describe our recommended biological objectives and evaluate the current status of the deer herd. The data are the result of multiple collection techniques across the state. The numbers may be biased in certain ways based on the method by which the data were collected. The interpretation of the data thus must be made with the understanding of how and to what extent some of the collection biases might affect these numbers. Meeting all objectives may not be feasible in areas where hunting is limited by land-use practices, soil productivity is poor, or deer habitat is suboptimal.

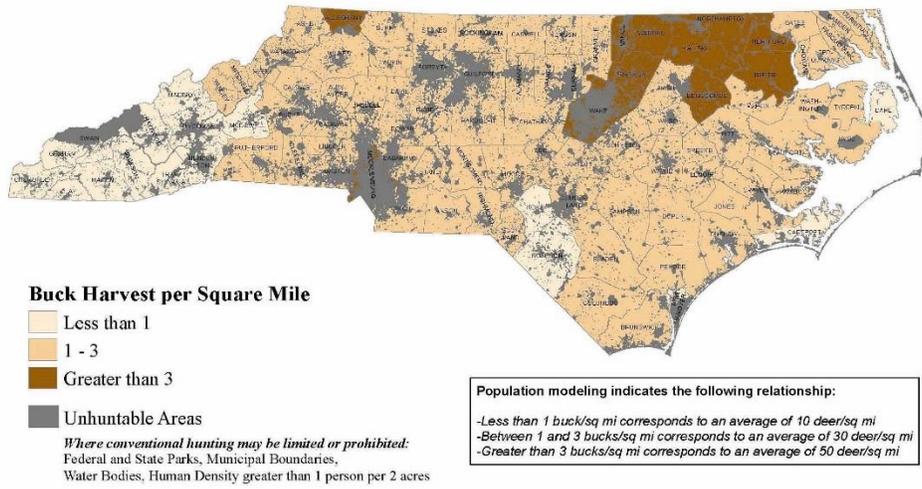
Biological Objective #1: Harvest of at least 1.0 antlered buck/mi², or if less than 1.0 antlered buck/mi² the area has a stable or increasing trend.

Justification: In general, a harvest of 1.0 antlered buck/mi² is indicative of a minimum deer density consistent with our stated deer management goal.

Data Reliability: While reported harvest may not exactly reflect actual harvest, reporting rates and associated biases are relatively consistent over time. This is our most useful information with respect to relative deer abundance at this time.

Current Status of Herd: Currently, all counties within the state exhibit an antlered buck kill of >1 antlered buck/mi², except for a few low productivity areas (Figure 1). However, in these areas antlered buck harvest remains stable or is slowly increasing.

Figure 1. Reported Antlered Buck Harvest per Huntible Square Mile
 (3-Year Average, 2007-2009)



Biological Objective #2: Total adult doe harvest (excluding fawns) is comprised of 30 - 35% does that are 1.5 years old.

Justification: The percentage of yearling does (1.5 years old) in the adult doe harvest is a good indicator of the harvest pressure placed on the doe segment of the population and is indicative of expected future population trends. Populations are expected to remain relatively stable at a density consistent with our stated deer management goal when yearling does comprise 1/3 of adult doe harvest. Conversely, in areas of low productivity where a population increase is desired, the percentage should remain below 30% (Downing and Guynn 1985).

Data Reliability: Current data is limited in some areas because of low sample size and distribution of samples.

Current Status of Herd: Although data are somewhat limited, harvest pressure on the doe segment across the state appears to be approaching the lower end of the desired range.

Table 1. Yearling Representation in Total Adult Doe Harvest (3-year average, 2007-2009).

| Season Framework | Percentage of Yearling Does in Total Adult Doe Harvest |
|------------------|--|
| Western | 30 |
| Northwestern | 29 |
| Central | 26 |
| Eastern | 29 |

Biological Objective #3: Total buck harvest (excluding button bucks) is comprised of no more than 30% yearling bucks (1.5 years old).

Justification: The percentage of yearling males (1.5 years old) in the antlered male harvest is a good indicator of harvest pressure placed on adult males within the hunting season (Downing and Guynn 1985). Regulations and management techniques aimed at creating a more biologically balanced male age structure should strive to minimize harvest pressure on yearling bucks when possible (Keyser et al. 2006).

Data Reliability: These data are very sensitive to bias in data collection methods and can be affected by hunter selectivity. For example, data collected via DMAP likely reflects a preference for harvesting older age class bucks. Much of the data in the Eastern framework comes from DMAP clubs, and therefore likely underestimates yearling harvest.

Current Status of Herd: Although data are somewhat limited, yearling buck harvest appears to be substantially higher than desired across the state.

Table 2. Yearling Representation in Total Antlered Buck Harvest (3-year average, 2007-2009).

| Season Framework | Percentage of Yearling Bucks in Total Adult Buck Harvest |
|------------------|--|
| Western | 45 |
| Northwestern | 49 |
| Central | 37 |
| Eastern | 35 |

Biological Objective #4: Total harvest is comprised of at least 50% does.

Justification: The percent of does in the total harvest is a good indicator of the effects of the annual harvest on population trends (Hayne and Gwynn 1977). Achieving this objective will also result in more balanced sex ratios. However, in areas of low productivity where a population increase is desired, the percentage should remain well below 50%.

Data Reliability: While reported harvest may not exactly reflect actual harvest, reporting rates and associated biases are relatively consistent over time. This parameter is heavily dependent on the actual number of bucks killed. The percentage of does in the harvest can vary substantially if buck harvest is impacted by changes in regulations, hunter selectivity, or other factors.

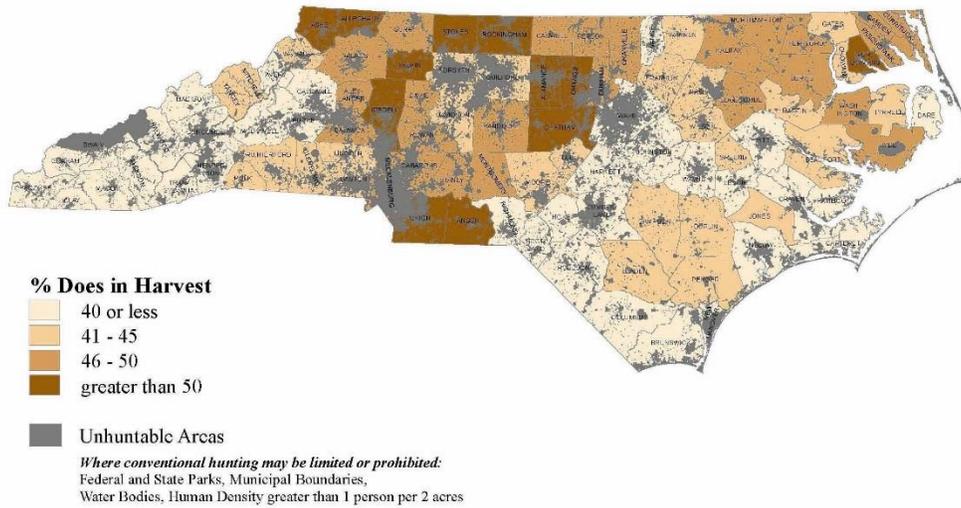
Current Status of Herd:

Current 3 year trends indicate that two of the four frameworks are approaching 50%. Limited either-sex opportunities in the Western Season account for lower numbers, which is appropriate in low productivity areas where a population increase is desired (Figure 2).

Table 3. Sex Composition of Total Harvest (3-year average, 2007-2009).

| Season Framework | Percentage of Does in Total Harvest |
|------------------|-------------------------------------|
| Western | 37 |
| Northwestern | 49 |
| Central | 49 |
| Eastern | 42 |

Figure 2. Percentage of Does in Total Reported Deer Harvest
 (3-Year Average, 2007-2009)



Biological Objective #5: Sex composition of harvest that occurs prior to peak breeding is at least 50% does.

Justification: Achieving this objective will ensure that does are not overrepresented in the population at peak breeding periods. This ensures adequate breeding of females during the first estrous period, fawn births occur during an optimal and relatively short span of time, and increases available food resources later in the season (Gruver et al. 1984).

Data Reliability: While reported harvest may not exactly reflect actual harvest, reporting rates and associated biases are relatively consistent over time. Peak breeding dates are approximate, and may differ somewhat across areas within deer season frameworks (Weber 1966).

Current Status of Herd: The percentage of does in the pre-breeding harvest falls short of the objective in all deer season frameworks. This is due to both a difference in when breeding occurs across the state and also a long standing tradition of hunting bucks early in the season and shooting does later. However, it should be noted that values for the Northwestern Season are close to meeting the objective.

Table 4. Sex Composition of Pre-Breeding Harvest (3-year average, 2007-2009).

| Season Framework | Approximate Date of Peak Breeding | Percentage of Does in Harvest That Occurs Prior to Peak Breeding |
|------------------|-----------------------------------|--|
| Western | November 28 | 36 |
| Northwestern | November 21 | 47 |
| Central | November 15 | 42 |
| Eastern | November 1 | 37 |

Biological Objective #6: No more than 20% of the total buck harvest (excluding button bucks) occurs before the time of peak breeding.

Justification: In areas with appropriate levels of buck harvest, achieving this objective will ensure that successful yearling buck dispersal is adequate (Rosenberry et al. 1999). This objective also ensures adequate breeding of females during the first estrous period and fawn births occur during an optimal and relatively short span of time (Gruver et al. 1984).

Data Reliability: While reported harvest may not exactly reflect actual harvest, reporting rates and associated biases are relatively consistent over time. Peak breeding dates are approximate, and may differ somewhat across areas within deer season frameworks. These numbers are greatly influenced by the amount and type of hunting opportunity before and after peak breeding.

Current Status of Herd: This parameter has not been met in any of the deer season frameworks.

Table 5. Buck Harvest in Relation to Date of Peak Breeding (3-year average, 2007-2009).

| Season Framework | Approximate Date of Peak Breeding | Percentage of Total Antlered Buck Harvest That Occurs Prior to Peak Breeding |
|------------------|-----------------------------------|--|
| Western | November 28 | 61 |
| Northwestern | November 21 | 44 |
| Central | November 15 | 38 |
| Eastern | November 1 | 34 |

Biologic Objective #7: Deer are a naturally occurring product of the land, there is no genetic manipulation, and movements are not restricted.

Biologic Objective #8: The risk of disease transmission is reduced.

These final two biological objectives apply more appropriately when considering new or proposed regulation changes. Avoiding genetic manipulation by minimizing the potential impacts of selective harvest and ensuring natural genetic flow across the landscape is paramount to sound deer management (Strickland et al. 2001). Furthermore, protecting or minimizing the risk of disease introduction and/or spread remains a significant objective of the deer management program (Williams et al. 2002). In general, these objectives are met equally well across all season frameworks. Regulations regarding baiting, supplemental feeding, Chronic Wasting Disease, and captive cervids all impact these objectives.

Recommendations

Division of Wildlife Management staff recommends that:

- the NCWRC adopt the following goal statement:

The NCWRC's goal for deer management and hunting is to use science-based decision making and biologically-sound management principles to assure long-term viability of deer populations at desirable levels of health, herd composition, and density with respect to land cover type and use, hunter satisfaction, and overall social acceptance;
- the NCWRC approve and implement the regulation change proposal evaluation process for deer management and hunting presented herein; and
- the Division of Wildlife Management
 - identify known data limitations and implement strategies for improvement,
 - assess habitat quality statewide and delineate appropriate deer management units, and
 - set specific biological objectives for deer management units and, if applicable, develop regulations to achieve those objectives.

Ad-hoc Deer Season Evaluation Committee

Christopher D. Kreh – District 7 Wildlife Biologist, **Committee Chair**

Scott Anderson – GIS Biologist

Joffrey Brooks – Management Biologist, Mountain Region

David Cobb, Ph.D. – Chief, Division of Wildlife Management

Brad Gunn – Administration and Planning Section Manager

Isaac Harrold – Public and Private Lands Section Manager

Brad Howard – Private Lands Program Coordinator

Tommy Hughes – Supervising Wildlife Biologist, Coastal Region

David Sawyer – Surveys and Research Program Coordinator

Jonathan Shaw, Ph.D. – District 6 Wildlife Biologist

Evin Stanford – Surveys and Research Biologist, Deer/Turkey/Wild Boar

Perry Sumner – Wildlife Diversity/Surveys and Research Programs Section Manager

Chris Turner – District 1 Wildlife Biologist

John Wooding, Ph.D. – Surveys and Research Biologist, Small Game

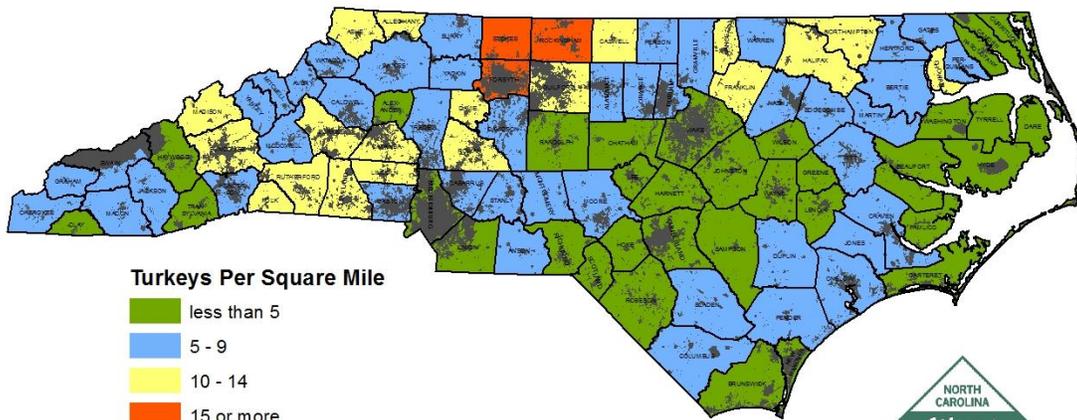
Literature Cited

- Downing, R.L., and D.C. Guynn, Jr. 1985. A generalized sustained yield table for white-tailed deer. In *Game harvest management*. S. L. Beasom, and S. F. Robeson (eds). Kingsville: Caesar Kleberg Wildlife Research Institute, Texas A&M University, Kingsville, p. 95.
- Gruver B.J., D.C. Guynn, Jr., and H.A. Jacobson. 1984. Simulated effects of harvest strategy on reproduction in white-tailed deer. *Journal of Wildlife Management* 48:535-541.
- Hayne, D.W. and J.V. Gwynn. 1977. Percentage does in total kill as a harvest strategy. Pages 117-123 in Proc. joint northeast-southeast deer study group meeting. Held at Fork Pickett, Blackstone, Va.
- Keyser, P.D. 2001. Assessment of density-dependent responses in white-tailed deer population management. Ph.D. Dissertation, Clemson University, South Carolina. 76pp.
- Keyser, P.D., D.C. Guynn, Jr., W.M. Knox, K.E. Kammermeyer, and J.M. Crum. 2006. Response of adult sex ratios to simulated harvest strategies in white-tailed deer. *Wildlife Society Bulletin* 34:1273-1279.
- Rosenberry, C.S., R.A. Lancia, and M.C. Conner. 1999. Population effects of white-tailed deer dispersal. *Wildlife Society Bulletin* 27:858-864.
- Strickland, B.K., S. Demarais, L.E. Castle, J.W. Lipe, W.H. Lunceford, H.A. Jacobson, d. Frels, and K.V. Miller. 2001. Effects of selective-harvest strategies on white-tailed deer antler size. *Wildlife Society Bulletin* 29:509-520.
- Weber, A.J. 1966. Regional differences in fawning times of North Carolina deer. *Journal of Wildlife Management* 30:843-845.
- Williams, E.S., M.W. Miller, T.J. Kreeger, R.H. Kahn, and E.T. Thorne. 2002. Chronic wasting disease of deer and elk: A review with recommendations for management. *Journal of Wildlife Management* 66:551-563.

Appendix VIII

2015 Wild Turkey Density Map

2015 North Carolina Wild Turkey Density Map



No Density Estimate

Where harvest data are not available to produce density estimates because hunting is limited or prohibited: includes federal and state parks, municipal boundaries, water bodies, and human density greater than 1 person per 2 acres.



Wildlife Management Division

Appendix IX

Turkey Hunter Observation Survey



2011-12 «Item_Name» (Item # «Item_Number») Survey

The North Carolina Wildlife Resources Commission requests that you complete this 2-page survey (front/back) and return it using the enclosed postage-paid envelope or submit your response online at www.ncwildlife.org. This survey provides an opportunity for you to let us know about hunting experiences you may or may not have had using the «Item_Name» permit. Your responses are used by the Commission to better manage and improve the quality of permit hunts. **We ask that you respond even if you did not hunt using this permit.**

«CustomerID»
 «First_Name» «Middle_Name» «Last_Name» «Suffix»
 «Address_1»
 «Address_2»
 «City», «State» «Zip» «Zip4»

Permit Number: «PermitID»

**Submit your response online at
www.ncwildlife.org**

1. Did you hunt during at least one day using the «Item_Name» permit?

Yes

No Indicate the reason(s) you did not hunt and return the survey in the postage-paid envelope:

all that apply

- Not enough turkeys or turkey sign
- Weather was poor for turkey hunting
- My hunting partner(s) could not go
- I had no more turkey tags left or was saving my last turkey tag
- I hunted somewhere else during the day(s) I had a permit for
- I could not afford to make the trip(s)
- Work or family obligations or health problems
- Other (please specify): _____

2. Please indicate which hunt(s) listed below you hunted using the permit. List the number of days and total number of hours hunted. **(Check the box if you did not hunt during a particular hunt choice date)**

| Hunt Choice and Date | Number of Days Hunted | Total Number of Hours Hunted | Did Not Hunt |
|----------------------|-----------------------|------------------------------|--------------------------|
| «HuntChoice_1» | | | <input type="checkbox"/> |
| «HuntChoice_2» | | | <input type="checkbox"/> |

3. Please indicate the number of turkeys you *personally* harvested using the permit during the hunt(s) listed below. **(Check the box if you did not harvest any turkeys during a particular hunt choice date)**

| Hunt Choice and Date | Number of Turkeys Harvested | | Did Not Harvest any Turkeys |
|----------------------|-----------------------------|---------------------------|-----------------------------|
| | Beard less than 7 inches | Beard 7 inches or greater | |
| «HuntChoice_1» | | | <input type="checkbox"/> |
| «HuntChoice_2» | | | <input type="checkbox"/> |

CONTINUE ON REVERSE SIDE →

Permit Number: «PermitID»

4. Please indicate the number of gobblers you heard using the permit during the hunt(s) listed below. **(Check the box if you did not hunt during a particular hunt choice date)**

| Hunt Choice and Date | Number of Gobblers Heard | Did Not Hunt |
|----------------------|--------------------------|--------------------------|
| «HuntChoice_1» | | <input type="checkbox"/> |
| «HuntChoice_2» | | <input type="checkbox"/> |

5. Overall, how dissatisfied or satisfied were you with your hunt(s) using this permit? (**one**)

Very Dissatisfied Very Satisfied

←—————→

1 2 3 4 5

6. Which of the following were important in determining how dissatisfied or satisfied you were with your hunts using this permit? (**all that apply**)

- Accessibility of hunting area
- Quality of turkey habitat
- Number of turkeys seen or heard
- Whether or not I harvested a turkey(s)
- Weather
- Behavior or courtesy of other hunters
- Other (please specify): _____

7. Do you think the number of other hunters during your hunt(s) using the permit was.... (**one for each hunt choice date listed**)

| Hunt Choice and Date | Number of Other Hunters | | | |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Too Few | Just Enough | Too Many | Did Not Hunt |
| «HuntChoice_1» | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| «HuntChoice_2» | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8. How far did you travel (one way) for a hunt using the permit? (**one**)

- 0 to 60 miles
- 61 to 120 miles
- 121 to 180 miles
- More than 180 miles

If you have any questions regarding this survey, please call us at (888) 248-6834. Thank you for your time and support of our wildlife programs.

STAY INFORMED....
Start receiving e-mails regarding permit hunting opportunities, application and survey reminders, draw status information, and N.C. Wildlife Update.
Sign up at www.ncwildlife.org/enews or give us your e-mail address (print neatly): _____

Appendix X

Game Land Use and Evaluation Procedure

EXHIBIT 1

APPROPRIATE USE DETERMINATION

Property Name: _____

Requested or Considered Use: _____

| DECISION CRITERIA | YES | NO |
|---|-----|----|
| A. Is the use a natural resource-dependent recreational use of a property? | | |
| If 'NO' above, then consider the following criteria. | | |
| B. Does the NCWRC have jurisdiction over the use? | | |
| C. Does the use comply with laws and regulations (federal, state or local)? | | |
| D. Is the use consistent with state or NCWRC policies? | | |
| E. Is the use consistent with public safety? | | |
| F. If the use was evaluated under previous administrative review and deemed inappropriate, have circumstances changed that would now make the use appropriate? <i>(leave blank if not applicable)</i> | | |

To be found appropriate, answers to Criterion A **OR** Criteria B – E (and F, if applicable) must be YES.

Determination (check one below):

_____ Appropriate

_____ Not Appropriate

Comments:

Property Manager: _____

Date: _____

Regional Supervisor: _____

Date: _____

EXHIBIT 2

COMPATIBILITY DETERMINATION

(Use as much space as needed)

Property Name: _____

Requested or Considered Use: _____

| DECISION CRITERIA | YES | NO | Comments |
|---|-----|----|----------|
| A. Use will not interfere with or detract from fulfillment of NCWRC management objectives? | | | |
| B. Use is compatible with the physical and natural resource characteristics of the property? | | | |
| C. Use is compatible with Natural Heritage Articles of Dedication and/or any deed restrictions or other legal limitations placed upon the property? | | | |
| D. Infrastructure is present on the property to support the requested use? | | | |
| E. Requested activity is not adequately provided for on other nearby public lands? | | | |
| F. Use is manageable within available budget & staff? | | | |
| G. Will the use be manageable in the future within existing resources? | | | |
| H. Is the requesting entity capable of providing any maintenance support for the activity, if applicable? | | | |
| I. If the use is not compatible as initially proposed, can it be modified with stipulations that avoid or minimize potential adverse impacts and make the use compatible? | | | |
| Other <i>(insert)</i> : | | | |

To be found compatible, answers to ALL of the above questions must be YES.

Determination (Check one below):

_____ Compatible _____ Not Compatible

Stipulations necessary to ensure compatibility (e.g., *Memorandum of Agreement; performance bond; time, space, or size limitations*):

Justification/Comments:

Property Manager: _____

Date: _____

Regional Supervisor: _____

Date: _____

Appendix XI

Phase I and II Land Acquisition Investigation Forms

North Carolina Wildlife Resources Commission Land Acquisition Investigation Form

-PHASE I: INITIAL INVESTIGATION-

WRC Staff Contact:

Date First Presented to WRC:

Tract Name:

Acreage:

County:

Estimated Value:

Property Owner or Representative:

Phone:

Address:

Status: High Interest Moderate Interest Low Interest No Interest

Grant Potential: NHTF CWMTF

OTHER (explain):

Resources Assessment and Biological Benefits (brief):

Additional Comments:

Program Potential: Game Land Wildlife Conservation Area Fishing Access Area
 None

Potential Source(s) of Stewardship Funds (indicate federal:state match rates):

Relative Priority Evaluation Score (attach worksheet):

Recommendation: Pursue Acquisition Defer Do not Pursue Acquisition

Map Attached: Yes No

**North Carolina Wildlife Resources Commission
Land Acquisition Investigation Form**

-PHASE II: FINAL ACQUISITION DETAILS-

WRC Action/Approval to Pursue (Date):

Acquisition Plan (specify total project cost, each source, and amount of OBLIGATED funds):

Based on Appraisal: Yes No

If Yes, Name of Appraiser:

Date of Appraisal:

Appraisal Handled by State Property Office: Yes No

Acquisition Plan Includes Bargain Sale: Yes No

If Yes, Explain Details:

Source(s) of Stewardship Funds (indicate federal:state match rates):

Five Year Stewardship Costs & Revenue Projection Evaluation (attach worksheet)

Five Year Estimate of Total Stewardship Expenditures: \$:

Five Year Estimate of Total Projected Revenue: \$:

Additional Comments:

Appendix XII

Public Comment Received

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

| Comments Received |
|--|
| I do not see any evidence of habitat improvement efforts from the access roads. Much of this game land is pocosin which is very poor game habitat. |
| Upland Game |
| All |
| Quail/Woodcock cover |

Question 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?

| Comments Received |
|---|
| quail |
| Most abundant species seem to be deer and turkey. Habitat improvement for turkey would probably impact a number of other species as well. |
| Waterfowl, Otters, Have seen a bald eagle on the game land. Ospreys, Turkey, Cypress Trees. |
| Quail/woodcock |
| Waterfowl, deer, quail, woodcock |

Question 3: How do you use this game land?

| Comments Received |
|---|
| I hunt on adjoining land and occasionally hunt over on the game land. |
| Train dogs |
| Hunt, fish, kayak, trap, camp |
| Waterfowl hunting, fishing. |

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

| Comments Received |
|--|
| Current level of access is satisfactory in order to keep it from being over pressured. Target shooting and other undesirable activities are already present and would be harder to control with additional access. |
| Satisfactory, BAA great, create kayak access near turkey quarter creek |
| Much improved since signage was improved |

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

| Comments Received |
|--|
| Practice timber management and create more productive habitat. |

Consider changing to 2 day per week waterfowl hunting. Tues, Saturday, holidays, Opening and closing days of season. The area is getting too much waterfowl hunting pressure since it is listed as a 6 day hunting area. This would make Croatan and Neuse River GL have the same enforcement rules for waterfowl.

Look at the model of Tall Timbers in the Red Hills of Georgia and Florida and seriously burn open up and yes plant some good food for Quail in all game lands in the eastern part of the state. There are Deer everywhere on public and private land and I want to see a renewed emphasis on Quail in this state. Seems the initial management is started but not continued.

Do not log Turkey Quarter Creek Islands.

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

| Comments Received |
|--------------------------|
|--------------------------|

| |
|------------|
| More game. |
|------------|

| |
|-----------------------------|
| Like the access and signage |
|-----------------------------|

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

| Comments Received |
|--------------------------|
|--------------------------|

| |
|---|
| With some habitat management this land could be an excellent game land. |
|---|

| |
|---|
| Create a primitive campsite on islands to facilitate kayakers |
|---|

